SUSTAINABLE INCOME STANDARDS: POSSIBILITIES FOR GREENER MINIMUM CONSUMPTION

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RESOLVE Working Paper 14-11

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ABSTRACT

The Minimum Income Standard (MIS) is the household income required in the UK to meet a minimum acceptable standard of living as defined by members of the public. The income standard has been drawn up without regard to issues of environmental sustainability up until now, and the Sustainable Income Standards project aims to explore what a 'greener' Minimum Income Standard might look like.

The aim of the first stage of the project is to identify 'green possibilities' – options and scenarios that offer the potential for reducing the environmental impact of specified minimum levels of consumption, taking as a starting point the standard ('non-greened') Minimum Income Standard. The present paper reports on this phase. Its purpose is to set out the rationales and calculations that have produced descriptions of ways in which minimum consumption patterns could be made greener. It sets the scene for the second phase of the project, in which these scenarios are taken to consultation with focus groups in order to explore their public acceptability, in terms of whether they are compatible with minimum acceptable standards of living.

Analysis of the carbon footprint of the standard Minimum Income Standard indicated that the major areas on which to focus are household energy use, food and transportation, in line with household carbon footprinting studies of other socio-economic groups. Accordingly, the paper sets out ways in which carbon emissions attributed to Minimum Income Standards may be reduced in each of these domains, and, where possible, provides estimates of the reductions achievable.

The project is important not only because it gauges the public acceptability of specific changes in Minimum Income Standards to take account of sustainability issues, but also because it gives a wider indication concerning the public acceptability of changes in norms towards 'greener' ways of living for low income groups.

1 INTRODUCTION

The Minimum Income Standard (MIS) is the household income required in the UK to meet a minimum acceptable standard of living as defined by members of the public[1]. This Working Paper is written as part of a project that aims to explore what a 'greener' Minimum Income Standard might look like.

The first stage of the project aims to identify 'green possibilities' – options and scenarios that offer the potential for reducing the environmental impact of specified minimum levels of consumption, taking as a starting point the standard ('non-greened') Minimum Income Standard. The present paper reports on this phase. Its purpose is to set out the rationales and calculations that have produced descriptions of ways in which minimum consumption patterns could be made greener. It sets the scene for the second phase of the project, in which these scenarios will be taken to consultation with focus groups in order to explore their public acceptability, in terms of whether they are compatible with minimum acceptable standards of living.

An important consideration is, of course, what do we mean by 'green'? In most of the project we focus on reducing greenhouse gas (GHG) emissions. However, it is arguably important to take account of other aspects of sustainability, and therefore other issues are considered as appropriate.

This part of the project has been carried out by desk research which has been heavily informed by consultations with experts[2].

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[1] Details of the Minimum Income Standards can be found at www.minimumincomestandard.org. In 2010 a single person needed to earn at least £14,400 a year to reach the standard, and a couple with two children £29,200.

[2] We are extremely grateful for the advice given by many experts, who are noted in the Acknowledgements section at the beginning of this paper. However, responsibility for the text remains with the project team.

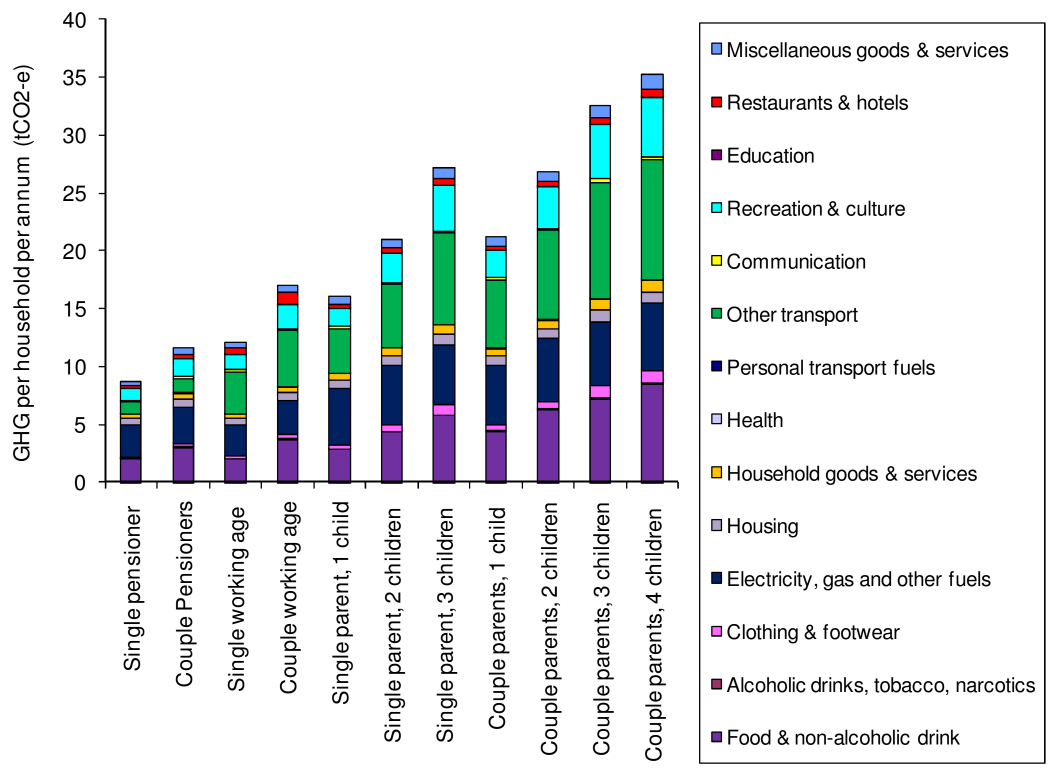
2 THE CARBON FOOTPRINT OF STANDARD MINIMUM INCOME STANDARD HOUSEHOLDS

As mentioned above, the starting point for this project is the standard (non-greened) Minimum Income Standard. This has been drawn up for eleven types of family in urban areas, and Figure 2.1 shows an estimate of the carbon footprint of MIS for each family type. A carbon footprint accounts for all the carbon that arises as a result of household expenditure. It includes not only carbon emissions from direct energy use, such as for space and hot water heating and powering personal transport, but also 'embedded' carbon emissions. Embedded carbon emissions are emissions that arise in supply chains in the production and distribution of goods and services purchased by households. Importantly, carbon footprints include supply chain emissions whether they arise in the UK or abroad.

It can be seen from Figure 2.1 that the carbon footprint varies according to the size of the family. Druckman and Jackson (2010b) estimated that the average urban MIS carbon footprint is around 38 per cent lower than that of the average UK household[3]. This is expected as there is a strong correlation between carbon footprint and income (Druckman and Jackson, 2009; Lenzen et al., 2004; Munksgaard et al., 2005; Vringer and Blok, 1995; WWF-UK, 2006).

[3] This estimation assumes that MIS family types have the same distribution across the UK as other households.

Figure 2.1 Carbon footprint of urban MIS households (2004)

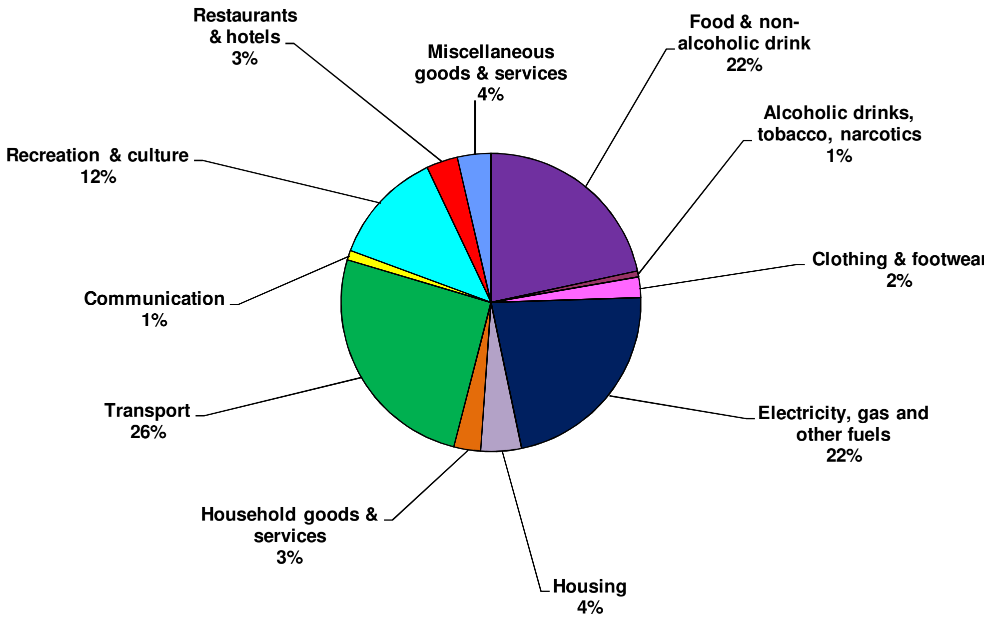


Source: Druckman and Jackson (2010b: Fig. 3)

Figure 2.2 shows the carbon footprint of an average MIS family according to expenditure categories. From this it can be seen that the largest categories are Transport (26 per cent), Food and non-alcoholic drink (22 per cent), and Electricity, gas and other fuels (22 per cent).

Minimum Income Standards have also been devised for various types of rural household, where the cost of living and carbon footprints are generally higher than for urban households. This is chiefly due to differences in household fuel and transport compared to urban households. Many rural dwellings are not connected to the mains gas supply and are therefore dependent on other fuels which are more expensive and also more carbon intensive (DECC, 2010; Smith et al., 2010). Additionally, prevalence of larger, older and less well-insulated housing stock in rural areas raises fuel consumption (Smith et al., 2010). Furthermore, it is assumed that most types of rural MIS households require a car, whereas it is assumed that their urban counterparts do not (see Section 5 for more details on this). Therefore in rural households the portion of the carbon footprint due to household fuels and transport is even higher than that shown in Figure 2.2 (as is the overall size of the carbon footprint).

Figure 2.2 Carbon footprint of an average urban MIS household



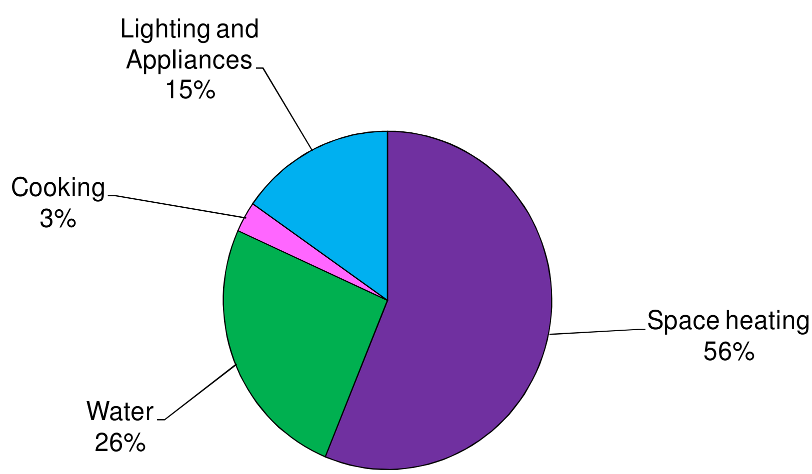
From the discussion above, it is apparent that if we are to make significant reductions in the carbon footprint of MIS households, the three main areas to focus on are household energy, food and travel. Sections 3, 4 and 5 accordingly explore changes in household energy, food consumption and travel respectively that can be made in the relatively short-term (up to around 2015-2020). In Section 6 we consider possible longer term changes, and Section 7 draws a conclusion[4].

[4] One interesting question that is currently high on the 'worry list' of policy makers is that of the 'rebound effect' and so it is worth taking a moment to consider how rebound might play out in this project. The rebound effect is a phenomenon through which only a portion of the GHG emission reductions estimated by simple engineering calculations are generally achieved in practice (Druckman et al., 2011). For example, replacing short car journeys by walking or cycling reduces consumption of motor fuels. But this frees up money that may be spent on, for example, purchasing extra clothes or flying on vacation. Alternatively, the money may be put into savings. Since all of these options lead to GHG emissions, total GHG savings may be less than anticipated. Indeed, in some instances, emissions may increase – a phenomenon known as 'backfire'.

3 HOUSEHOLD ENERGY

Household energy is required to provide space heating, water heating, lighting, and power for electrical and electronic gadgets and appliances. Figure 3.1 shows the relative amounts used for each of these categories for an average UK household. From this it can be seen that over half of household energy for an average UK household is used for space heating; water heating is the next most significant use, at around a quarter of the total, with the remainder being used for cooking, and lighting and appliances.

Figure 3.1 Direct energy use by an average UK household (2007)

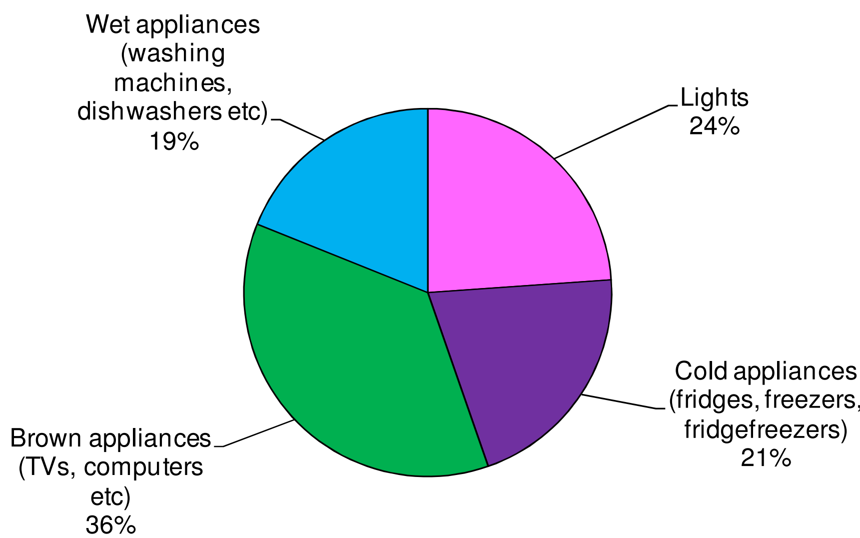


Due to the very nature of this project, this particular type of rebound effect will not arise through moving from the standard MIS to the 'green' MIS. This is because minimum incomes are, by definition, constrained to fit the Minimum Income Standards expenditure budgets. There is therefore no 'surplus' income to re-spend, and it is re-spending that gives rise to this type of rebound. The only types of rebound that may arise through moving, on a large scale, from general to 'green' MIS, are (in theory) 'economy-wide' rebound effects (Sorrell, 2007). These are effects whereby, because, say, meat consumption by UK MIS households is reduced, prices of meat might fall because demand is lower. Cheaper meat might have the effect of increasing meat consumption by other income groups in the UK, or increasing meat consumption in other countries. Therefore the total (global) carbon emissions reductions may not be as high as hoped for. Estimation of such effects is beyond the scope of this project, but the likelihood of backfire is extremely small. Therefore, even if some economy-wide rebound were to occur, it can be concluded that movement from the general Minimum Income Standard to the 'green' Minimum Standard is worthwhile.

Source: DECC, (2009).

Electricity use for lighting and appliances is shown in more detail in Figure 3.2. From this it can be seen that over a third of electricity use by an average UK household is for powering ‘brown’ appliances such as televisions and computers, with a quarter being used for lights, and around a fifth each for cold and wet appliances.

Figure 3.2 Electricity use by an average UK household (2007)



Source: DECC, (2009).

3.1 Home energy emissions and ways of living – a framework for analysis

To what extent can the adoption of sustainable patterns of home energy consumption be linked to household choices about living patterns and living standards, and to what extent is home energy consumption a function of wider technological and infrastructure developments that may enable reductions in household energy use without behavioural change?

The level of home energy emissions is certainly influenced to a large degree by the physical energy efficiency of the homes in which people live. The efficiency of heating boilers, the materials used in home construction, the amount of space occupied by the household and standards of home insulation all do much to determine emissions from space heating and hot water, which between them account for 82 per cent of home energy emissions (see Figure 3.1). While the amount of space occupied (e.g. the number and size of rooms and whether in a house or a flat) is an aspect of people's living standards, other features of the home (e.g. how its walls are insulated) do not affect daily life, and are not in the context of this project issues of 'public acceptability'.

Yet whatever the energy efficiency of the home itself, a number of behavioural factors can also influence emissions levels. This allows us to distinguish in the following discussion three aspects of sustainability in relation to home emissions:

Assumed structural factors, taken as a starting point: *we imagine that a household is living in a home with a given level of thermal efficiency.*

Behavioural variations: everyday choices and decisions that someone in such a home might take, which may influence the level of emissions. In the next phase of the project, we will seek views of the public about whether the definition of a minimum living standard should assume such behaviours.

Structural variations relevant to living standards: aspects of the home that affect both emissions and people's lived experiences. In practice, the main examples of this are the size and built form (e.g. flat versus house) of the home. While this will not, in the short term, be an issue about which people make behavioural choices, we should nevertheless seek views on what minimum level of living is socially acceptable, taking the emissions consequences into account.

3.2 Space heating

When setting the Minimum Income Standard for expenditure on space heating, energy use was calculated at the level necessary to '*maintain health and well being of the householders and the fabric of the home*' (Oldfield, 2008). Some specific assumptions made concerning the 'structural' factors of MIS households are different from current average UK households. For example, it was assumed that cavity wall insulation, loft insulation and double glazing are installed in each dwelling, which is not the current case in the UK. Also each household type is assumed to occupy a dwelling that is closely matched to its family size, as shown in Table 3.1. This is not currently the reality in the UK, where many households, even those on low incomes, and especially pensioners, have an extra bedroom above the number specified in Table 3.1. Hence the estimated household fuel consumption of each urban MIS household type is below expected expenditure as shown in the Expenditure and Food Surveys for equivalent households (Oldfield, 2008).

Specifically, we assume that homes have:

- Draughtproofing
- Loft insulation
- Cavity wall insulation
- Energy saving light bulbs installed
- Double glazing
- Gas condensing boiler
- Thermostatic control valves on all radiators
- Room thermostat
- Hot water tank insulation
- Primary pipework insulation

These assumptions are based on the premise that low income households benefit from the basic thermal efficiency treatments available through such schemes as the Warm Front, Supplier Obligation, ECO, and Green Deal. (In practice, the Minimum Income Standards households, who are assumed to live in council accommodation or social housing, would generally have thermally efficient homes irrespective of these schemes, but it is also relevant that people on low incomes not in social housing would be eligible for such support.)

Table 3.1 Housing specifications and heating regimes for MIS households

Family type	Dwelling and heating description
Single male, female	1-bed mid terrace ground floor flat, heating period 9 hours day, at 20℃.
Couple with no children	2-bed ground floor flat, heating 6 hours day, 12 at weekends, at 21℃.
Single pensioner	1-bed mid terrace ground floor flat, heating 21℃ 16 hours a day.
Couple pensioner	2-bed ground floor flat, heating period 16 hours day, at 21℃.
Lone parent one (toddler) child Couple one (toddler) child	2-bed end terrace house, heating period 16 hours day, at 21℃.
Lone parent or couple two children, pre-school, primary school	3-bed mid terrace, heating period 16 hours day, at 21℃. (pre-school child in family)
Lone parent or couple three children, pre-school, primary school, secondary school.	4 bed house, heating period 16 hours day, at 21℃. (pre-school child in family)
Couple four children, toddler, pre-school, primary school, secondary school.	4 bed house, heating period 16 hours day, at 21℃. (pre-school child in family)

Source: Oldfield (2008).

Starting from this context in terms of the thermal efficiency of homes, we can now consider features affecting both emissions and living standards. As a starting point, the Minimum Income Standard has benchmarks both for size of home and levels of thermal comfort, as shown in Table 3.1. These are based on World Health Organisation guidelines (Oldfield, 2008). Average fuel use and costs were estimated using the Building Research Establishment Domestic Energy Model (BREDEM 12) (Anderson et al., 2002; Oldfield, 2008).

The energy required to heat a home can vary significantly due not just to its type of construction but to factors related to the choices made by the occupants (Peacock et al., 2010). The significant influence that householder behaviour can have on system performance was illustrated by a study of 12 identical houses with identical heating systems in which it was found that the energy consumption of the highest consuming household was almost twice that of the lowest consuming household (Carbon Trust 2007: Table 13). The variations can be due to either householder actions (e.g. leaving windows open, number of appliances running etc.) or to system control settings (such as the setting of the thermostat). Therefore it is important to discuss with the focus groups what might be considered the norm in these aspects.

Average room temperatures in the UK are around 19 degrees Centigrade (Goodall, 2007), whereas the average winter-time temperature in British houses in 1970 was 13 degrees centigrade (MacKay, 2009). The standard MIS assumes internal temperatures of 20-21 degrees Centigrade, based on World Health Organisation guidelines, as shown in Table 3.1 above. The appropriate internal temperature for any specific household depends on the characteristics of its occupants including various factors such as their activity levels. Also people adapt to different temperatures through coping measures such as wearing extra clothes or drinking hot drinks. Rather than a dwelling being at a constant temperature throughout, it is more energy efficient for temperatures to vary between different rooms in a household, with living rooms being warmest, bedrooms cooler and unoccupied rooms coolest (Hong et al., 2006; Summerfield et al., 2007). Control of internal temperatures assumes availability of a room thermostat supplemented by thermostatic radiator valves (TRVs), and also, importantly, an adequate understanding of how to use them.

Below we list measures/actions that would reduce emissions and could potentially be assumed to be adopted as a matter of routine by MIS households, if the public think that this is reasonable.

- Creating different temperature zones by shutting doors: living room warmest, other occupied areas quite warm; unoccupied rooms not heated.
- Using a timer to control the heating and provide heat when its required. This is more efficient than keeping the temperature constant 24 hours per day.
- Wearing warm clothing such as a jersey(s) indoors during the winter.
- Using a rug to keep warm while sitting in the living room (for example, for use while watching TV).
- If a room gets too hot, reducing the heating rather than opening windows.

- Not using secondary space heaters (such as electric heaters) in cold weather, an adequately insulated dwelling with efficient central heating should render secondary space heaters unnecessary. Note: MIS does not include allowance for secondary heaters (Oldfield, 2008).
- Closing curtains or shutters at dusk.

Two further issues with an important effect on space heating are the type and size of dwelling. If, for example, a lone parent with a toddler was assumed to live in a two bedroom ground floor flat instead of a two bedroom end of terrace house, the energy used for space heating (and associated GHGs) would be reduced by around 58 per cent[5].

This suggests that the housing specifications in Table 3.1 above which specify, for example, that families with children need a house rather than a flat, should be reviewed in light of the implications for sustainability.

3.3 Hot water

Hot water consumption, like space heating, will be determined to a large degree by fixed structural conditions such as the efficiency of the boiler. However simple behavioural changes have a great deal of potential. For example, spending less time in the shower and washing up in a bowl rather than under a running tap can have more impact than installing water saving technology. Indeed, without addressing behaviour, technology alone may not deliver the expected savings (Clarke et al., 2009).

In some cases there is a trade-off between water conservation and energy reduction. For example, dishwashers use less water than washing up by hand, but result in higher carbon dioxide emissions due to energy use. Electric showers generally use less water than baths or other types of showers, but, because water is heated by electricity, may have higher carbon emissions (Clarke et al., 2009). The Energy

[5] Calculated from Tables 1 and 2 in Oldfield (2008).

Saving Trust advocates use of showers instead of baths and we therefore follow their advice here in the suggested actions for MIS focus groups to consider:

- Hot water cylinder setting no higher than 60 degrees centigrade;
- Taking a quick shower (three minutes) instead of a bath[6];
- Clothes washing at 30 degrees centigrade; and
- Washing up in a bowl rather than under a running tap (MIS budgets include a washing up bowl).

3.4 Lights, appliances and gadgets

Although as shown above (Figure 3.1), appliances and lights only consume 15 per cent of home energy, this is an area where there is considerable scope for savings. This applies both to the appliances that households own and the way in which they are used. The following are possible ways in which emissions could be minimised:

- Ensuring that all appliances are at least A rating. This may be more expensive in up-front purchase cost but the running cost should make up for this over time;
- Turning off appliances and gadgets when not in use, and not leaving them on standby;
- When old appliances are replaced with a more energy efficient model, disposing of them in a responsible manner. There is a growing trend of households replacing items such as TVs and fridges whereby, rather than old, energy-inefficient items being taken out of use, they are used as 'spares' and so continue to consume energy (Garnett, 2007);
- When purchasing a new TV, favouring a small screen LCD, as energy consumption increases with screen size, and plasma TVs have higher energy consumption than LCD TVs[7]. Only one TV per household. (Both of these conditions are at present fulfilled in MIS);

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[6] A typical bath can use over 100 litres of water, while a shower uses only about a third of the quantity. http://www.energysavingtrust.org.uk/Resources/Features/Features-archive/Top-five-green-New-Year-resolutions. Accessed 19.05.11

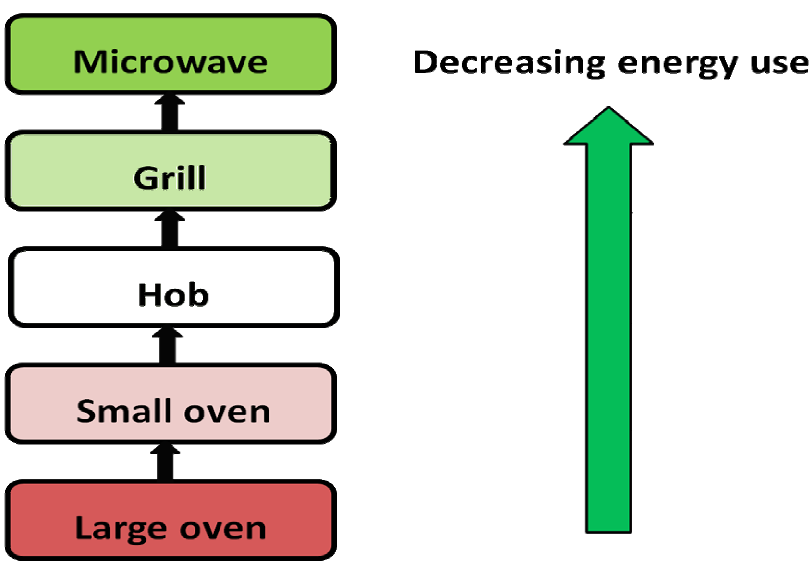
[7] CNET Energy Efficiency Guide. http://reviews.cnet.com/green-tech/tv-consumption-chart/ Accessed 19.05.11.

- Installing energy saving lightbulbs[8];
- Switching off lights in unoccupied rooms; and
- Hang drying clothes rather than using tumble driers. (This was already an assumption in the standard MIS).

3.5 Cooking

While cooking consumes only around three per cent of home energy, more efficient cooking methods would achieve reductions in energy use. The chart in Figure 3.3 shows a hierarchy that can be used for guidance. It is estimated that moving from use of electric ovens and hobs to microwaves could save around 10 per cent of energy and its associated costs (MTP, 2009)[9]. Examples of specific energy savings estimates are shown in Appendix 1.

Figure 3.3 An energy saving cooking hierarchy



Based on information from MTP (2009)

[8] These use up to 80 per cent less electricity than a traditional bulb and last around 10 times longer (so it will save around £45 before it needs replacing). http://www.energysavingtrust.org.uk/home-improvements-and-products/lighting. Accessed 04/09/11. http://www.energysavingtrust.org.uk/Publication-Download/?oid=1992656&aid=6771242. Accessed 19.05.11.

[9] Gas ovens and hobs are more carbon efficient than their electric counterparts, but the general advice in this section is still expected to hold.

Other savings could be made by:

- Only boiling the required amount of water in the kettle;
- Putting lids on pans while cooking (Garnett, 2008);
- Regularly defrosting of freezers for efficient operation.

While the total emissions savings from more energy-efficient cooking would be low compared with some other types of change, even small savings may be considered to help. So if the public were to think that all cooking methods are equally acceptable in other respects, they may take the view that this is a change worth making.

3.6 Conclusion – household energy

Estimated emissions savings from some of the key measures outlined above are presented in Table 3.2. The authors are particularly grateful to David Allinson and Kevin Lomas of Loughborough University for some of the information used in this chart. The chart shows that although each measure in itself has relatively little effect, implementing all these measures might achieve a reduction in the GHG emissions due to household energy use of over 25 per cent.

Table 3.2 Estimates of GHG emissions reductions achievable through selected measures

Action	% reduction in household energy GHGs
Put on a thicker sweater in winter+	7%
Install energy efficient light bulbs	6%
Shower instead of bath	5%
Small LCD TV instead of plasma	3%
Appliances not on standby	3%
Reduce heating by one hour a day+ *	2%
Turn heating off in one unused room+ *	2%
Wash clothes at 30 degrees C	1%
Increase use of microwave in favour of other forms of cooking	<1%
Only boil required quantity of water in kettle	<1%
Total*	~25%

* These measures are not included in the total as they cannot be assumed to be mutually exclusive with others.
\+ Source: Allinson and Lomas (2011). Other estimates are own calculations by the authors, based on information from a variety of publications.

The effect on MIS of adopting some combination of these assumptions would be to reduce both carbon emissions and the fuel budget (although not by a proportionate amount, since the marginal price of fuel is lower than its average price, which includes standing charges). The current MIS budget already assumes the household has an LCD TV rather than a plasma, while the adoption or non-adoption of other energy-saving measures on the list is not specified. Consequently, it is not possible to estimate the exact impact of the adoption of these measures on MIS fuel costs. However, if norms change in the direction indicated, the eventual effect on minimum fuel emissions can be expected to be approximately this much lower than if none of these measures were considered part of the minimum, and households typically did not adopt them. That is to say, a ‘green’ minimum could consume around 25 per cent less household energy than a non-green minimum.

4 FOOD

As shown in Figure 2.2 above, food is estimated to account for about 22 per cent of carbon emissions in an urban MIS budget. Several aspects of the content of the food ‘basket’ could influence overall emissions. Our analysis below suggests that by far the most important of these is the content of the MIS diet, given the large variations in carbon emissions associated with different food categories. Other factors including the ways in which food is grown, packaged and transported, can also make a significant difference in some cases.

4.1 Diets

There are four key factors that must be considered in devising possible ‘Green MIS’ diets:

- Public acceptability
- Nutrition
- Cost
- Greenhouse gas emissions

Public acceptability is a key feature of the Minimum Income Standard, and this has especial pertinence with regard to diets. This is because food is not simply fuel to keep human bodies functioning: food is an integral part of cultures and identities. For example, food is frequently a central feature in celebratory occasions (think for example, of birthday cakes). Many religions have dietary rules that are more than merely concerning hygiene: for example, Judaism forbids pork consumption based, historically, on hygiene concerns, although there is now little evidence that pork is a health risk. Food is also used to portray caring and love, as demonstrated by the common saying ‘The way to a man's heart is through his stomach’[10]. Furthermore, research has shown that people's identity is partly played out through their diets and any radical change in diet can threaten identity and may therefore be problematic (Abrahamse et al., 2009).

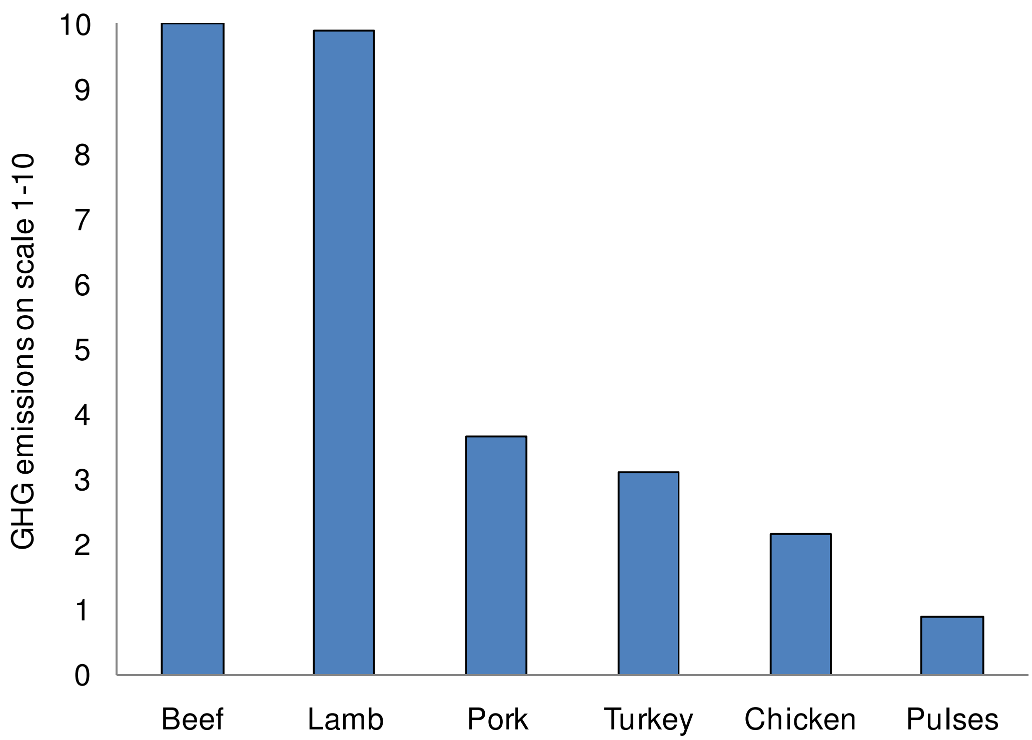
[10] The origin of this saying is thought to be in a letter written in 1814 by John Adams, American statesman: ‘The shortest road to men’s hearts is down their throats.’(Brandt 2009).

Diets have changed with time: for example, in the UK in the 1960s spaghetti was not commonly eaten in an English household, whereas now it might be considered one of the staple foods. However, although diets do change with time, rapid radical changes are unlikely, especially if imposed. This is an important aspect that will be explored in the focus group discussions.

It is vital that any diet recommended meets nutritional standards. It is commonly agreed that the average current UK diet is too high in meat, fat and sugars, and many changes (such as a reduction in red meat) have benefits across the board with regards to nutrition, cost and the environment. The standard MIS diet has been designed to avoid these problems, and it is important that any 'green' modifications to the diet do not jeopardise this.

The main theme of the discussion with the MIS focus groups concerning reduction of the environmental impacts from food consumption will be around dietary changes as this is where the 'big' wins are. The dietary change suggested is to reduce meat consumption, in particular meat from ruminant animals (cows and sheep). Figure 4.1 illustrates the GHG emissions on a scale of one to ten for various different types of protein.

Figure 4.1 GHG emissions of protein foods on a scale 1-10



Source: Authors' calculations based on Audsley et al., (2010a).

Any dietary change away from meat consumption will need to be accompanied by an increase in the intake of cereals and pulses in compensation. Such a change in diet would introduce significant changes in land use (both in the UK and potentially overseas also) that would need careful management. Audsley et al., (2010b) show that without such management, there is the potential for the benefits of diet switches to be largely cancelled out by other environmental costs associated mainly with land use. This suggests that dietary switches need to be co-ordinated with other aspects of how food is produced and distributed, and hence that aspects looked at in section 4.2 below need to be seen as complementary to changes in diet itself.

We suggest that discussions around changing diets to a 'greener' version of MIS should be based on the acceptability of a diet of the type outlined as 'Consumption Scenario 1' in Audsley et al., (2010b); however, we also take account of the dietary choices made by the original MIS groups (which were moderated by a nutritionist).

The Audsley diet recommends a 50 per cent reduction in livestock product consumption compared to current UK diets, balanced by increases in plant commodities. It is based on patterns observed in Turkey, Croatia, Bosnia and Cuba, which are considered to be rare examples of countries where per capita food energy supply is about 3000 kcal per day or more and animal product intake is about half that of the UK. The diet has been checked to be nutritionally acceptable. Details of this diet are presented in Box 4.1.

Box 4.1 Comparison of recommended diet with current UK diet

'Under the reduction scenario (Consumption scenario 1), consumption of milk and eggs is 60 per cent of current consumption, and meat consumption is 36 per cent of current consumption. Sugar consumption is also reduced to align with healthy eating guidelines. Reduction in consumption of livestock products is balanced by increasing plant consumption on the basis of constant food energy supplied. Fruit and vegetable consumption was increased by 50 per cent and basic carbohydrate (e.g. cereals, potatoes) and oil rich commodities (except palm oil) by 33 per cent. Substitution was estimated on the basis of food energy use at the commodity level using FAOSTAT data.'

Source: Audsley et al., (2010b: page 4).

As a starting point for the current project, we used the original MIS spreadsheets and combined the weekly menus of single working age women and men, without children, to give an approximate fortnightly diet. The MIS plate is very close to the Audsley recommendations with regards to the proportion made up by high starch foods and fruit and vegetables. It also matches the Audsley recommendations that the livestock component (i.e. meat, eggs and dairy) is half that of the current UK diet (16 per cent compared with 33 per cent); however, the beef component was only 25 per cent lower than the UK diet, while there was a much larger decrease in the consumption of poultry and eggs (81 per cent and 74 per cent respectively). As a consequence, the emissions associated with the current MIS diet are lower than the UK diet but not as low as the Audsley scenario.

We suggest bringing the MIS menus in line with Audsley through a further 50 per cent cut in the beef element (there were no lamb-based meals); this could be offset by 'allowing' a modest increase (of about 14 per cent) in 'other animal protein' foods. As the fish element of the current MIS diet is lower than recommended by Audsley, we would include this in the 'other animal protein' category. Compared to current MIS diets, this green diet has around five per cent lower GHG emissions, and is around two per cent cheaper.

Table 4.1 Protein guidance classification

(a) Current MIS menu for single working age woman and man

	Beef and Lamb	Other animal protein		Pulses or no protein
Light meals	Cornish pasty	Sandwich: Ham (x2) Cheese (x4) Egg Tuna	Jacket & Baked beans & cheese Jacket & tuna Tuna salad Pasta, tomato sauce & cheese	Tomato Soup Pasta & tomato sauce
Main meals	Spaghetti Bolognese Chili Lasagne Jacket & Mince Steak	Pork chop Bacon, sausage & egg Hawaiian pizza	Chicken curry Chicken breast Cod in breadcrumbs	

(b) Other meal options

Other animal protein	Pulses or no protein
Stir fry chicken	Jacket & Hummus
Grilled salmon	Hummus Sandwich
Chicken pasta	Leek & Potato Soup
Chicken salad	Quorn Curry
Fried eggs, chips and beans	Quorn Chili

A further useful way of presenting the changes in diets is to use the traffic light system. Table 4.1 colour codes the protein element of meals into red (bad) through yellow (less bad) to green (good). This chart might be of use in framing the discussion with the MIS focus groups. The first table identifies the protein components of the 28 main and light meals from the composite ‘two week’ menu (and reveals the one light meal that had no significant protein element – tomato soup). Parentheses indicate where a dish is chosen for two or more meals in the two week period. The second table offers additional common lower carbon meals, many derived from other MIS menus. These alternatives have been selected to be at the lower end of the emissions spectrum and so do not feature cheese, cod and pork dishes. We also exclude baked beans because the substantial weight of beans in a ‘normal’ portion cancels out the lower emissions reflected in the GHG ratings (135g of baked beans has a similar footprint to 17g ham). We would ask the MIS focus groups:

- Which, if any, of the beef dishes could be replaced with dishes from the green sections or, failing that, from the yellow sections?
- Could any of the beef dishes have their meat content reduced, and, if so, by how much?
- Which of the dishes in the yellow section could be replaced by those in the green sections?
- Could any of the dishes in the yellow section have their meat content reduced?

4.2 Other choices concerning food

Although dietary changes can bring the biggest measurable environmental benefits in food consumption, other changes in the characteristics of the food purchased also need to be discussed with the MIS focus groups. There are several reasons for this. One is because, as mentioned above, dietary switches may not have their intended effects if damaging production modes are adopted in order to supply alternatives. A second reason is that just because complexity makes it very difficult to measure carbon emissions associated with particular food products based on aspects of their production and distribution, and still harder to give signals about this through labelling, this does not make such factors unimportant. Obtaining the public's views about the extent to which acceptable food choices could be influenced by such factors is of general value in considering whether future norms may change, especially if our ability to identify and signal the ‘greenness’ of particular products were to improve. A third reason is because it is easiest to test public views about their willingness to accept new norms against factors that they already associate with sustainability, even though the evidence suggests that perceptions do not always align with reality. For example, Tobler et al., (2011) found that the public overestimate the influence of 'food miles' rather than of transportation means and also overestimate the environmental benefit of organic production, and the environmental harm of packaging.

In this context, the project will look at public views of changes which in general can be expected to have environmental benefits, even where these benefits are hard to measure, depend on various other conditions being present, or are small. On the other hand, we will avoid asking them about changes for which there is no clear evidence of environmental benefits.

4.2.1 'Organic'

Purchasing food with certification of organic production methods often has environmental benefits in terms of (for example) increased biodiversity and reduced eutrophication in comparison with traditional farming methods. Audsley et al., (2010a) estimated that overall a five per cent reduction in supply chain emissions might be achieved by a food system built on UK organic farming. However, other research has concluded that assessing the benefits of organic foods from both environmental and nutritional perspectives is complex (Brandt and Mølgaard, 2001) and it cannot be clearly determined that on balance organic farming creates net environmental benefit (see for example Williams (2002) and Magkos et al., (2003)). In the context of this highly mixed and ambiguous evidence, we do not propose asking MIS focus groups specifically about organic foods, but will explore their views briefly if the issue is raised.

4.2.2 Fish

Members of the MIS focus groups might be aware that there are severe problems with regard to the world's fisheries, and that stocks of fish in many parts of the world are endangered. In order to promote continued provision of fish, some researchers argue that a shift in consumer tastes toward more-efficient species, such as carp, catfish, and shellfish will be required (see, for example, Halweil (2011)). The Audsley Consumption Scenario 1 suggests that fish consumption remains at the same levels as it is today. As with organically certified food, therefore, we suggest only discussing views about this issue if it is raised by participants.

4.2.3 Seasonality and transporting of food

The least GHG-intensive fruit and vegetables are likely to be seasonal, field grown UK produce cultivated without additional heating or protection, that are not fragile or easily spoiled (Garnett, 2008)[11]. For imports, seasonal, field grown produce that requires only a short sea or short road journey will also be fairly low in intensity (Garnett, 2008). It is particularly important to avoid foods that have been air-freighted (Jungbluth et al., 2000). It would therefore be useful to consult the MIS focus groups on whether it is reasonable to expect the MIS diets to have a seasonal nature, and to exclude produce when it is out of season in the UK or nearby.

One problem with this is that it is hard for purchasers to implement, given current information systems in UK food shops. A possible information system[12] can be illustrated with respect to strawberries: when strawberries are in season in the UK in June and July they are cheap, plentiful and have relatively low environmental impacts. We can imagine an environmental rating system (1=low environmental impacts; 10=high impacts) in which such strawberries are given a rating of 1. In contrast strawberries purchased during the winter will probably be imported, more expensive and have higher environmental impact due to air freighting, and so might be given a rating of 10 on our scale. We can imagine shopping guidelines that might say that, for example, no produce with a rating above 5 on our scale can be purchased. This would provide seasonal guidance for consumers in their purchasing decisions: for example, apples might meet the criteria during the autumn and winter but during spring time they probably would not, and therefore apples might be substituted for a different fruit at this time of year. A similar rating system is already available in The Netherlands [13]; this web-based system, since its launch in September 2010, has had about 20,000 visitors to the website, and 30,000 downloads of the I-Phone 'App' (Nijdam, 2011).

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[11] Thus, for example, vulnerable perishable fruit should be avoided out of season.

[12] There is, of course, a limit to the extent to which information systems (product labelling) may have the desired effect. This is outside the remit of this paper.

[13] Produced by the Dutch environmental agency Milieu Centraal, available at http://groentefruit.milieucentraal.nl/Groente-en-Fruit-Kalender/groente-en-fruit-kalender/zoeken/formulier. The system is only available in Dutch.

Such a system may overcome the tendency of the public to focus on the single issue of 'food miles'. Food miles, as can be seen from the above discussion, is just one factor in the overall life cycle impacts of food (Dowler, 2008). The arguments concerning sourcing of food are complex: on the one hand, long distances in supply chains lead to high emissions from fuel use, compromise animal welfare standards, and encourage deeper industrialisation of food and food culture (FEC, 2011). On the other hand there are many social and economic benefits associated with trade in food, especially for developing countries (FEC, 2011). Therefore incorporating issues about how products are grown and how far they need to be transported, as well as the choice of produce itself, as achieved in an information system described above, is a possible pragmatic way forward, which has proven successful in The Netherlands (Nijdam, 2011).

4.2.4 'Grow your own' fruit and vegetables

Growing fruit and vegetables in gardens and allotments has many benefits, including increased understanding of food production and seasonality, and potentially reduced travel to shops. Additionally, use of communal gardens and allotments can increase sense of community, with the added value that that can have for well-being and other environmental aspects (Peters et al., 2010). However, growing your own fruit and vegetables does not necessarily decrease GHG emissions, as it can depend on specific practices employed, such as use of fertilizers, and heated greenhouses. We will not recommend that 'grow your own' is part of the Green MIS, although it will, nevertheless, be useful to seek the views of the MIS focus group participants.

4.2.5 Shopping

Food shopping is considered as part of the discussion on travel. See Section 5.5.

4.2.6 Storage and packaging

The way in which food is stored and packaged influences its overall environmental impacts. For example, a reduction in packaging may reduce the environmental impacts of the packaging, however, it may also compromise shelf-life, thereby increasing wastage and hence overall have a negative environmental impact. It is therefore important that appropriate storage and packaging is used to reduce losses.

- Fruit and vegetables tend to be refrigerated. Those transported long distances, or stored for long periods, tend to have high GHG emissions associated with refrigeration (Garnett, 2008). *Should these foods be specifically excluded from a 'green' MIS?*
- The highest supply chain losses tend to occur with regards to foods such as salads, which are delicate and have a short shelf-life. Pre-prepared produce (such as trimmed vegetables or mixed salad) are especially vulnerable to damage and require more refrigeration (Garnett, 2008). *Should these foods be specifically excluded from a 'green' MIS?*

4.2.7 Waste

It has been shown that on average over 6kg of food and drink is wasted per UK household per week, and reducing food wastage has been identified as a major, pro-environmental action (WRAP, 2009). Food waste collections have recently been introduced in many areas. Collected waste food is generally composted, thus reducing GHG emissions that would arise if it were sent to landfill as was traditionally the case. However, any food wasted at the consumer stage incurs wasted emissions embedded in its supply chain and therefore should be avoided.

In theory, food waste should not be a problem in the MIS, as the MIS budgets specify the quantity of food required to meet the needs of a specified family size. However, due to the problem of matching portion sizes required with portion available in shops, purchase of superfluous quantities of food arise. This is a particular issue with single person households. In some cases the MIS diets specifically note that excess quantities should be frozen. Therefore, although there is no need to explicitly take waste into account in the green MIS work, it could be mentioned to the focus groups.

4.3 Conclusion – Food

The most important potential actions concerning food that could be presented to groups can be summarised as:

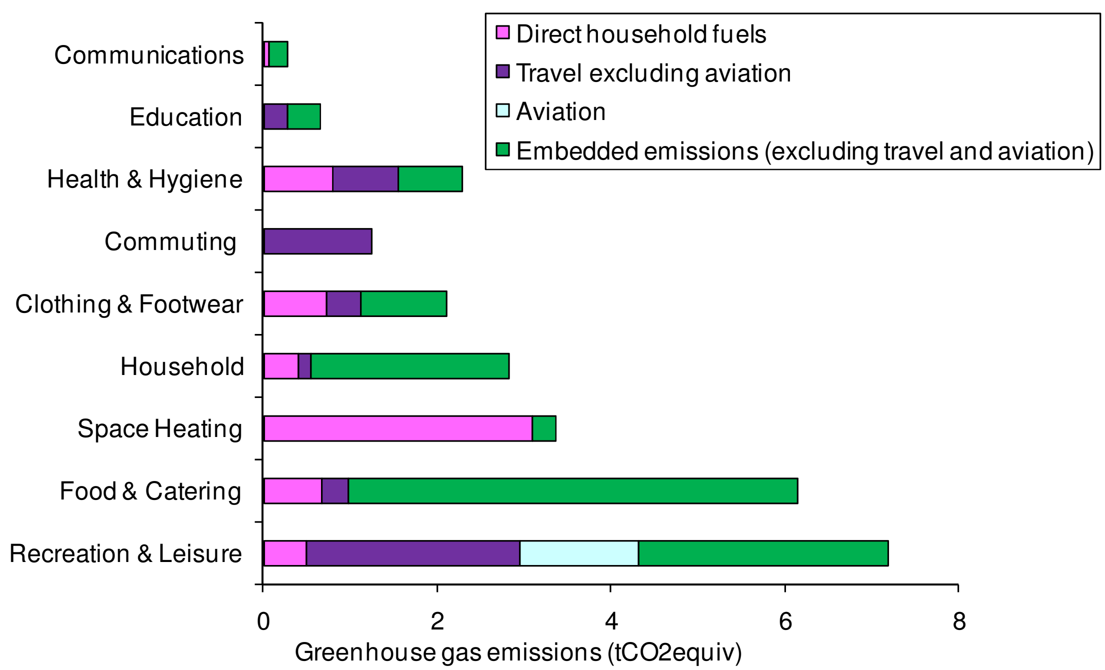
- Consider reducing consumption of meat from ruminant animals (cows and sheep).
- Consider purchasing, wherever possible, fruit and vegetables that are: seasonal, field grown UK produce cultivated without additional heating or protection, that are not fragile or easily spoiled. Examples of products that may at various times of the year sink below a five on our imaginary scale are probably:
    - Tomatoes. These will have a low rating while in season in the UK but then a higher rating out of season when they may be grown in a hothouse which is heated by electricity.
    - Peas. Similarly, these will have a low rating while in season in the UK but then a high rating if flown in from, for example, Egypt.

5 TRAVEL

5.1 Setting the scene - an average UK household's travel

Travel emissions (excluding aviation) account for around one fifth of the total carbon footprint of an average UK household. Figure 5.1 illustrates that there is an element of travel in all the major categories of the carbon footprint except, of course, space heating.

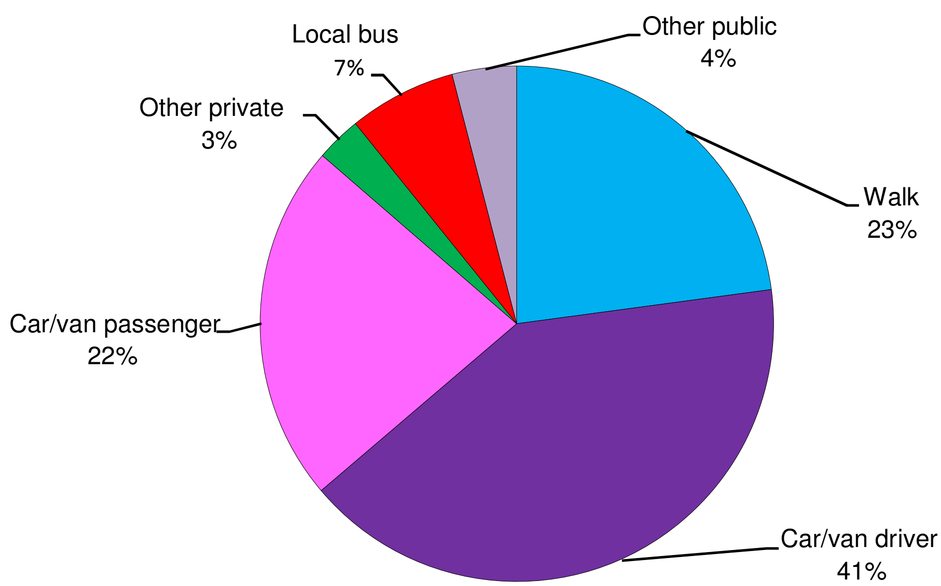
Figure 5.1 Greenhouse gases attributed to high level functional uses for an average UK household (2004)



Source: Druckman and Jackson (2010a) Figure 2.

There are two major ways of reducing emissions due to travel. First is to improve the carbon efficiency of the transportation, either by changing modes from, say, car to walking, or by improving the efficiency of the mode, such as lower fuel consumption cars. In 'greening' the MIS, we are interested particularly in changing mode, since the adoption of technologies that make a particular mode more efficient tends to occur in ways that do not affect consumer experiences and hence living standards. (There are, of course, certain exceptions to this, such as the ease of use of electric bikes and electric cars at various stages of technological development.) The second major way of reducing emissions is to reduce the need to travel. In 'greening' the MIS we consider both these options, although the possibilities for reducing the need to travel in the short term are limited by the existing infrastructure.

Figure 5.2 Average number of trips by main mode of transport in Great Britain (2007)[14]



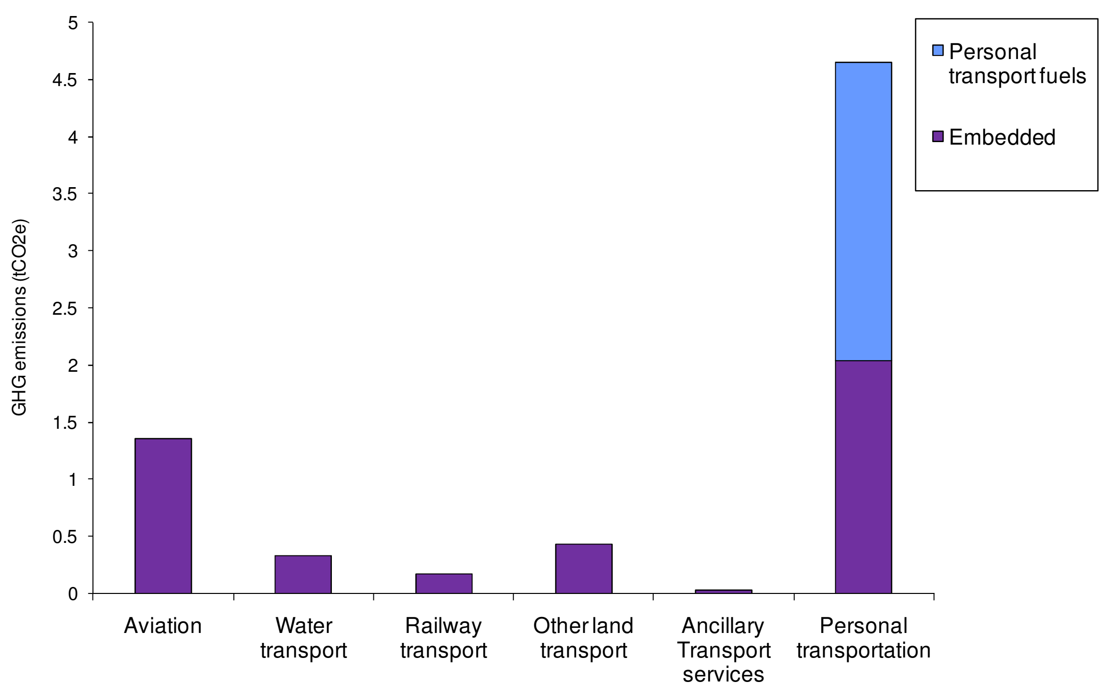
Source: Department for Transport (2010).

The pie chart in Figure 5.2 illustrates the extent to which cars are the predominant form of transport in Great Britain, accounting for nearly two thirds of trips, whereas under a quarter of trips are done by walking and only around one tenth by public transport. Car travel accounted for 79 per cent of the distance travelled on land (Department for Transport, 2010) and Figure 5.3 shows that travel emissions for an average UK household are dominated by emissions associated with running and owning personal vehicles (66 per cent of total transport emissions including aviation).

[14] This chart refers to average UK travel, not to MIS households.

This includes both direct fuel use and embedded emissions which comprise emissions associated with the manufacture, distribution and maintenance of vehicles, including running garages and service stations. Embedded emissions also include, for example, emissions that arise upstream in refining petrol, in tyre production and distribution, and running membership organisations such as the Automobile Association. Embedded emissions are therefore related to both the level of car ownership and also, to a limited extent, to the mileage travelled. It can thus be seen that both embedded and direct emissions are important and hence in 'greening' the MIS we consider possible reductions in both car ownership and in distances driven.

Figure 5.3 Travel emissions for an average UK household (2004)



Source: Druckman and Jackson (2010a)

One of the problems with moving to a less car based society is that the systems of provision for alternatives are largely not in place, although for low income areas they tend to be somewhat better than the general provision[15] (Stokes, 2011). The other is a social problem: cars are more than about getting from A to B; a person's choice of car is often an expression of their sense of identity, and status signal. Cars also provide a private space in which people feel safe and secure, whereas, to some people, a journey to be taken by public transport, walking or cycling can be much more challenging.

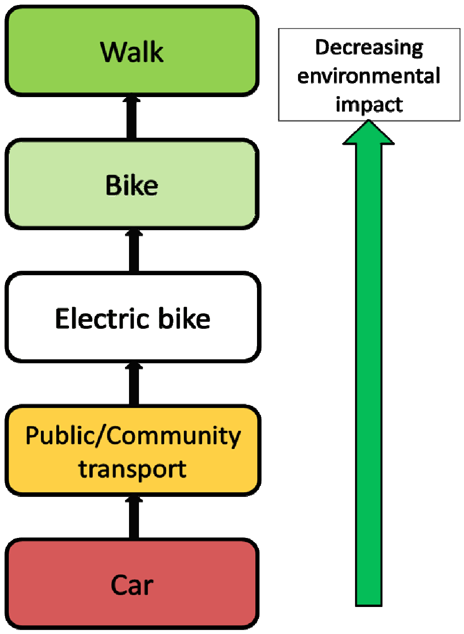
As shown in Figure 5.3 the carbon emissions due to use of public transport services (bus, coach, rail, ferry etc) by an average UK household are small in comparison to those due to personal transportation, being responsible for just 14 per cent of transport emissions.

5.2 Changing travel mode

The simplified hierarchy shown in Figure 5.4 gives guidance concerning preferred travel options for consideration in the 'green' MIS, although, of course, actual options for any particular journey depend on many factors such as distance and purpose of journey, and the physical capabilities of the traveller.

[15] Better off people tend to live in more suburban and rural areas with less public transport and more distant facilities (Stokes, 2011).

Figure 5.4 A simplified hierarchy of preferred travel options



Very rough guidance of the associated monetary costs and carbon dioxide emissions are shown in Table 5.1, separated into fixed costs and costs per mile, and emissions per mile and embedded emissions per year. The table illustrates the embedded emissions allocated to an electric bicycle are considerable due the battery manufacture at around half those of a car. This figure is surprisingly high and is thought to be due to the short lifetime of a battery, which is estimated to last for only around 1-2 years, so we have assumed 1.5 years[16]. However the emissions of an electric bike are *per mile* are over 30 times lower than those of a car. The table also illustrates that buses are generally environmentally preferred to car use, although this critically depends on the bus loading. With current average local bus loading, a bus produces around half the carbon emissions per mile compared to a car with single occupancy. A full bus will have lower emissions per passenger mile. The emissions per mile due to an electric bike are of the order of 16 times lower than those of a bus.

[16] Sources: Cherry et al., (2009), Barrett and Scott (2003) www.globalchangeblog.com; www.ford.co.uk; Department for Transport (various years).

Table 5.1 Estimates of monetary costs and carbon emissions of transport options

	Monetary costs		Carbon emissions	
	Per mile £ per mile	Fixed £ per year	Per mile kgCO2e per mile	Embedded kg CO2e per year
Walk	0.00	0	0.00	0
Cycle	0.00	33	0.00	<1
Electric bike	0.10	210	0.01	400
Bus	0.38	0	0.16	-
Car (small petrol car)	0.12	900	0.33	800

5.3 Travel assumptions in the standard (non-green) MIS

The starting point for this project is the general MIS and also the MIS for rural households.

In the standard urban MIS it is assumed that cars are not necessary, and each budget includes a weekly bus pass for every household member (except for pensioners and small children who travel free) (Bradshaw et al., 2008). All budgets also include provision for taxi hire, to cover specific trips such as weekly supermarket visits, late night journeys, or emergency hospital visits. Each budget contains a one-week holiday in the UK. In rural areas it is assumed that many family types will need a car, as shown in Table 5.2 (Smith et al., 2010).

Table 5.2 Minimum transport provision in rural MIS

	Rural town	Village	Hamlet
Single pensioner	Bus + taxi	One car: Ford Fiesta 1.2	One car: Ford Fiesta 1.2
Pensioner couple	Bus + taxi	One car: Ford Fiesta 1.2	One car: Ford Fiesta 1.2
Single working-age adult without children	One car: Ford Fiesta 1.2	One car: Ford Fiesta 1.2	One car: Ford Fiesta 1.2
Working-age couple without children	Bus + one car: Ford Fiesta 1.2	Two cars: 2 x Ford Fiesta 1.2	Two cars: 2 x Ford Fiesta 1.2
Couple parents with up to three children	Two cars: Vauxhall Astra Estate 1.4 + Ford Fiesta 1.2	Two cars: Vauxhall Astra Estate 1.4 + Ford Fiesta 1.2	Two cars: Vauxhall Astra Estate 1.4 + Ford Fiesta 1.2
Lone parents with up to three children	One car: Vauxhall Astra Estate 1.4	One car: Vauxhall Astra Estate 1.4	One car: Vauxhall Astra Estate 1.4

Source: Smith et al., (2010: Table 9)

In light of these identified patterns, we propose that the issues to be explored, as set out below are focused in particular on the case of people living in a rural town. This is the closest example we have to a ‘swing location’, where differences in transport modes suggested by different groups suggest that there is greatest potential for modal changes under the right circumstances. This case can be discussed in the rural groups. For the urban groups, there may be limited scope for discussing transport options, and issues around community transport as an alternative to taxis may be raised. If there is time, it would be possible also to discuss with these groups (a) the circumstances under which the assumption that public transport is acceptable will be valid (including whether it applies to people in all parts of an urban area and what kind of infrastructure will be required to sustain it); and (b) the scope for greater use being made of self-propelled transport as an alternative to public transport, given their lower emissions.

5.4 Short term ‘green’ MIS travel options

As stated above, the preferred travel option depends, amongst other factors, on the distance to be travelled. We have therefore drawn up a generic table of preferred travel options for various distances – see Table 5.3.

Table 5.3 Preferred green MIS travel options by distance

Distance travelled	Preferred Green Choice	Otherwise	Or Else
0-2 miles	Walk/cycle	Bus	Community transport /Taxi/Car share
2-5 miles	Cycle	Bus/train	Community transport /Taxi/Car share
5-10 miles	Electric Bike	Bus/train	Community transport /Taxi/Car share
10+ miles	Public transport	Community transport/Taxi	Car share

Community transport is non-profit transport that is developed by local people and communities to serve their local needs. It provides transport where there is either no existing conventional public transport or where existing public transport cannot be used, for example because of limited wheelchair access. Community transport services generally run during daytimes to provide access to shops, hospitals, social activities and so on, but some organisations are now providing, or considering providing, evening services. For example, the North Wealden Community Transport Partnership website states (under the heading of 'A bright future') that '*A locally based bus will enable evening and weekend operations and we have already received expressions of interest from a large number of local bodies which include youth, disabled and senior citizen groups as well as several local societies'.* [17] More information concerning community transport is provided in Appendix 3.

The primary advantage of community transport is that it involves shared vehicle use, and thus efficiencies should, in theory, be achieved. Taxis also involve shared vehicle use but can be an expensive option and do not, in general, achieve the same efficiencies because they provide private individual service rather than communal journeys. 'Car share' in the chart can apply either to lift-sharing schemes in a privately owned car or to use of car clubs. One of the draw-backs of lift sharing schemes is that they rely on private ownership of vehicles by at least some households, and, given the convenience of having a private vehicle parked outside a dwelling, this will, in many cases, lead to increased mileage. A car club provides people with a fleet of vehicles parked in their neighbourhood and gives them access to a car whenever they need it but without the high fixed costs of individual car ownership (Department for Transport, 2011). Car club members are able to mix and match their travel, using a car when that is the best option but travelling by public transport or cycling or walking at other times (Department for Transport, 2011). Car clubs are increasing in availability but will frequently not be available, or useful, in rural areas, as the vehicle may be too far from the place where it is needed.

[17] *http://www.4weald.co.uk/about.html*. Accessed 21.04.11.

If car ownership is deemed necessary it is important that the vehicle has as low emissions as possible. According to the Green-Car-Guide[18] suitable vehicles might be:

Small family car: Toyota Auris HSD

Estate: Skoda Fabia Estate SE 1.2 TSI 86 PS

We are not suggesting electric cars, as the battery-charging infrastructure is not yet in place. Hybrid vehicles tend to be expensive to purchase and do not give high enough fuel savings to warrant the extra capital cost.

In cases where a car is required, we suggest that eco-driving techniques[19] could be assumed when estimating the miles per gallon. Eco-driving involves measures such as: driving smoothly; driving slower and maintaining a steady speed in as high a gear as possible; switch off the engine when stationary for more than a minute, and keeping tyres properly inflated.[20] Such measures can reduce fuel use by 15 per cent[21].

Of course, the mode of transport does not rely solely on the distance: it depends also on factors such as the purpose of the journey, and peoples' physical abilities. We therefore will discuss ‘green’ travel options in relation to the purpose of journeys.

5.4.1 Work related travel

The median travel distance to work by residents of rural towns in the UK is 7 miles (Smith et al., 2010: Table 7). Thus according to the generic guidance in Table 5.3 the first preference for a ‘greener’ option than travel by personal car is electric bike.

[18] http://www.green-car-guide.com/guide/small-family-cars-2.html.

[19] http://www.energysavingtrust.org.uk/scotland/Scotland-Welcome-page/At-Home/Transport-Eco-driving/Eco-driving-Tips.

[20] For a more complete list with more details please see http://www.energysavingtrust.org.uk/scotland/Scotland-Welcome-page/At-Home/Transport-Eco-driving/Eco-driving-Tips.

[21] http://www.energysavingtrust.org.uk/scotland/Scotland-Welcome-page/At-Home/Transport-Eco-driving/Eco-driving-Tips.

The discussion with MIS groups could be informed by the following questions:

- What work place measures might be required? (e.g. provision of shower, changing and storage facilities, charging points for electric bikes).
- If safety is brought up as a barrier to the uptake of cycling, ask what cycle infrastructure would be necessary to make cycling an acceptable option (examples include cycle lanes, or cycle paths that are separated from traffic).
- Given the above, can you envisage cycling to work being the norm, such as in Holland?

The next preferred option is bus or train, and for the MIS it is expected that bus will be the preferred option due to cost. This will lead to a discussion concerning the availability of buses, both in terms of the routes operated and the suitability of bus timetables for commuting to work. Therefore further issues of interest to the MIS groups are:

- In cases where suitable bus routes exist, but the timetables are not suitable for commuting, would use of buses to get to work be possible if employers agreed to flexi-time working to fit in with bus timetables?
- If bus routes and timetables were suitable for commuting, would commuting by bus be an acceptable option?
- Alternatively, could people be expected to restrict their choice of job to those accessible on bus routes?

For commuting to work the use of taxis or community transport are not realistic but car-sharing is the next best option after buses.
This raises the issue:

- What work place measures might be required? (e.g. free/guaranteed parking for car sharers; facilitation of search for car share partners).

5.4.2 Education

The median travel distance to school for primary aged children in rural towns in the UK is one mile (Smith et al., 2010: Table 7). Thus most primary school children will be able to walk or cycle to school, generally being escorted by an adult. In cases where it is hard for a family member to escort the child, use of a ‘walking bus’ enables the child to get to school. A ‘walking bus’ is a group of children walking to or from school with a minimum of two adult escorts, following a set route, with agreed pick up and drop off points at or near pupils’ homes. The walking bus allows parents to share responsibility, and even enables some young children to walk whose parents are unable to accompany them on foot.

The median travel distance to school for secondary aged children in rural towns in the UK is three miles (Smith et al., 2010: Table 7). Thus the preferred option for secondary school children is cycling but where this is not deemed appropriate public transport is the next preferred option.

5.5 Shopping

Shopping is an activity where there is scope to reduce the need to travel as well as increasing the efficiency of the mode of transport when specifying how to ‘green’ the MIS. We suggest that the MIS budgets provide for local shopping. This will involve frequent trips for regular items undertaken by walking or by bike, supplemented with less frequent shopping for heavy and bulkier items, either by community transport, taxi or internet shopping with home delivery.

The benefits of buying locally are hard to quantify: they include reduced travel (potentially having savings in time, GHG emissions and money), increased sense of community, flourishing neighbourhoods, and increased physical activity with resultant health benefits (Dowler, 2008; PAT, 1999; Rex and Blair, 2003). Food shopping warrants special consideration here, as food is purchased on a more regular basis than other products. Where the local food shop is a supermarket we recommend that this shop is used. Purchase of food from supermarkets is often not regarded as ‘green’ due to a number of factors, including supermarkets’ treatment of farmers, and their focus on bulk turnover, which encourages consumers to purchase above their requirements and hence increases waste[22]. However, the major supermarket chains are making significant efforts to increase the sustainability of

[22] See for example ‘Buy one get one free’ and ‘3 for the price of 2’ offers.

their produce, and so for the purposes of the green MIS we suggest a simple rule of local shopping, whether this be a supermarket chain or not.

Farmers' markets are becoming increasingly popular. A farmers' market supplies food directly from producers to consumers, so circumventing the 'middlemen' in the food supply chain (Trobe, 2001). According to Trobe (2001), the benefits for consumers include provision of locally grown, fresh, healthy and, in many cases, organically certified food at affordable prices. Additionally, through buying locally grown produce, consumers are giving their support to local producers as well as helping to revitalize rural economies (Seyfang, 2009; Stagl, 2002; Trobe, 2001). The environmental benefits due to reduced food miles depend on the distance travelled to the farmers market. For example, one study has suggested that if a customer drives a round-trip distance of more than 6.7 km in order to purchase their vegetables, their carbon emissions are likely to be greater than the emissions from the system of cold storage, packing, transport to a regional hub and final transport to customer's doorstep used by large-scale vegetable box suppliers (Coley et al., 2009). Therefore, again, as with local shops, it is hard to precisely quantify the benefits and drawbacks of purchasing from farmers' markets, and we will not recommend that they are used within the 'green' MIS. Nevertheless we will seek the views of the MIS focus group participants.

There is an increasing number of schemes that supply locally grown, organic, seasonal fruit and vegetables direct to the door. These can decrease travel emissions to shops and have the advantage of encouraging purchase of local produce, but without the advantages of increased sense of community mentioned above in connection with local shops and farmers' markets. These are currently 'niche' services, and expansion of them might encourage over-commercialisation with attendant loss of quality and trust (Audsley, 2011).

The MIS groups might raise the question of local *accessibility* to fresh foods, in particular fresh fruit and vegetables. This question draws on the (contested) theory of 'food deserts' which defines food deserts as '*areas of relative exclusion where people experience physical and economic barriers to accessing healthy food'* (Shaw, 2006: p 231). Local accessibility to shops in low income areas has declined during the last two decades as the number of superstores has risen[23]. According to PAT (1999) this is due to falling and low local demand, crime and the threat of crime, and lack of local competition which sometimes leads to overpricing and low quality goods. Furthermore, as noted by Dowler (2008) food prices vary "*by retail source (as well as by quality, economies of scale, etc.); large multiple retailers … are likely to maintain the lowest prices for basic commodities, although traditional markets and discounters can be cheaper for particular foods*." Nevertheless, evidence concerning the extent of food deserts is mixed: Dowler (2008) notes that while some studies have found little evidence of them[24], other studies such as Rex and Blair (2003) found clear evidence of '*healthy food desertification*' (Rex and Blair 2003: page 461)[25]. So although we acknowledge that food deserts (or 'healthy food deserts') may be a problem in some areas, we do not think it is sufficient a barrier to not suggest local food shopping as the preferred way forward for discussion at the MIS focus groups.

5.6 Conclusion – transport

The above analysis gives an indication of the relative environmental impact of different transport choices that can be presented to groups. The central objective of the transport section of the groups should be to explore the social acceptability of switching modes, including the conditions that would need to be in place to improve this acceptability. The most important switches to be explored in the focus groups (in all cases for some but not all trips) should be:

In rural towns:

- From car to public transport, bike or electric bike for work and for leisure trips.
- From car to walk or cycle for trips to school where these are less than one mile.
- Greater sharing of cars, and potential for use of community transport.

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[23] "*While the number of superstores in this country has increased from 457 in 1986 to 1102 by 1997, some eight independent shops disappeared everyday between 1986 and 1996. The number of independent stores has declined by almost 40 per cent in the eleven years between 1986 and 1997[2].*" Nielson Market Research (1998) cited by (PAT 1999: page 1).

[24] See for example Cummins and Macintyre's (2005) study of Glasgow, cited by Dowler (2008).

[25] In contrast, they found access to chocolate, cigarettes and biscuits was relatively good.

In urban areas:

- From taxis to community transport where public transport is not an option.
- Conditions required to preserve the no car ownership assumption (if time).
- Greater scope for walking or cycling.

In addition, the possibility of lowering travel needs will be explored, looking at two principal issues:

- Is there at present scope for doing more things more locally, especially shopping, and therefore making shorter trips?
- Can participants envisage living in a world where more things could be done within a single local area, such as living, working, playing and shopping? This can involve discussion both about whether communities may start organising themselves differently (community self-organisation) and about how people would feel if planners moved towards designing mixed use developments.

6 LONGER TERM CHANGES

In this section we outline longer-term (up to around 2050), more visionary changes to the MIS that were prepared for discussion at the focus groups. These are qualitative only, with no attempt to quantify either the price or GHG ramifications.

6.1 'Localism'

In this scenario we envisage strong local government and empowerment of community groups. Mixed use settlements will be the norm, where people can work, shop and enjoy recreational activities without the need to travel beyond their locality. People will in general be able to walk or cycle to their local services, and where this is not possible, community transport schemes will be available. Facilities for cycling will have been dramatically improved and cycling will be considered the norm in this scenario.

We envisage that households will group together to purchase renewable technologies such as biomass combined heat and power systems (CHP), wind and solar. Communities set up shared facilities such as communal laundries, and DIY/garden tool sharing schemes.

6.2 'It's all done for us'

In this scenario we envisage settlement patterns remain largely unchanged. People will still be travelling substantial distances to access work, shops, hospitals, entertainment and so on. The central grid electricity supply will be largely decarbonised and electric vehicles will have become the norm. Disadvantaged rural communities will rely on electrified bus transport but where this is not available cars will be required, as currently. People who do not own cars will have to rely on informal car sharing and lift schemes, as community initiatives will not have been encouraged and hence there will not be any community transport schemes. Facilities for cycling will not have been improved and although electric bikes will be available their use will be limited due to safety concerns.

Building regulations for both new build and refurbishment are very strong. Old solid wall 'hard to treat' buildings have been refurbished. New dwellings are generally smaller than current standards (therefore more fuel efficient) and the built form is generally flats/terraced houses rather than detached/semi-detached. *The focus groups might be asked: how acceptable will it be for families to live in apartments instead of houses with gardens?*

'Choice editing' is carried out so that it is no longer possible to purchase 'energy guzzling' appliances – only A+++ rated appliances and gadgets are available. *The focus groups were asked to discuss how acceptable they find choice editing in this manner.*

7 CONCLUSION

In this paper we have set out options for 'greening' the Minimum Income Standard. This paper formed the basis of suggestions that were put forward for consideration of their public acceptability through focus groups in the second part of the project.

The Sustainable Income Standards project is important not only because it gauges the public acceptability of specific changes in Minimum Income Standards to take account of sustainability issues, but also because it gives a wider indication concerning the public acceptability of changes in norms towards 'greener' ways of living for low income groups.

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APPENDIX 1 HOUSEHOLD ENERGY

Table A1 Energy savings results achieved by use of a microwave in place of electric oven or hob

Food	Circumstance	Energy-saving range*
Milk	Up to 800g cooked in 200g portions in mugs in microwave vs a saucepan on the hob	25-50%
New Potatoes	Cooked with little water, in microwave vs more water on hob	70-75%
Frozen Vegetables	Cooked with little water, in microwave vs more water, on hob	65%
Fresh Salmon fillet	Cooked without water, in microwave vs poached in water, on hob	63-78%
Whole chicken	Cooked using convection and microwaves in a combination microwave oven vs electric oven	23%
Baked potatoes	Cooked using convection and microwaves in a combination microwave oven and microwave only methods vs electric oven	21-61%
Lasagne	Cooked using microwave only vs electric oven	40-81%
Indian ready meal	Cooked using microwave only vs electric oven	38-63%
Frozen ready meal for one	Cooked using microwave only vs electric oven	55-73%
Frozen pizza	Cooked using convection and microwaves in a combination microwave oven vs electric oven	22%

* Energy-saving range varies with number of portions and microwave function
Source: MTP (2009: Table 3).

APPENDIX 2 TRAVEL ESTIMATIONS

Table A2.1 Estimates of the weekly cost and GHG implications of changes from the MIS to the proposed measures: assumes different distances for different purposes

	Measure (Instead of using a car)	Cost saving if new measure adopted (£/week)	Carbon saving if new measure adopted (kg CO2/ week)
Work related travel	4 miles: push bike 8 miles: electric bike 18 miles: bus	4.25 1.42 -0.35	11.67 23.03 26.92
Education; older child Two trips by child replaces four trips by parent (i.e. drop off/ pick up)	2 miles: walk or push bike 5 miles: electric bike 13 miles: bus	3.51 5.12 18.18	9.64 23.94 47.40
Food shopping (and other shopping using free Park-and-Ride)	2 miles: walk or push bike 5 miles: electric bike 13 miles: bus	0.48 0.20 -1.28	1.32 3.25 4.40
Shopping for clothes and personal goods (add £4 car park charges)	2 miles: walk or push bike 5 miles: electric bike 13 miles: bus	4.48 4.20 2.72	1.32 3.25 4.40

Table A2.2 Estimates of the fixed costs and GHG implications of different types of transport (per year)

	Details	Cost implications (£/year)	Carbon implications kgCO2e per year
Car	Car	600	792
	Car Tax	95	
	MOT charge	55	
	Service	158	
	TOTAL*	**908**	**792**
Electric Bicycle	Bicycle	50	300
	Maintenance (includes battery replacement)	156	
	TOTAL	**200**	**300**
Bicycle	Bicycle and maintenance	30	<1
Bus	Manufacture	0	-
Walking	Cost of equipment	0	0

*Excludes insurance

APPENDIX 3 COMMUNITY TRANSPORT

This information is obtained from East Sussex County Council's website[26]

What is community transport?

Community transport is non-profit transport that is developed by local people and communities to serve their local needs. It provides transport where there is either no existing conventional public transport or where existing public transport cannot be used, for example because of limited wheelchair access.

Community transport can be provided by a variety of vehicles, from a voluntary car service all the way through to a bus; it depends on the needs of the community. Most community transport services are not run on a schedule or timetable, but rather respond to requests when they are made.

Who can use community transport?

Community transport can be used by everyone in the community.

Some operators only carry selected groups, but you should contact operators in your area to see if you could use the service.

Where does community transport operate?

There are already more than 40 community transport schemes operating in East Sussex and the number is growing all the time. Every community transport service is different and has been developed to serve the needs of its community. Typical destinations include hospitals and doctors' surgeries, shopping centres, places of work and places of entertainment.

How much does community transport cost to use?

Each community transport operator has its own fares structure but fares will often be based on the distance of your journey and whether a single or return journey is required.

Will my Concessionary Travel Pass be accepted?

Some community transport operators may accept a Concessionary Travel Pass; however they are not required to and you should always check with the operator before booking your journey.

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[26] East Sussex County Council: http://www.eastsussex.gov.uk/roadsandtransport/public/communitytransport/download.htm

Could you volunteer?

Community transport relies on local volunteers to help with bookings, fundraising and driving. A few hours of your time could make a difference to your community. Contact your local operator for more information.

What is East Sussex County Council's role?

The County Council works in partnership with a range of organisations including Primary Care Trusts, local people, community groups and operators to ensure that community transport schemes provide local solutions to local transport needs. The County Council provides advice and support wherever possible; however, it is important the focus and control of these services remains with the local community.

Examples:

- Polegate Taxi Rider[27]: provision of regular hourly door-to-door service to and from Polegate Town Centre from surrounding neighbourhoods. Operates Monday – Friday morning and afternoons, and Saturday mornings. Cost £1 or less (children under five are free).
- 'Youth Express' bus, Heathfield[28]: offers free transport to the Junior Night at Heathfield Youth Centre on Thursday evenings during term time.

[27] http://www.eastsussex.gov.uk/NR/rdonlyres/93F2D7D5-F20D-4E87-817E-1D5DAD5C88C9/0/polegate_taxi_rider.pdf

[28] http://youth.heathfield.net/youth-express.php