Local food and climate change

The role of community food enterprises

A publication commissioned by Making Local Food Work
Local food matters. It can have wide-ranging benefits for local economy, community regeneration, health and the environment. Community Enterprise puts people in control of meeting their own needs. Combine the two and you have a recipe for thriving local communities. This belief underpins the Making Local Food Work Programme.

Peter Couchman - Chief Executive
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Community food enterprises are rising in importance as more and more communities decide to take an active role in growing, creating, processing, distributing and retailing the food they consume.

Some policy formers are recognising their role, but not in the area of climate change. Why? Many of these communities will identify with the grassroots groundswell of wanting to take individual and community action to tackle climate change. Yet, their contribution is often dismissed as being irrelevant.

Some will see this as the result of powerful vested interests only researching the solutions offered by the status quo of the mainstream food industry. But it goes further than that. It is also about the community food enterprises recognising when they have a contribution to make and what has to change to make that contribution stronger.

Making Local Food Work, an initiative funded by the Big Lottery Fund to explore community enterprise approaches to connecting land and people through food, has decided to tackle these challenges head on by commissioning this report. It is not designed to be pleasant reading.

Policy formers will find that they have failed to engage with a sector that can make a major contribution to tackling climate change, both through its own actions and by its ability to create real behaviour change at the community level.

Community food enterprises will find that, for all the great work already happening, there is so much more that they can do as well. It will help them to see when they can make claims that they are performing better than mainstream food industry.

This report is designed to challenge us all to realise that there is no one simple solution to food and climate change, but there are steps that, by supporting and being engaged with community food enterprises, we can all take.

Peter Couchman
Director, Making Local Food Work
Summary

Food accounts for at least a fifth of UK greenhouse gas emissions and the sector faces the daunting challenge of reducing emissions by more than two thirds within the next forty years. Until recently, the focus of public and political debate around the contribution food makes to climate change was on transport. This saw local food become closely associated with tackling climate change and other environmental problems. A succession of life cycle assessments and scientific reviews over the past decade have highlighted that other factors besides transport, such as the use of energy intensive farm inputs or even cooking in the home, make a bigger overall difference to climate change.

Where does this leave community food enterprises, the grassroots local food initiatives that are the focus of this report? Most were set up for other reasons – social, economic and environmental – rather than to tackle climate change. They are hugely diverse, spanning community supported agriculture schemes, community shops, farmers’ markets, food co-ops and buying groups. Many have something distinctively local about them – such as shorter supply chains – but none is defined just by that fact. Little of the research on climate change and local food, which mostly looks at the effect of shorter-distance transport on more conventional supply chains, can offer them direct guidance.

This report forms part of an exploratory study commissioned by Making Local Food Work to understand better the role of local and community food enterprises in addressing global environmental issues, focusing on greenhouse gas emissions and how we adapt to a changing climate. It is about making practical sense of the opportunities and challenges facing community food enterprises when it comes to climate change, answering:

- What can be done in practice to reduce their contribution to climate change?
- What needs to be done in order to claim with any confidence, for example to customers, that a community food enterprise is helping to tackle climate change?

For policy makers, we want the report to answer:

- What policy measures could help community food enterprises decarbonise and flourish in a low-carbon food system?

We find distinctive opportunities for community food enterprises to reduce greenhouse gas emissions in every part of the food chain, including transport. The lowest impact community food enterprises appear to be ultra-low-carbon, as well as providing social and economic benefits. A key challenge is to ensure that reducing the impact on climate change in one part of the chain does not result in a higher impact elsewhere in the chain, cancelling out the intended benefit.
Our recommendations for community food enterprises include:

- In production: reducing greenhouse gas-intensive inputs such as nitrogen fertiliser and animal feed from off-site.
- In marketing: support for customers to reduce emissions by providing advice on cutting food waste (for example using leftovers), cooking efficiently (for example putting lids on pans) and ways of saving energy in the home.
- In retail: increasing transport efficiency through collaboration, home delivery or using low-carbon fuels, and source electricity from a green energy supplier.
- Overall: spelling out a clear vision of where a community food enterprise fits in a low-carbon world, setting performance targets and monitoring progress.

Community food enterprises are highly diverse and offer social and economic benefits irrespective of their contribution to tackling climate change. Instead of asking whether local food is good or bad for the climate in general, policy makers should therefore focus on supporting community food enterprises in addressing the distinctive challenges and opportunities they present in contributing to a low-carbon food system. Some particularly important areas to tackle include:

- Providing a supportive policy environment to help community food enterprises to make the best of their distinctive opportunities to reduce greenhouse gas emissions while providing social and economic benefits.
- Enabling community food enterprises to plan and co-ordinate together in order to improve their efficiency, for example in creating regional hubs for food transport.
- Providing support and advice ensure that small and medium enterprises can access technology that can reduce emissions.

A key challenge is to ensure that reducing the impact on climate change in one part of the chain does not result in a higher impact elsewhere in the chain, cancelling out the intended benefit.
1 Introduction

Changing how and what we eat is crucial to tackling climate change. This report is about making practical sense of the opportunities and challenges facing community food enterprises when it comes to climate change.

1.1 Why climate change and local food?

Changing how and what we eat is crucial to tackling climate change. Until recently, the focus of public and policy debate about the climate change impact of food was on transport. ‘Food miles’ – a term coined to highlight the wider environmental and social issues arising from globalised food supply systems – came to be used as a shorthand for the climate change impact of food. This saw local food become closely associated with tackling climate change and other environmental problems. In a 2006 survey, for example, a quarter of respondents identified environmental concerns as a reason to buy local food.

Yet, no sooner had local food been swallowed up by the debate over climate change, than it was spat back out again. A succession of scientific studies over the past decade has shown that ‘food miles’ are not a useful shorthand for the contribution that different foods make to climate change. Other factors besides transport, such as the use of energy-intensive fertilisers or even cooking in the home, make a bigger overall difference.

So where does this leave community food enterprises, the grassroots local food initiatives that are the focus of this report? Most were set up for social and economic reasons, rather than to tackle climate change, and can demonstrate clear benefits on those counts. They are hugely diverse, spanning community supported agriculture schemes, community shops, farmers’ markets, food co-ops and buying groups. They include ways of growing, making, distributing and selling food that are utterly different from the supply chains that account for the other 95-99% of the market, not just scaled down versions of the same. Many have something distinctively local about them – such as shorter supply chains – but none is defined just by that fact. Little of the research on climate change and local food, which mostly looks at the effect of shorter-distance transport on more conventional supply chains, can offer them direct guidance.

In policy, meanwhile, the distinctive challenges and opportunities that community food enterprises face in tackling climate change deserve to be better understood. The challenges include helping community food enterprises, which as a sector can demonstrate many social and economic benefits, make efficient use of natural resources without being able to achieve the economies of scale available to larger operations. Conversely, the lowest-impact community food enterprises release next to no greenhouse gas emissions from transport and thereby offer the prospect of ultra-low-carbon food if they can match that performance right along the supply chain. The opportunity lies in supporting community enterprises to make good on this unique potential, while recognising that a low-carbon future will include a mix of local, regional and global supply chains.

1.2 Our aim

This report is about making practical sense of the opportunities and challenges facing community food enterprises when it comes to climate change. For people working in this sector, the report aims to answer:

- What can we do in practice to reduce our contribution to climate change?
- What do I need to be doing in order to claim with any confidence, for example to customers, that my work is helping to tackle climate change?
For policy makers, the report answers:

- **What policy measures could help community food enterprises decarbonise and flourish in a low-carbon food system?**

It should also be clear what this report is not. It does not try to pin down whether local food is generally better or worse for the climate — that’s a wild goose chase, given how diverse the sector is. It also gives a wide berth to debate about whether features common to many community food enterprises — such as face-to-face relationships with customers or higher incidence of more sustainable farming practices — are caused by their ‘localness’ or merely associated it. For people and policy makers trying to make the best of such approaches in practice, the association matters.

### 1.3 What we did

This report forms part of an exploratory study commissioned by Making Local Food Work to understand better the role of local and community food enterprises in addressing global environmental issues. The project focused specifically on climate change. Other outputs from the project besides this report included a process of engagement with the management team, project officers and key community partners in the Making Local Food Work programme.

The report is based on a short literature review, semi-structured interviews, a discussion day and a small survey. The literature review focused on research relating to climate change, local food and community food enterprises. The interviews were held with a diversity of practitioners engaged in a variety of community food enterprises, many of whom have support from Making Local Food Work including village shops, community supported agriculture and farmers markets (see Annex 1). The discussion day involved 16 practitioners and Making Local Food Work staff engaged in working on or supporting community food enterprises (see Annex 3). The survey was distributed to 283 Making Local Food Work practitioners and resulted in 37 responses (see Annex 2).

The literature that was reviewed included studies of climate change and food systems in general, studies of how community food enterprises work in practice and studies focused specifically on the environmental impact of local food supply chains. A large number of studies now exist that consider the climate change impact of different activities involved in producing and consuming different foods. These try to analyse activity right along the food chain using an approach called life cycle assessment. In reviewing the literature, evidence was captured relevant to eight main stages of food production and consumption, namely: agricultural input supply, farm management, processing, storage and packaging, distribution, shopping, consumption and waste. Relevant evidence was also noted on how community food systems might help adapt to a changing climate.

This remainder of this report is split into the following sections:

- Section two explains why climate change matters, the links with food, and how community food enterprises fit in. A key point here is that trying to reduce the impact in one part of the system can simply displace problems to other parts. In order to reduce the overall contribution to climate change, the knock-on effects need to be tackled as well.

- Sections three to seven explore the main ways that different parts of the food chain contribute to climate change. Each section examines how changes in one part of the chain can affect other parts and describes practical measures that people working in community food enterprises are taking to address those challenges. The impact along the whole food chain is considered, starting with food transport. To make this easier to digest, some of the eight areas covered in the literature review are grouped together (e.g. distribution and shopping).

- Section eight provides an overview of how community food enterprises can reduce their own and their customers’ contributions to climate change.

- Section nine discusses how community food enterprises can help us adapt to a changing climate.

- Section ten summarises recommendations for people working in community food enterprises and for policy makers.
Climate change and food

The world is warming and the rise in temperature is strongly linked to human activity. Food is a hugely important part of this story. The production and consumption of food in the UK is estimated to account for almost one fifth of our greenhouse gas emissions.

2.1 Why climate change is an issue

Climate change poses a very serious threat to humanity. Over the last twenty years, scientists have accumulated a vast body of research demonstrating that the world is warming and that the rise in temperature is very strongly linked to human activity. These changes are occurring as a result of greenhouse gases – most prominently carbon dioxide, but also more powerful gases like methane and nitrous oxides – which are being released into the atmosphere as a result of burning fossil fuels, deforestation and agriculture.

So far, the world has warmed by close to one degree Celsius since pre-industrial times and more warming is inevitable as a result of the gases which have already accumulated in the atmosphere. Scientists and politicians have agreed that we need to limit warming to two degrees above pre-industrial levels in order to avoid the worst effects. This would mean dramatically reducing the greenhouse gases we release into the atmosphere over the next five to ten years. Research shows that, if we continue on our current (‘business as usual’) trajectory, four to seven degrees of warming are possible this century. For comparison, during the last glacial age temperatures were at their minimum five or six degrees cooler than they are now. The impacts on humanity of this kind of temperature rise are difficult to imagine.

Even under more optimistic scenarios, where the world takes action over the next few years, some impacts from climate change cannot be avoided. Although poorer countries are likely to suffer more, the rich world is not immune. Major droughts could be seen, for example, in the Mediterranean, Australia and North America, as a result of a two degrees temperature rise. Movements of displaced people and disruption to food supply chains could also have huge impacts around the world. It is important therefore not only that emissions of greenhouse gases are urgently reduced, but that the world adapts to the changes to come.

2.2 Where food fits in

Until recently, most of the policy debate around climate change has focused on the need to reduce carbon dioxide emissions from burning fossil fuels for energy or transport. This fails, however, to recognise the significant greenhouse gas emissions worldwide which come from other sources, including deforestation, agriculture and waste.

The global food system is a hugely important part of this story. Emissions from the production and consumption
of food come not only from its transport, but from the conversion of land for farming, the process of farming itself, the energy used in food processing and retail, and from food waste. Agriculture is a major source of methane, which is 23 times more powerful than carbon dioxide at warming the atmosphere, and nitrous oxide, which is 296 times more powerful. The Intergovernmental Panel on Climate Change estimates that agriculture is responsible for 13.5% of emissions worldwide. If the connection between deforestation and agriculture is taken into account, farming’s contribution to causing climate change rises considerably. In Latin America, for example, about 70% of previously forested land in the Amazon is used as pasture, and feed crops cover a large part of the reminder. Deforestation is responsible for just under 18% of emissions around the world.

The production and consumption of food in the UK is estimated to account for almost a fifth of our overall greenhouse gas emissions. Figure 1 shows a breakdown of these emissions. These figures do not take into account emissions from soil and the potential to lock carbon up through good soil management. Nor do they include emissions associated with land use change, including deforestation outside the UK connected to rearing or raising crops to feed animals and produce meat for global markets. If an appropriate share of these global emissions from land use change is attributed the UK, the figure rises to 30%.

Figure 1: Food and its contribution to UK greenhouse gas emissions (by consumption, excluding land use)
2.3 Assessing greenhouse gas emissions in the food chain

Life cycle assessment has been a key tool in assessing the impact of food on climate change. It takes account of the impact at all stages of the supply chain, from agricultural production (and its associated inputs) through to processing, packing, transport, retailing, home storage and preparation, and final disposal.

Life cycle studies have shown that ‘food miles’ are not a simple shorthand for greenhouse emissions. They highlight that other factors besides transport, such as the use of energy intensive farm inputs or even the energy used in cooking the product at home, very often make a bigger overall difference to climate change. Overall, what you eat is more important to the climate than where your food has come from. These studies also highlight important trade-offs – how reducing the impact on climate change in one part of the chain can cause the impact to rise elsewhere in the chain, cancelling out the intended benefit. For instance, refrigeration can reduce emissions from food waste but increases emissions from the use of electricity.18

There are many such examples and they mean that, whether you are referring to a supermarket or a vegetable box scheme, it is not possible to say an operation is low-carbon just because it is doing well on a single issue, like reduced food miles or greener farming methods, without checking up on the consequences elsewhere. The research also shows what a wide variation there can be from superficially similar systems, caused for example by variations in the distance farmers or processors travel to deposit their products, the volume of food transported per trip, transport mode used and the efficiency of storage facilities.19 These very wide ranges demonstrate the considerable potential for emissions reductions from adopting new or slightly different practices and show that emissions ‘hotspots’ vary from food to food and even from farm to farm.

2.4 The policy framework and the challenge

In 2007, the UK introduced the world’s first Climate Change Act, setting a binding target to reduce emissions by 80% by 2050. Whilst a very significant step forward, this overall ambition has not so far been reflected in binding targets or a clear policy framework for reducing emissions from the food sector.20 Overall, UK and European Union food and farming policy does not reflect the need for rapid and transformative change in order to reduce emissions to the same extent of policy in other areas, like energy supply, and it takes no account at all of emerging concern over land use change. In 2007, the Food Council Research Network called for the government to respond by committing to a reduction of 70% or more in absolute food-related emissions by 2050.21 This is poses an enormous challenge, which will require technological, social and behavioural change, and which the food sector is only beginning to tackle. It is likely that all the tools in the box will be needed, including global, regional and local sourcing.

The question for this report is what role community food enterprises can play in achieving that 70% reduction and how this can best be achieved, both by people involved in community food enterprises taking action to reduce their emissions, and by policy makers facilitating this action. The following sections examine this question by looking at five key stages in the food chain in turn.
Food transport and shopping

Transport of food is responsible for about 12% of the UK’s food-related greenhouse gas emissions. Cutting down on food miles can help reduce this, but probably most effective in terms of reducing greenhouse gas emissions are:

- helping customers to be able to walk, cycle or use public transport to buy food, or to provide efficient deliveries, such as to people’s homes or in bulk to a drop-off point or food co-op
- using renewable fuels (e.g. green electricity for an electric vehicle, or recycled cooking oil)
- making efficient use of journeys such as through co-operation and using return journeys for other deliveries

3.1 The problem

Food transport accounts for an estimated 12% of all greenhouse gases associated with UK food consumption, compared with the 40% associated with agriculture. Overall, transport comes second to agriculture as a contributor to climate change, and is equivalent to food manufacturing as a source of greenhouse gases.

For some foods, transport – particularly international transport – can be a major hotspot. These include field-grown vegetables (e.g. potatoes and carrots), top fruit (e.g. apples) and other fresh produce that has a low production footprint. One study found, for example, that air-freighted green beans from Kenya were at least 20 times more greenhouse gas-intensive than beans grown in-season in the UK. At the other end of the scale, the emissions from producing meat and dairy are generally so large that transport tends to account for a relatively small part of their carbon footprint. Similarly for bulk products such as sugar, transported by ship, the effect of distance is negligible compared with other factors.

When it comes to road freight, how close food is produced to its point of consumption is also far from the only factor affecting the emissions associated with transporting it. Route planning, loading, the timing of deliveries compared with traffic and vehicle efficiency are all factors in road freight emissions. The global warming potential of a van is estimated to be seven times higher per tonne-kilometre than a 32 tonne truck.

While much of the concern over emissions from food transport has focused on distribution in the supply chain, the environmental impacts of shopping by car are estimated to be greater, except possibly when food is air-freighted. This is because cars are a fuel-inefficient means of transporting goods compared with ships, trains, trucks or vans. Travel for food and other household items accounts for 5% of all car use or over 16 billion vehicle kilometres per year, rising by 9% annually. Most people drive to the supermarket in spite of having a store within walking distance.

3.2 Opportunities and challenges

3.2.1 Scale efficiencies

As explained above, reducing emissions from transport is not just about reducing the distance that food travels between the supplier and the retailer. Several studies have indicated that local food suppliers may inadvertently cause increases in transport emissions by...
using less efficient modes of distribution, or by causing shoppers to travel further.\textsuperscript{32} As a rule, fleets of large, up-to-date, centrally co-ordinated trucks that are responsible for long-distance road-freight between supermarkets and their distribution centres are many times more efficient than the vans and small lorries commonly associated with community food enterprises. This is therefore an important area for community food enterprises to tackle. Empirical research for the Department of Environment, Food and Rural Affairs has found that, “transport efficiency on a par with national supply chains can be achieved by local operators through effective collaboration with independent third-party logistics providers that are able to operate efficient businesses based solely on local collaboration, where loads are collectively organised and efficient route design is made possible”.\textsuperscript{33}

The small scale of community food enterprises has also enabled some experiments in using renewable fuels that are more radical than most initiatives by large food and logistics businesses. For example, Lowhub is a London-based wholesale food delivery service that uses vehicles powered by electricity and recycled cooking oil.\textsuperscript{34}

3.2.2 Shopping trips

It is no use reducing emissions associated with transporting food from the farm to retail, only for the good work to be undone by longer or more frequent shopping trips by car. In an extreme case imagined by one researcher, a consumer driving 15 km by car specifically to purchase one kilogram of food would use an amount of energy ranging from four times (for Gouda cheese in the local system) up to 153 times (for potatoes in the mainstream system) the amount of the energy already consumed in getting the food from the farm to the point of retail.\textsuperscript{35}

While there are local food shops and markets in towns and cities to which a high proportion of customers may walk – just as they might walk to a convenience outlet of one of the major multiples – community food enterprises also include farm shops, usually located in rural areas, that can generate a significant amount of car travel. One detailed case study of a farm selling homemade sausages found that the total transport after processing for sausages sold through its farm shop was about 11 times as carbon-intensive as for those it sold through a multiple retailer.\textsuperscript{36}

The main way in which car shopping can be reduced, besides by walking or taking public transport, is through home delivery. A number of studies suggest that home delivery may well result in lower greenhouse gases than shopping, as long as it actually displaces shopping trips rather than supplementing them.\textsuperscript{37} Although the major supermarkets also now operate delivery services, they have long been the local food sector, ranging from the relatively large-scale, such as Riverford, to small producer box schemes. A study comparing a large scale organic box scheme with a hypothetical farm shop estimated that the scheme would be more carbon-efficient for any consumers who would have to travel more than 7.4km in order to reach the shop.\textsuperscript{38} Where home delivery entails a single weekly drop-off, such as a vegetable box, total emissions reductions may depend on changes in consumption: to avoid food waste, more perishable foods may need to be eaten first.

3.2.3 Impacts of year-round production

Savings from reducing transport emissions to the point of sale can also be undone by higher emissions from production, or from storage, packaging and processing of food products. For fruit and vegetables, the main issue is out-of-season production.\textsuperscript{39} In the winter, for example, emissions associated with glasshouse production may mean that it is less greenhouse gas-intensive to truck fruit and vegetables from Spain than to produce them in the UK. Similarly, emissions associated with storing apples for many months or freezing broccoli, for example, more than make up for the transport emissions saved by not bringing them from New Zealand and Spain respectively.\textsuperscript{40}

Given that many people in the UK now expect most foods to be available throughout the year, the challenge facing community food enterprises is to get their customers used to seasonal variation. This is an issue that directly confronts efforts to reduce greenhouse gas intensive inputs in farming and horticulture, which we consider more fully in section 4.2.
3.3 Getting practical

In extreme examples, distribution-related emissions in community food enterprises can be very low. A farm shop selling vegetables grown on-site has minimal emissions from distribution, however inefficient its vans might be. The issue is how far extra people travel to shop there – a lay-by stall that catches commuter traffic, a farm near a village where customers travel by foot or a farm with facilities that displace other leisure travel might all be examples where the extra distance people travel to shop is minimal.

One opportunity that warrants further attention is to consolidate deliveries to small scale local outlets. Sustain’s Eat Somerset project started to explore some of the complex issues around local distribution and focused directly on work with the mainstream retail sector, aiming to increase the amount of local produce sold by neighbourhood stores. They worked with symbol groups, independent stores, wholesalers, and a wide range of producers. Detailed descriptions online of their painstaking work, successes and challenges reveal the complexities of trying to get local food into the marketplace efficiently.41

Making Local Food Work is looking at tackling the barriers which prevent community food enterprises from collaborating on sourcing in spite of real commitment to work together efficiently. The programme is working with a number of shops on local sourcing but most of these are too far apart to collaborate. They are running a wider pilot in Nottinghamshire with a larger group of shops sited close together. A big obstacle is that small suppliers rarely see the long term benefits of collaboration, while small shops see each other as competitors.

Many community food enterprises use low-carbon fuels. For example Growing Communities, a social enterprise run by local people in Hackney, East London, uses an electric vehicle (see photo below) to get produce to its three distribution centres. Another initiative reported in our survey that “half of our local deliveries are made in a milk float that is recharged using solar power” and others that they were using biodiesel (see Annex 2).

Some community food enterprises are surveying and actively seeking to reduce shopping miles. Growing Communities has surveyed shoppers at its Stoke Newington Farmers’ Market and found 92% walking, cycling or taking public transport to get to the market, despite only 66% coming from the same postcode area. Tunbridge Wells Farmers’ Market surveyed how far their shoppers travelled and found that 62% of customers travel from within 2 miles and 79% from within 10 miles.42
Farming

Farming represents the largest source of greenhouse gas emissions in the food system, particularly methane and nitrous oxides, which have a powerful effect on climate change. Community food enterprises can help to reduce these emissions by providing custom for farmers who are taking steps to reduce their emissions.

4.1 The problem

Greenhouse gas emissions from agriculture arise both from the process of farming itself and from the production of ‘inputs’ such as fertilisers, fuel for machinery, energy for heating and materials, and animal feed. Animal feed is a special case because it is an input to some livestock farming but the greenhouse gases associated with producing it arise from other farm inputs and from land clearance outside the UK (see Box 1 below).

Box 1: Meat, dairy and land use change

Animal products account for just under a third of nutritional energy intake in the UK. However, their consumption is responsible for nearly twice that share of emissions – 58% of emissions from our consumption of food arise from meat and dairy. Around the world, the facts are equally startling. Livestock are estimated to account for 70% of agricultural land use worldwide (30% of the Earth’s land surface) and more than half of the greenhouse gas emissions attributable to agriculture.43

Many of these consequences arise because the creation of agricultural land drives land use change, which results in the release of emissions as soils are disturbed, vegetation destroyed and forests cut down. This change is connected to raising livestock either directly (livestock is raised on recently converted land), or indirectly as crops like soya are grown for animal feed and then imported into the European Union. In Latin America, for example, about 70% of previously forested land in the Amazon is used as pasture, and feed crops cover a large part of the reminder, with some of that animal feed destined for Europe.44 Deforestation is responsible for just under 18% of emissions around the world and the world’s growing appetite for meat and dairy is increasingly understood to be the single largest threat to the climate from the food system as a whole.

Apart from animal feed, the manufacture of nitrogen fertilisers is the most important source of emissions upstream of the farm.46 The process by which fertiliser is produced is both energy intensive (generating carbon dioxide) and leads to the production of the powerful greenhouse gas nitrous oxide.47 Manufacture of fertiliser alone accounts for around 1% of total greenhouse gas emissions in the UK.48 Nitrogen fertiliser is a particularly important factor for field-grown crops.

The soil itself can also range from a major source of emissions to absorbing carbon out of the atmosphere, depending on methods of husbandry.
Using chemical fertilisers and manures is one influence on this, contributing to nitrification and denitrification in the soil, emitting nitrous oxide. The loss of carbon stored in the soil can also be a source of emissions, and is affected by other factors such as methods of tillage and the type of ground cover. The Soil Association estimates that an additional 12% of the UK’s annual agricultural greenhouse gas emissions (not included in the official tally) are released from converting permanent grassland to arable land. While research has shown that soil emissions can be important and that some land uses, such as pasture, can lead to more carbon being stored in the soil, the range is poorly understood, poorly reflected in most life cycle assessment studies and highly variable from place to place and even day to day.

Mechanisation and grain drying can also be particularly important sources of emissions for arable farming. In UK glasshouse production, greenhouse gases associated with the direct use of electricity for heating and lighting may outweigh greenhouse gases from fertiliser production. In warmer countries such as Spain, where heating is not used, biomass and plastic waste can be the main source of emissions.

### 4.2 Opportunities and challenges

An enormously complex literature exists around the best ways to reduce emissions from farming. Box 2 lists some of the changes in farm inputs and husbandry which have been recommended by the international United Nations body of scientists working on climate change. Many of the recommendations are focused on the need to alter fertiliser use and seek substitutes for artificial nitrogen fertilisers.

Overall, organic and other low-input forms of agriculture generally result in substantially lower greenhouse gas emissions per unit area of land compared with conventional agriculture. Due to lower average yields for organic production in Europe, the reduction in greenhouse gas emissions per unit of product is generally smaller. This is particularly the case for animal products, with organic husbandry encouraging low stocking densities for animal welfare and wider environmental reasons besides climate change. It follows that efforts to cut greenhouse gas emissions through lower external input and more extensive farming practices such as organic should go hand-in-hand with efforts to reduce total consumption of livestock products.

Farming practices are closely intertwined with the use of external inputs. Conserving soil carbon not only reduces emissions from the soil but also conserves soil nutrients and reduces the need for fertilisers. Methods including conservation agriculture, organic farming, integrated nutrient management, cover cropping, agroforestry and the use of biochar have been shown to conserve soil carbon. The Soil Association estimates that organic farming produces 28% higher levels of soil carbon on average in Northern Europe and that widespread adoption of organic farming in the UK could offset at least 23% of UK agriculture’s greenhouse gas emissions. This looks fairly conservative against the United Nations Food and Agriculture Organisation’s estimate that global conversion to organic agriculture could mitigate 40-65% of agricultural greenhouse gases.
Seeking to reduce emissions from one farm input could increase emissions from others. For example, reducing mechanisation or chemical use in favour of more labour-intensive methods could see a rise in emissions from journeys to work unless measures were taken to plan travel efficiently.

Changing farm inputs may also have knock-on effects for greenhouse gas emissions associated with land and animal husbandry. Reducing the use of industrially produced nitrogen fertiliser may increase the use of manures and slurries. Even as by-products these have a greenhouse gas production footprint and also, like nitrogen fertilisers, increase nitrous oxide emissions from the soil.60 Conversely, carefully regulating feed intake can reduce emissions from ruminant digestion, but can lead to an increase in emissions from inputs as the feed used creates economic incentives for deforestation overseas.

Despite these trade offs, the high impact of internationally sourced farm inputs mean that localising farm inputs is potentially an important step in reducing emissions. A study comparing dairy farms – one conventional and one undergoing organic conversion – found that in both cases less than five percent of greenhouse gas emissions from farm inputs occurred locally.61 The authors recommended that farms derive more of their energy needs from close by (e.g. renewable or bioenergy), seek substitutes for inputs of artificial nitrogen fertilisers and reduce their dependence on imported feed.

Changing farming methods can potentially result in changes in the type, appearance, quality or timing of food produced. Reducing greenhouse gas-intensive farm inputs (for example eliminating the use of heating in glasshouses) is also likely to constrain what can be produced. It therefore brings the additional challenge of ensuring that customers are not lost, which would simply displace emissions to other producers. To succeed in this, a producer must find or promote a new market for seasonal fresh produce, thereby depending on changes in consumption (see Box 3 below). Community food enterprises have a potential advantage in their strong, face to face relationships with customers. These relationships can even extend to providing the financial support needed to make low-external input farming viable in an economy where the polluter does not currently pay.

In 2008, 27% of UK organic sales took place outside multiple retailers compared with 2.5% of the overall...
grocery market. This suggests that farmers who produce organic food are more likely to sell through independent retailers. By the same token, consumers shopping through outlets such as vegetable boxes, farmers’ markets or independent shops are more likely to buy organic produce than those shopping at multiple retailers.

4.3 Getting practical

There are cases of producers engaged in local food provision seeking to assess the emissions associated with their farming practices and to plan their future land use accordingly. For example, Chris Smaje of Vallis Veg in Somerset estimates that a nut orchard, agroforestry and pasture are amongst the land uses for his holding that would act to take more carbon from the atmosphere than would be produced through farming. Box 3 details the move, by one relatively large organic farm and retail operation, from national to local selling, and the greenhouse gas emissions and changes to production associated with this move to local retail.

The team planning an organic farm that will provide food for the Unicorn Grocery in Manchester are planning their cropping around both what will sell and what they can produce using green manures and green compost, avoiding livestock manures which could be a substantial source of emissions.

Growing Communities’ activities include a vegetable and fruit box scheme, an organic farmers market, urban market gardening and urban apprentice gardening. They have calculated that as a result of their project, 27 suppliers were able to ensure a sustained market for their produce in 2008 through the farmers market, supporting about 275 hectares of land in organic or organic conversion.

Canalside Community Supported Agriculture in Leamington Spa, Warwickshire hopes to grow 50% of the feed required for the animals they produce, thereby potentially reducing the emissions associated with land use change from feeds imported to the area.

Stroud Community Supported Agriculture in Gloucestershire incorporate cattle into their mixed farming system: “By keeping a herd of cattle it was now possible to maintain soil fertility and ensure good crops of vegetables could be grown without relying on external sources of manure and compost. The herd is maintained throughout the year on the farm’s own grass and hay.”

Community Supported Farming, in South Devon, has enabled farm land to be converted from conventional to lower-input farming methods. David Barker of Barker Organics says “If the support group had not been formed, quite honestly we would not be in business now!”

Box 3: From national to local

Peter Segger is a fresh producer of long standing based in Wales, who has gone a full circle: starting off supplying a large range of items to mostly local outlets; then supplying very few items in large quantities to supermarkets; then supplying to large scale, mostly English, box scheme operators; and now following a deliberate policy to supply everything in local outlets. This latest change has reduced emissions in distribution but increased emissions from customers as more visit his local shop. The operation produces over 50 fresh produce lines and processes seasonal surpluses into preserves.

They have sought to carbon footprint their products and operations in detail, including measuring soil carbon levels over the decades. Peter argues that to succeed as a business they must maximize the amount that each customer spends in all the markets, which means extending their seasons and extend their range within a low-carbon framework. So now they have, all year round, potatoes, carrots, tomatoes (in one form or another), beetroot, garlic, spinach, salads, cabbages, and more minor crops. This is all grown without heating or lighting. This means customers do not have to buy Spanish or flown-in crops much over the winter or at all during the rest of the year. The business does not buy products in. By localising, they have extended their seasons, extended their range and reduced greenhouse gas emissions from imports, while maintaining a zero or net negative carbon balance here at home.
5 Manufacturing and retail

Community food enterprises can take action to reduce the emissions from manufacturing and retail activities by using energy more efficiently and by buying electricity from renewable sources. A focus on fresh and less processed foods, with short supply chains, can reduce dependence on energy-intensive storage and refrigeration, but needs to be achieved without compromising on food safety. Reducing packaging is also important, and often a strong motivating factor for consumers and enterprises interested in the environment.

5.1 The problem

Processing, packaging and storage, particularly refrigeration, are the main sources of emissions in food manufacturing and retail. Studies of greenhouse gas emissions have mostly focused on fresh produce or on foods that have only undergone primary processing, such as meat and milk. For these, processing is rarely a major source of emissions compared with agriculture or later stages of the food chain.

For products that undergo further processing, it can be an important hotspot. Thirty percent of the greenhouse gases associated with Walkers crisps arise in processing, for example. Little research is available on highly processed foods such as ready meals, involving multiple ingredients often from different locations, which may be heavily packaged and refrigerated, but overall, food manufacturing has been estimated to be responsible for just over 2% of total UK greenhouse gas emissions.

Food packaging has been estimated to be responsible for 1.27% of UK greenhouse gas emissions. Packaging can be a relatively important source of emissions for foods such as processed potatoes that have a small footprint overall. The use of packaging is heavily linked to how food and food products are transported and stored, how much they are processed, and how.

One commentator has argued that “...the interactions among refrigeration, packaging, food transport, food product innovations and various socio-economic developments have helped create cultural norms and practices that are highly energy-dependent.”

Refrigeration contributes to climate change both because of the energy used to operate the equipment and because of the impact of refrigerant gases. Some refrigerant gases are thousands of times more potent than carbon dioxide at warming the atmosphere. It has been estimated that food refrigeration is responsible for about 3-3.5% of the UK’s greenhouse gas emissions. This is fairly new phenomenon. Just forty years ago, only 60% of the UK population owned a fridge, and only 3% a freezer. For food sold by multiple retailers, the ‘chill chain’ can stretch right from the moment a vegetable is picked, through the distribution chain and retail outlet, into a shopper’s home, with only a brief interruption in their trolley and car boot. Refrigeration can also be a major source of greenhouse gases for unprocessed fruit and vegetables, particularly when they are sold out of their main growing season. It is refrigeration that means that UK-grown apples, kept until the following summer, have a carbon footprint as large as those imported from the southern hemisphere.

5.2 Opportunities and challenges

Community food enterprises which undertake food processing tend to use smaller scale operations than the larger multiples. As a result they have been criticised for using resources inefficiently, which is then expected to lead to greater greenhouse gas emissions per unit
Climate change and local food

of food processed. Some research has backed this up – for example one study comparing small-scale and industrial bread-making in Sweden found that the small-scale mills result in lower energy efficiency. The study may not compare like with like, given that artisanal bread-making produces a qualitatively different product than industrial production. Nor is its story is universal. Another study discovered lower emissions per kilo of bread from a small-scale bakery. In fact, greenhouse gas-efficiency of processing varies from place to place and country to country, affected by such factors as regulatory requirements or the availability of green electricity. These may result in foods processed far from the place of consumption having a lower greenhouse gas footprint than those made nearby – or vice versa – but for reasons that are unconnected to how localised the food supply chain is.

The best way to reduce emissions from food processing is to reduce the extent to which food is processed at all. This takes thought – for if processing reduces the need for later cooking or refrigeration, or uses food that would otherwise go to waste, it is unlikely that eliminating processing in favour of fresh produce sales would reduce overall greenhouse gases. Little empirical evidence exists as to whether local food retailers such as farmers’ markets in general sell a higher or lower proportion of processed goods than the grocery market as a whole.

If processing is undertaken, the best way for people processing food on a small scale to reduce their greenhouse gas emissions is likely to be to ensure that their energy supply is as green as possible. If using electricity, for example, they would be advised to ensure they have green electricity supplier that provides electricity generated from renewable resources and invests in their further development.

It is a similar story for refrigeration. Long-distance transport depends on refrigeration and it is this, rather than the transport as such, which has led a review for government to conclude that any growth in food transport is “highly likely to increase impacts linked to fossil-fuel use”. Refrigeration can reduce food waste and therefore greenhouse gas emissions – but such is the energy intensity of refrigeration, that its further growth as the default method of food preservation would likely increase overall food system emissions due to the increased demand for electricity.

Many more foods are refrigerated than is required by food safety law. One survey found that greengrocers used little or no refrigeration whereas supermarkets display much of their fruit and vegetables in refrigerated cabinets. The upshot was that supermarkets used more energy per unit area than other shops, though whether this meant they also used more energy per unit of food they sold remained an open question.

The implications for consumer behaviour are in turn uncertain. If food obtained through community food enterprises is less likely to be refrigerated at the point of sale, will shoppers be less likely to refrigerate it at home? Will they change their eating habits accordingly, or compensate by shopping more frequently or wasting more food? Community food enterprises wishing to understand or communicate the benefits of reducing refrigeration use in their own operations would be advised to explore these issues with their customers.

Where community food enterprises use refrigeration on their own premises, greenhouse gases could readily be reduced by ensuring that:

- Products are only refrigerated when it prolongs their shelf-life or is necessary for food safety reasons, with excess capacity switched off or sold on.
- Fridges and freezers have doors, and measures are taken to conserve energy, for example, by turning off fridge lighting out of hours.
- Electricity is sourced from a green electricity supplier who provides electricity generated from renewable resources and invests in their further development.

It is also worth investigating options for generating energy from renewables, such as wind, photovoltaics or small-scale hydropower. Advice and grants are available for small businesses and local supporters might also be willing to take it on as a project.
Similar rules of thumb apply to packaging which, for minimum greenhouse gas emissions, should be used only when it reduces perishability. Using recycled packaging and providing facilities to enable customers to recycle packaging could reduce greenhouse gas emissions associated with the materials used.88 Purchasing organic dry goods in bulk with other local initiatives can also reduce packaging and transport as well as delivery costs.

Packaging is a highly visible case of wasteful use of natural resources, which has led to greater reported consumer concern about waste issues than other, arguably more pressing, environmental effects of the food system. Some packaging can help to reduce food waste (such as robust containers for soft fruit, and hygienic plastic packaging for meat), and there are better and worse options for these in terms of environmental impact – largely to do with the material chosen, whether the containers are re-usable, and their weight. Where community food enterprises address packaging issues, they can do so through simple means, such as encouraging customers to bring their own re-usable bags, using compostable trays and offering direct or bulk sales from producers to minimise individual packaging.

They can also do so through shortening supply chains, and prioritising the purchase of perishable and fragile produce close to home. This reduces the need for large amounts of freight packaging, and cuts the number of times such fragile produce changes hands, to minimise damage and waste. Some also have retail mechanisms that considerably reduce food and packaging waste, such as box schemes that limit the amount of choice that consumers have over the types of produce purchased, maximising efficiency and utilising a much larger proportion of the food produced.

5.3 Getting practical

Anecdotal evidence suggests that some community food enterprises focus on making their processing more efficient. Local Food Links in Devon provides locally sourced meals for 23 schools in Dorset, with two hub kitchens in Bridport and Glanford. In addition to using strict sourcing criteria (organic, local, no fish from threatened fisheries) and promoting seasonal and even non-meat dishes, 75% of meals are freshly made. They are keen to do more research on the relative efficiency of different types of operations used in such catering, from cooking on the school site, to local batch cooking, to large scale operations supplying meals to reheat.89

Organic Lea in North London aims to “offer all in the Borough an opportunity to access fresh, organic produce”. Their operations include a vegetable box scheme using produce from their land and local growers, a café, growing sites, and education and training initiatives. The little processing they do relates either to the cafe or to using seasonal gluts to produce chutneys and make juice with a hand operated press. On site in Chingford, E4, they grow seasonal produce throughout the year to supply the schemes.90

People involved in community food enterprises comment on the difficulties of purchasing more efficient refrigeration. A representative of a small village shop described how they find the chill and refrigeration costs (and therefore emissions) “enormous” and would like to reduce them.91 A respondent to the survey commented that they are “desperate to find a lower cost source of remote chillers and fridge units. We believe that retailers should be made to use this sort of unit, but only on the basis that if these became the norm then the current price relationship should reverse” (Annex 2).

Our survey of Making Local Food Work projects indicated that respondents see reduced food packaging as one of their biggest benefits compared with the mainstream. Nearly (36/37) stated that they were previously aware of food packaging as a significant source of emissions and 73% (27/37) felt that their enterprise emitted fewer greenhouse gas emissions than equivalent conventional enterprises (compared to 65% of respondents who felt the same with respect to the transport of food). These assessments are subjective yet reflect of a high level of awareness of packaging as an issue that was also evident in our interviews.
6 Consumption

If greenhouse gas emissions are to be reduced significantly, we will need to change the balance of the food we eat. A lower impact diet is seasonal, largely based on food that comes from plants, and can include some meat and dairy products grown to high environmental standards. To achieve these changes involves people choosing and cooking a wider variety of food that may currently be used to buying. Community food enterprises can play a lead role in changing the way people think about food, appreciating the variety and benefits of seasonal produce, and helping people to choose a healthier and more sustainable balance of food, whilst supporting food producers in making a decent living. Direct contact between food producers and consumers, and with food growing projects, is also arguably an important way in which people can understand that adopting a more sustainable way of living can be attractive and achievable.

6.1 The problem

Direct emissions from home food preparation account for just under 2% of total UK greenhouse gas emissions.92 Including cooking and preparation in the home, it is a relatively important source of greenhouse gas emissions only for products such as potatoes that have low emissions elsewhere in the chain.

As noted above, what foods we consume has a much greater influence on our greenhouse gas footprints than how we consume them. A first factor, of course, is simply the amount that we consume, with one analysis in the United States proposing that eating less would be an effective way to reduce total greenhouse gas emissions.93 More attention, however, has focused on the implications of substituting different types of food, year-round or seasonally.

It can take different amounts of energy and other inputs to grow the same foods in the same place at different times of the year, mainly due to the weather. The differences are particularly pronounced for glasshouse produce, but could also be a factor for other products such as milk. It follows that, to eat food grown locally or nationally with minimal inputs, you need to vary your diet with the seasons.

A second respect in which changes in consumption could reduce greenhouse gas emissions is by substituting high-greenhouse gas foods with low-greenhouse gas alternatives whilst still maintaining a healthy diet. Some highly-greenhouse gas intensive foods, such as air-freighted vegetables, make a relatively small contribution to our diets and food-related greenhouse gases. Others, notably meat and dairy, play a large part in most people’s diets and a correspondingly significant role in their overall emissions.

The share of our total footprint taken by different foods – which combines their greenhouse gas intensity and level of consumption – indicates the product categories where substitution could make the greatest difference (Table 1). This has lead a review for the Department of Environment, Food and Rural Affairs to conclude that “‘eat less meat’ is a critical element of a low impact diet”.94
6.2 Opportunities and challenges

While the case for changes in consumption is clear at a general level, the actual greenhouse gas savings from real substitution decisions will depend heavily on their knock-on effects.

For example, it might be expected that more seasonal diets would reduce supply-chain waste from surplus production. However, surpluses are a product of production planning and demand forecasts, both at the mercy of the weather, rather than simply a consequence of the changing seasons. If in practice lower prices for seasonal food led to higher consumer waste, that could more than outweigh the greenhouse gas savings from using lower inputs in production.96

Likewise, exactly what seasonal produce people substitute for what could have an overwhelming bearing on the total greenhouse gas impact of eating more seasonally: “The price and the environmental footprint per unit volume of an in-season strawberry may... be higher than the price and environmental footprint of an out-of-season apple.”97

The devil is also in the detail when it comes to livestock products. Substituting meat for dairy may be counterproductive, for example. Substituting red meat for white meat, depending on the method of production, may forgo carbon sequestration from pasture. Emissions related to fish or non-animal protein will again depend on production, processing and other factors. Any such substitution could also have important consequences for other environmental issues such as biodiversity, for animal welfare, for farmers and rural communities, and for consumers.98 None of that changes the overall message that reducing meat and dairy consumption offers large reductions in total greenhouse gas emissions, but it does warrant care in translating that finding into policy or consumer advice.

Researchers in the United States have compared the potential greenhouse gas savings from changes in diet with those from buying locally produced food. The Department for Environment, Food and Rural Affairs’ Food Synthesis Review reports that:

“The study concluded that the reduced greenhouse gas impacts from a dietary shift were far greater than those from buying local food. While buying all food locally-sourced could reduce a household’s emissions by a maximum of 4%-5%, the same effect could be achieved by cutting meat and/or dairy from the diet on one day per week.”99

In many areas, given the small market share of most community food enterprises and the fact that some local producers operate mixed farming systems, it may in practice be possible to combine both behaviours. It only becomes a clear trade-off in the hypothetical situation where very high rates of local food supply are combined with efforts to exploit local environmental comparative advantages. It is entirely plausible for most local food

<table>
<thead>
<tr>
<th>Food type</th>
<th>Share of total EU Global Warming Potential</th>
<th>Importance of transport</th>
<th>Other key factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat</td>
<td>12%</td>
<td>Low</td>
<td>Production method</td>
</tr>
<tr>
<td>Dairy</td>
<td>5%</td>
<td>Low</td>
<td>Production method</td>
</tr>
<tr>
<td>Fruit and vegetables</td>
<td>2%</td>
<td>Medium</td>
<td>Production, storage</td>
</tr>
<tr>
<td>Basic carbohydrates</td>
<td>1%</td>
<td>Low</td>
<td>Production, processing</td>
</tr>
</tbody>
</table>

Table 1: Importance of different stages in the food chain for different food products in the European Union (EU) and their relative contribution to total greenhouse gas emissions95
Community food enterprises have a great opportunity to change and develop consumer behaviour through direct communication with their customers.

producers or retailers, including those producing meat and dairy products, to encourage their customers to eat a lower impact diet. Indeed, the relatively high return to farmers’ from direct sale and the high value the consumers place on food bought directly\textsuperscript{100} may support restructuring towards lower-volume, higher-value business models for livestock farmers.

Are people who buy local food more likely to try to change their food consumption habits or wider lifestyles? This could be relevant to greenhouse gas emissions for two distinct reasons. On the one hand, consumers who have a higher or lower footprint than others might preferentially select to buy local food. On the other, some community food enterprises, such as community supported agriculture schemes, actively aim to put members in touch with where their food comes from and support sustainable lifestyles.\textsuperscript{101}

Certain types of community food enterprise such as organic box schemes might be understood to challenge cultural norms around choice, consumption and people’s relationship with the environment in ways would support wider changes in consumption behaviour. Some community food enterprises have the advantage of increased face-to-face contact between producers and consumers and the responses to our survey – where just over 80\% of respondents (30/37) expressed an interest in reducing their emissions – reflects the level of interest within this sector in taking action and the potential for using this contact to impact on consumer choices.

6.3 Getting practical

In a member and customer survey in 2009, Growing Communities found that almost 95\% of members surveyed said they had changed their shopping and cooking habits since joining the scheme. Typical examples included not shopping at out of town supermarkets, eating more seasonally and being more aware of the differences between production systems. In one member’s words:

“It has been great to discover how good fruit and veg can taste, compared to the stuff the supermarket offers. It’s also great not to have to think about what to buy, but rather to think about what to make with what I have in the bags. It’s lovely not to have to go into supermarkets so much. I eat a lot less meat now, and a lot less unhealthy food, and a lot more fruit and veg.”

Community food enterprises have a great opportunity to change and develop consumer behaviour through direct communication with their customers. Many projects already provide point of sale information and some provide posters and even training schemes for customers wanting to learn to grow food (e.g. Organic Lea). A minority of initiatives, such as Growing Communities, are seeking to develop and measure their success in encouraging wider pro-environmental behaviour by participants. Surveys and spreadsheets can be used to collate data on sourcing, use of energy and other inputs, and customer travel, customer purchase of seasonal products, for instance. Surveys might revisit the same customers year on year, exploring wider issues such as energy use and insulation in the home, and air travel.
Food waste

The direct greenhouse gas emissions from food waste look very small (only 0.3% of the total). However, when food goes to waste, this also wastes the very considerable energy, effort and natural resources that have gone into producing the food in the first place. It is estimated that about one quarter of the food that UK households buy ends up in the bin. A lot of food is also wasted at the farm and manufacturing stages, sometimes due to cosmetic standards for fruit and vegetables. Some community food enterprises have addressed these issues very effectively by adopting policies and practices that reduce waste, such as efficient ordering, special offers for produce that would otherwise go to waste, or directing edible left-over food to local catering. Appropriate packaging, storage and staff training can also help to extend the shelf life of food.

7.1 The problem

Food waste contributes to greenhouse gas emissions in two ways. The waste itself can be a direct source of emissions, particularly methane, if it enters landfill. It also squanders the greenhouse gases emitted in production, processing and other stages of the supply chain that ultimately do not contribute towards feeding people. The government-funded Waste Resources Action Programme estimates that UK households waste 25% of the food they buy. Producing and distributing edible food that goes to waste has been roughly estimated to account for around 5% of all UK greenhouse gas emissions. About seven million tonnes end up in landfill each year, resulting in further direct emissions over and above this figure.

7.2 Opportunities and challenges

How much food we waste is shaped by how it is distributed, sold and consumed. In seeking to make sure perishable foods are constantly available, retailers over-order and manufacturers over-produce. A study of local food systems for the Department of Environment, Food and Rural Affairs concluded that: “the reduced use of transit and distribution packaging by localised systems could lead to substantial waste reductions. Waste handling within localised systems also appears to be more sensitive to the environment and small scale recycling, composting or re-use is possible.”

Community food enterprises also face particular challenges. They are less likely to use sophisticated packaging, which can reduce food waste by preventing food from being spoiled and extending its shelf-life. While making packaging generates greenhouse gas emissions because it uses up energy, packaging disposed of in landfill releases fewer greenhouse gas emissions because it uses up energy, packaging disposed of in landfill releases fewer greenhouse gas emissions.

How much food we waste is shaped by how it is distributed, sold and consumed.
emissions than equivalent amounts of food waste. The same researchers also argued that using less packaging could therefore lead to community food enterprises producing more greenhouse gas emissions.  

This argument needs to be balanced against the fact that community food enterprises do not generally transport food long distances, reducing the need for packaging to protect it in transit. Furthermore, perishability is far from the only factor causing food waste, with only about a third of food waste thrown away because it has gone off. Nevertheless, community food enterprises need to ensure that reducing packaging does not come at the expense of increased food waste.

What happens to our waste also matters. Food waste also need not go to landfill. It can be composted and the methane produced through anaerobic digestion can be used to generate energy. How waste will be handled in a particular instance is important in working out whether or not reducing packaging would reduce overall greenhouse gas emissions.

7.3 Getting practical

Community food enterprises can reduce waste by ensuring they have a good idea of what they need to buy. By investing in good marketing this is possible even in a small enterprise. Several impressive schemes – for example Local Food Links, Dorset and Growing Communities – have developed low cost purchasing databases which help with more efficient ordering, thereby reducing waste and costs. Community food enterprises can also sell food looking past its best at lower cost (whilst maintaining hygiene standards), giving food away when it cannot be sold to customers or local institutions, using produce for smoothies or soups, and composting any leftovers.

Many of the case studies in this project saw reducing waste as a significant benefit of their work. For instance, Unicorn Grocery ensured minimal food waste by applying a waste hierarchy: if it does not sell, sell at half price, then give it away in a free-to-take bin, then use for soups in the shop café, finally compost anything that remains.
Priorities

Trying to reduce the contribution we make to climate change can seem dauntingly complicated. Yet, as well as pointing out some of the issues that make it so, the previous sections have also described how many community food enterprises are tackling those challenges in practice.

Most are starting with the emissions that are closest to home – transport and refrigeration for retail and delivery schemes, feed and fertiliser for farm and community supported agriculture schemes – but taking active steps to avoid displacing the emissions they save to other parts of the food system.

Table 2, below, sums up the story so far. It shows the total direct emissions for each part of the food chain and some of the main activities that contribute to those emissions. Then it highlights the main displacement risks, and practical steps that community food enterprises can and are taking to deal with the issues.

Table 2: Greenhouse gas emission sources, factors, risks and actions for community food enterprises

<table>
<thead>
<tr>
<th>Source of greenhouse gas</th>
<th>Share of all UK emissions</th>
<th>Key factors influencing emissions</th>
<th>Challenges for community food enterprises</th>
<th>Practical steps for community food enterprises</th>
<th>Examples from community food enterprises</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport</td>
<td>2.3% (excluding overseas transport)</td>
<td>What mode of transport is used (air, lorry, car etc.) The distance travelled Frequency of journeys</td>
<td>Transport on a smaller scale can be less efficient Longer shopping trips by customers Emissions from producing or storing food out of season may be higher than importing it</td>
<td>Community food enterprises can work with mainstream retailers to increase their transport efficiency Networks of retailers can work together to increase their transport efficiency including sharing their distribution infrastructure through ‘hubs’ Retailers and distributors can use low-greenhouse gas fuels Retailers can survey customer car use and encourage their consumers to cut their car use</td>
<td>Sustain’s Eat Somerset project Making Local Food Work pilot project in Nottinghamshire Growing Communities Tunbridge Wells Farmers’ Market Canalside CSA</td>
</tr>
<tr>
<td>Farming</td>
<td>8.5% (excluding emissions from land use change)</td>
<td>Land use change outside the UK adds 50% to UK food chain emissions overall Animal feed Soil husbandry methods Emissions from animal digestion Emissions from manufacture of fertiliser Energy use for heating Energy use for machinery</td>
<td>Reducing one farm input can increase another (e.g. reducing mechanisation can increase travel by workers) Changes in farming method can lead to changes in the type, quality or availability of food, which could displace custom elsewhere Changes to food quality or appearance could also lead to more food waste</td>
<td>Growers can seek alternatives to artificial nitrogen fertiliser and manage nitrogen as efficiently Farmers and growers can localise farm inputs, particularly animal feed Growers can seek community finance to support investment in more sustainable farming practices Growers can reduce emissions from energy use by using green electricity supplier Some growers assess their greenhouse gas emissions on a year by year basis and plan their land use accordingly</td>
<td>Unicorn Grocery growing project Stroud Community Supported Agriculture Barker Organics Canalside CSA</td>
</tr>
<tr>
<td>Source of greenhouse gas</td>
<td>Share of all UK emissions</td>
<td>Key factors influencing emissions</td>
<td>Challenges for community food enterprises</td>
<td>Practical steps for community food enterprises</td>
<td>Examples from community food enterprises</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------------------</td>
<td>----------------------------------</td>
<td>------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>Manufacturing, retail and packaging</td>
<td>4.9% (does not include energy used in creating packaging overseas)</td>
<td>Energy use in processing food before retail Energy use in creating packaging and in emissions from packaging waste Energy use from storage (heating, lighting etc.) and particularly from refrigeration. Associated release of refrigerant gases</td>
<td>Smaller processing operations can be less efficient Less processing can mean more home refrigeration and cooking Less packaging can mean more food waste</td>
<td>Retailers can use a green electricity supplier and seek grants for conversion to renewable energy Community food enterprises can promote the consumption of less processed foods, which are less likely to need refrigeration and packaging Retailers can refrigerate only where it prolongs shelf-life or is needed for food safety, and take measures to increase fridge efficiency Packaging should be used only when it reduces perishability and thus food waste Multi-site caterers can use hub kitchens to gain scale efficiencies Retailers can process surplus to reduce waste and work with community networks who can use food waste Retailers can stock produce from farms which have lower emissions</td>
<td>Organic Lea Unicorn Grocery Growing Communities Burton In Lonsdale Village shop Local Food Links, Dorset Lanreath Community Shop and Post Office</td>
</tr>
<tr>
<td>Consumption</td>
<td>1.8%</td>
<td>The amount we eat: meat and dairy accounts for one third of nutritional energy intake but 58% of emissions from the UK food system When products are consumed – whether energy has been used in producing them out of season or storing them Energy use in cooking</td>
<td>Although the message is clear overall, there are some exceptions to the rule e.g. Lower prices for seasonal food could lead to more consumer food waste Production methods matter, so eating less meat and dairy will not always directly reduce emissions and may have other unintended consequences</td>
<td>Retailers can survey and support customers/members to adopt lower impact diets – particularly eating smaller amounts of meat and dairy and a higher proportion of systems using fewer external farm inputs (e.g. grass fed) Survey and support customers/members to adopt wider changes in lifestyle to reduce their environmental impact</td>
<td>Local Food Links, Devon Growing Communities Organic Lea</td>
</tr>
<tr>
<td>Waste</td>
<td>0.3% (excluding emissions from producing food that is never eaten, estimated at 5% of UK greenhouse gas emissions)</td>
<td>How much food we waste What food we waste Whether retailers have over-ordered in order to ensure their shelves are fully stocked Use of recycling or anaerobic digestion</td>
<td>Reducing waste could lead to more transit packaging Packaging and refrigeration reduce waste, but as only a third of food is thrown away because it has gone off, changes in behaviour are also necessary to achieve substantial reductions</td>
<td>Community food enterprises can reduce waste by ensuring they have a good idea of what they need to buy Community food enterprises can sell food past its best at lower cost, give away free or compost Growers can use anaerobic digestion and produce biogas to increase on-farm efficiency</td>
<td>Local Food Links, Dorset Unicorn Grocery</td>
</tr>
</tbody>
</table>
Local food and adaptation to climate change

It is impossible for even developed countries like the UK to avoid serious impacts from climate change. Although poorer countries are likely to suffer more, the rich world is by no means immune, and floods, droughts and extreme weather events are all likely to have an impact on the economies and societies of the developed world. Some of these impacts may arise because of the more severe effects taking place elsewhere, for example as a result of disruption of global food supply chains or of the movement of environmental refugees.

This means that society needs to look now at how we might change the way we live in order to cope with the upcoming changes to our climate. This is called climate adaptation.\textsuperscript{110}

Adaptation in the food system will be crucial. In agriculture, yields are likely to be affected and to become less predictable,\textsuperscript{111} making it harder for farmers to cope with fluctuating incomes, and for the food industry to secure predictable levels of supply. For supermarkets reliant on a system where products are available consistently throughout the year this is likely to pose a significant challenge.

What role might community food enterprises play in adapting to climate change in the UK? We would suggest that the following features might be important:

- Reduced reliance on imports where supply may be more variable and transport more vulnerable to disruption;
- Reduced reliance on inputs which require energy for production;
- Support for methods of food production which are more likely to be able to adapt to changing climatic conditions;
- Creation of a new skills base able to grow more diverse food products and a customer base better equipped to cope with variability in supply.

Adapting to climate change does not mean a return to protectionism or assuming that the entire food system will be based on local sourcing in the future.

9.1 Reduced reliance on imports

Community food enterprises, by their nature, source more food locally, though feed for producing livestock products and other inputs may be sourced from overseas. Within a diversity of supply chains – long and short – this could contribute to reducing reliance on increasingly insecure global supplies and transport.

The science of climate change increasingly indicates that tropical regions are likely to suffer disproportionately from climate change; that poor countries will inevitably be least able to adapt; and that global food supplies are likely to be significantly disrupted. Parts of Africa,
Asia, South America and Australasia are feeling the negative effects from climate change now, after a 0.7°C temperature rise, and the impact is likely to worsen in the future as temperatures rise.

Water stressed areas are particularly likely to be affected. Much of the horticultural production of Spain, for example, is located in the Almeria region, which already suffers from water shortages. As the effects of climate change worsen, some regions may find it harder to export food to other countries than they do currently, or may choose to prioritise feeding their own population first.

It has been suggested that increased local sourcing would mean that producers in poor countries lose the income they would have had from exporting food to developed countries. This has been a focus for significant controversy. However, adapting to climate change does not mean a return to protectionism or assuming that the entire food system will be based on local sourcing in the future. Responding and adapting to climate change will be about reducing risk. Some commentators have argued that retailers of local food may be particularly vulnerable to environmental change, as individual businesses will be less able to rely on a broad base of supply. This argument applies, however, only to individual businesses. We would argue that it may be prudent on a national scale to support a mix of longer and shorter supply chain to create a ‘balanced risk portfolio’.

9.2 Supporting adaptive farming methods

Community food enterprise can represent an important market and source of finance for sustainable farming systems, including organic agriculture. The relationship is particularly important for producers operating on too small a scale to supply the multiple retailers.

The United Nations Food and Agriculture Organisation has acknowledged some adaptive benefits from organic sourcing. A working report for the European Commission echoes the same sentiments, saying that “Organic farming...as it usually implies higher diversity and high level of knowledge of the functioning of the farm ecosystem, is also likely to be more resilient to climate change.” This paper also states that “to address the double challenge of reducing greenhouse gas emissions while at the same time coping with the changing climate, it will be necessary to ensure synergies between adaptation and mitigation as much as possible... Measures that provide co-benefits in terms of reducing emissions and increasing resilience of farming need to be identified and promoted. These include, among other, soil and tillage practices that help maintain and increase organic carbon in soils, and protection and management of pastures.”

9.3 Developing skills and customers

Many community food enterprises we spoke to are developing the skills to grow a wider range of foods and using a diversity of techniques that use low external inputs. Their methods include using green manures and diverse varieties that are adapted to a range of seasonal conditions. Community food enterprises generally have higher requirements for skilled labour than conventional operations and often encourage public participation. As the government’s Food 2030 Strategy suggests, there is benefit in increasing and spreading knowledge about food growing. Ultimately this could allow people to grow foods no longer available or affordable in other outlets. A consuming public that is used to variations in the availability and appearance of food – and equipped with the cooking and food preservation skills to cope with them – should also be an asset in adapting to climate change.

Many community food enterprises already experience variations in availability and appearance. For example, the vegetables provided through producer box schemes vary with the seasons. Community food enterprises often provide support to their customers or members, such as recipe leaflets, to help them make the best of such variation. As such, they are already developing an adaptable customer base and have developed approaches to doing so that may also be of value to the other parts of the food sector.
10 Recommendations

This report, including the following recommendations, are designed to challenge us all to realise that there is no simple solution to food and climate change, but there are steps that, by supporting and being engaged within community food enterprises, we can all take.

10.1 For community food enterprises

A recent review of the entire food sector suggested that the most important ways to reduce greenhouse gas emissions are: decarbonising the wider economy (e.g. energy supplies), changing consumption habits (particularly meat consumption), increasing production efficiency (raising yields with respect to inputs, particularly nitrogen) and technical measures on-farm to reduce direct emissions.118

Many of these measures call for widespread social change (e.g. changing consumption habits) or significant government action (e.g. decarbonisation the energy sector), and so do not suggest measures that community food enterprises can take directly. So what actions at the local level are likely to have the biggest impact?

The following list of recommendations is based on the discussion in previous sections of the challenges facing community food enterprises and how people are already addressing them. It is a general guide, which people can adapt depending on their activities, finances and overall aims. The most important point to remember is that someone who works in one area (e.g. as a retailer) then will need to collaborate with other areas (e.g. their suppliers) in order to achieve the greatest results. Community food enterprises which are taking action across most of these areas will be well-placed to say that they are contributing to tackling climate change.

In production:
- Reduce greenhouse gas-intensive inputs such as nitrogen fertiliser and animal feed from off-site.
- Reduce direct emissions through good soil management and anaerobic digestion, which uses manure and food waste to produce gas for use in local houses and businesses.

In marketing:
- Create a market for low-greenhouse gas foods – celebrate variations in seasonal availability, and promote the quality of your meat and dairy, aiming to sell less at higher prices.
- Support and inspire your customers to reduce emissions by providing advice on cutting food waste (for example using leftovers), cooking efficiently (for example putting lids on pans) and ways of saving energy in the home that are consistent with the measures they are supporting you to take in your operation.
- Encourage green travel on foot, public or chartered transport.
- Monitor changes through customer surveys.

In retail:
- Increase transport efficiency through collaboration, home delivery or using low-carbon fuels.
- Source electricity from a green energy supplier.
- Only use enough packaging and refrigeration to prevent food wastage.
- Develop a strategy to reduce food waste.
Overall:
- Spell out a clear vision of where your community food enterprise fits in a low-carbon world.
- Set performance targets and monitor how well you are doing.

10.2 For policy makers

Community food enterprises are highly diverse and offer social and economic benefits irrespective of their contribution to tackling climate change. Instead of asking whether local food is good or bad for the climate in general, policy makers should therefore focus on supporting community food enterprises in addressing the distinctive challenges and opportunities they present in contributing to a low-carbon food system.

Some particularly important areas to tackle include:

- Providing a supportive environment to help local and community food enterprises make the best of their unique potential to be ultra-low carbon. That may involve removing policy barriers (such as restrictive planning controls) which inhibit projects from being developed, or providing a market for local produce through public procurement.

- Providing support to enable community food enterprises to plan and co-ordinate together in order to improve their efficiency, for example in creating regional hubs for food transport. Long-term funding streams for projects with proven ability to deliver can be crucial.

- Providing access to technology and advice in order to reduce emissions. A particular issue which arose in this report was the cost of more efficient refrigeration units for local shops. Small and medium enterprises need support to purchase this kind of technology if they are going to be able to reduce their emissions.

- It is important to identify, reward and recognise differences in performance. Many community food enterprises are making heroic attempts to measure and reduce their emissions, often with little support, that are not recognised in most studies or policy relating to food and climate change. If standardised, accessible measurement tools were developed and made accessible, many more would follow their example.
Annex 1:
people we interviewed

<table>
<thead>
<tr>
<th>Name</th>
<th>Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jean Smith</td>
<td>Burton in Lonsdale Village Shop</td>
</tr>
<tr>
<td>Irene Keen</td>
<td>Lanreath Community Shop and Post Office</td>
</tr>
<tr>
<td>Clare Horrell</td>
<td>Project officer covering Distribution and Supply</td>
</tr>
<tr>
<td>Barbara Simmons</td>
<td>Tunbridge Wells Farmers Market</td>
</tr>
<tr>
<td>Nicole Hamilton</td>
<td>MLFW Project officer shops and local food</td>
</tr>
<tr>
<td>Ceinwen Lally</td>
<td>MLFW Farmers Markets Project Officer</td>
</tr>
<tr>
<td>Marlene Barrett</td>
<td>Organic Lea</td>
</tr>
<tr>
<td>Tim Crabtree</td>
<td>Local Food Links, Dorset</td>
</tr>
<tr>
<td>Rob Alderson</td>
<td>Unicorn Grocery and land project</td>
</tr>
<tr>
<td>Tom Ingalls</td>
<td>Canalside Community Supported Agriculture</td>
</tr>
<tr>
<td>Julie Brown</td>
<td>Growing Communities</td>
</tr>
</tbody>
</table>
Annex 2: MLFW survey of projects and climate change

In a one month period 37 responses were received for an on-line survey. The following summarises these responses.

Which of the following options describe your food enterprise? Please select ALL that apply

<table>
<thead>
<tr>
<th>Option</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Supported Agriculture</td>
<td>13.5%</td>
</tr>
<tr>
<td>Food Cooperatives and Buying Groups</td>
<td>8.1%</td>
</tr>
<tr>
<td>Community Owned Local Shop</td>
<td>16.2%</td>
</tr>
<tr>
<td>Commercially Owned Local Shop</td>
<td>5.4%</td>
</tr>
<tr>
<td>Farmers’ Market</td>
<td>13.5%</td>
</tr>
<tr>
<td>Country Market Society</td>
<td>10.8%</td>
</tr>
<tr>
<td>Food Distributors and Supply Links</td>
<td>5.4%</td>
</tr>
<tr>
<td>Other</td>
<td>32.4%</td>
</tr>
</tbody>
</table>

Approximately how many people are involved with your enterprise? Averages

<table>
<thead>
<tr>
<th>Type</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff</td>
<td>2.6</td>
</tr>
<tr>
<td>Volunteers</td>
<td>10.2</td>
</tr>
<tr>
<td>Customers</td>
<td>719.6</td>
</tr>
<tr>
<td>Members</td>
<td>80.9</td>
</tr>
</tbody>
</table>

Listed below are the places within the food industry that produce a lot of greenhouse gases. Before completing this survey, did you KNOW that these were an issue?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-farm production (either your enterprise or your suppliers)</td>
<td>89.2%</td>
<td>10.8%</td>
</tr>
<tr>
<td>Food processing e.g. cooking/pasteurising</td>
<td>86.5%</td>
<td>13.5%</td>
</tr>
<tr>
<td>Food packaging</td>
<td>97.3%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Transport of food to your site</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Refrigeration/chillers</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Production or sale of out of season produce e.g. strawberries in winter</td>
<td>97.3%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Customer transport to your site</td>
<td>97.3%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Waste disposal (on site and by consumers)</td>
<td>91.9%</td>
<td>8.1%</td>
</tr>
</tbody>
</table>
For each of the following issues, do you think that your enterprise produces more, less or the same amount of greenhouse gases compared to an equivalent conventional enterprise? For example, you or your supplier may only use organic fertiliser, or you may sell more raw ingredients and less processed food.

<table>
<thead>
<tr>
<th>Issue</th>
<th>More than</th>
<th>The same as</th>
<th>Less than</th>
<th>I don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-farm production (either your enterprise or your suppliers)</td>
<td>0%</td>
<td>18.9%</td>
<td>51.4%</td>
<td>29.7%</td>
</tr>
<tr>
<td>Food processing e.g. cooking/pasteurising</td>
<td>5.4%</td>
<td>21.6%</td>
<td>45.9%</td>
<td>27%</td>
</tr>
<tr>
<td>Food packaging</td>
<td>0%</td>
<td>8.1%</td>
<td>73%</td>
<td>18.9%</td>
</tr>
<tr>
<td>Transport of food to your site</td>
<td>2.7%</td>
<td>13.5%</td>
<td>64.9%</td>
<td>18.9%</td>
</tr>
<tr>
<td>Refrigeration/chillers</td>
<td>2.7%</td>
<td>27%</td>
<td>51.4%</td>
<td>18.9%</td>
</tr>
<tr>
<td>Production or sale of out of season produce e.g. strawberries in winter</td>
<td>0%</td>
<td>8.1%</td>
<td>78.4%</td>
<td>13.5%</td>
</tr>
<tr>
<td>Customer transport to your site</td>
<td>5.4%</td>
<td>18.9%</td>
<td>59.5%</td>
<td>16.2%</td>
</tr>
<tr>
<td>Waste disposal (on site and by consumers)</td>
<td>0%</td>
<td>8.1%</td>
<td>70.3%</td>
<td>21.6%</td>
</tr>
</tbody>
</table>

Please let us know what you are doing, either deliberately or by the nature of your work, to tackle the effects of your food enterprise on climate change. Any relevant anecdotal evidence, or any measuring you have done, would be really helpful.

There are 27 responses. 10 specifically mentioned reducing packaging. The following are illustrative.

We are actively promoting local, seasonal, food consumption.

Buying from local producers. Using recycled bags, providing place for local people to get food and provisions so they do not have to travel the 6 miles into town. Buying fruit and veg in season from local producers.

Half our local deliveries are made in a milk float that is recharged using solar power. Coordination of delivery in/out of produce.

We are desperate to find a lower cost source of remote chillers and fridge units. We believe that retailers should be made to use this sort of unit, but only on the basis that if these became the norm then the current price relationship should reverse. After all, the cooling unit is the same, the cabinet is the same, the only extra is a long bit of piping with a plastic insulator on it. How on earth can companies justify charging £4,000 extra for that? Why is no-one acting on this?

The nature of the Country market is to produce locally home-baked good locally grown vegetables, flowers and plants together with crafts. The emphasis being on ‘local’ means a minimum amount of travelling for the produce, and the market is run on a co-operative basis providing
an employment opportunity for local people should they be interested - especially as a flexible option suited to those who have to work around eg young children, elderly relatives.

Installing a 11kW wind turbine.

Hoping to start benchmarking carbon emissions using Climate Friendly Food Scheme (www.climatefriendlyfood.org.uk)

Some producers sourcing local ingredients/growing their own to reduce food miles.

Use limited packaging due to direct selling nature of business.

New policy of no free carrier bags and those available to buy are biodegradable.

All producers live within 20 miles of the sales point.

Reuse of packaging such as jam jars, plant pots etc.

Use bio-diesel in van; only stock occasional out of season products (ie at Christmas), use a waste disposer who does recycle (unlike LA collection) New business so no measuring yet.

Encouraging people to grow their own food and increasing food resilience through training and providing allotment spaces for the local community.

Would you like to be able to MEASURE the amount of greenhouse gases produced by your enterprise?

Yes 45.9%
No 35.1%
I Don’t Know 18.9%

Would you be interested in trying to REDUCE the amount of greenhouse gases produced by your enterprise?

Yes 81.1%
No 10.8%
I Don’t Know 8.1%

If so, what would you find more useful to help you reduce the amount of greenhouse gases associated with your enterprise? You may tick up to THREE options that you would find most useful.

Leaflets for customers to read 27.3%
A quick self-assessment tool on how to measure your impact 66.7%
A toolkit on how to reduce your impact 60.6%
A general guide 15.2%
Policy changes (by your local government for instance) 18.2%
Funds for tackling greenhouse gas production in your enterprise 45.5%
Other 6.1%
Annex 3:
Participants in the discussion day

The following people participated in the discussion day on community food enterprises and climate change on 17th February 2010.

<table>
<thead>
<tr>
<th>Name</th>
<th>Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jean Smith</td>
<td>Burton in Lonsdale Village Shop</td>
</tr>
<tr>
<td>Marion Facey</td>
<td>Lanreath Community Shop and Post Office</td>
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<tr>
<td>Tim Crabtree</td>
<td>Local Food Links, Dorset</td>
</tr>
<tr>
<td>Julie Brown</td>
<td>Growing Communities</td>
</tr>
<tr>
<td>Maresa Bossano</td>
<td>MLFW Food co-ops and buying groups co-ordinator, Sustain</td>
</tr>
<tr>
<td>Thea Platt</td>
<td>Project officer, CPRE</td>
</tr>
<tr>
<td>Jane Stammers</td>
<td>Country Markets Ltd</td>
</tr>
<tr>
<td>Bonnie Hewson</td>
<td>Project Officer, Soil Association</td>
</tr>
</tbody>
</table>
Notes


7 The Intergovernmental Panel on Climate Change (IPCC) was set up in 1988. It was set up by the World Meteorological Organization and United Nations Environment Programme and is funded by governments.


41 Case studies and final reports at http://www.sustainweb.org/page.php?id=423


55 Anton et al. (2005) cited in Edwards-Jones, G. et al. (2008) Testing the assertion that ‘local food is best’: the challenges of an evidence-
based approach. Trends in Food Science and Technology 19: 265-274.


Acknowledgements

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