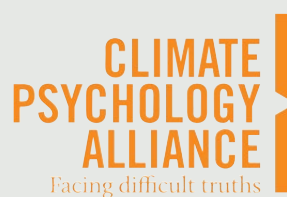


The Carbon Conversations guide to

*Living with the*  
**CLIMATE CRISIS**  
*Living lightly*

A guide to carbon reduction  
for members of *Living with  
the Climate Crisis* groups

Rosemary Randall and Andy Brown



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If you wish to translate this material or adapt technical data to fit other geographical regions please contact [admin@climatepsychologyalliance.org](mailto:admin@climatepsychologyalliance.org)

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# INTRODUCTION

*Living lightly* is written for people taking part in the Climate Psychology Alliance's *Living with the climate crisis* groups. It explains the impact of an ordinary UK lifestyle and explains how making changes to your diet, travel, purchases and home can make a difference. It explains how a footprint is calculated, raises some key issues for each area, lists actions to take and suggests some points to discuss with friends or family. Finally, it raises some other environmental issues you may want to consider: water, plastics, biodiversity and land use. You can work through the pamphlet alone but most people find it easier to approach carbon reduction as a conversation with others.

Carbon reduction is just one of the ways in which you can take action. The many others – political action, projects in your local community and action at work – are covered in the accompanying *Participant's handbook*. Reducing your own impact is a way of preparing yourself for the future and living in accordance with your values. Detailed knowledge about your carbon footprint can also help you focus on the actions that will make a big difference, stop you fretting about small changes and inform the rest of your campaigning and conversations about the climate crisis.



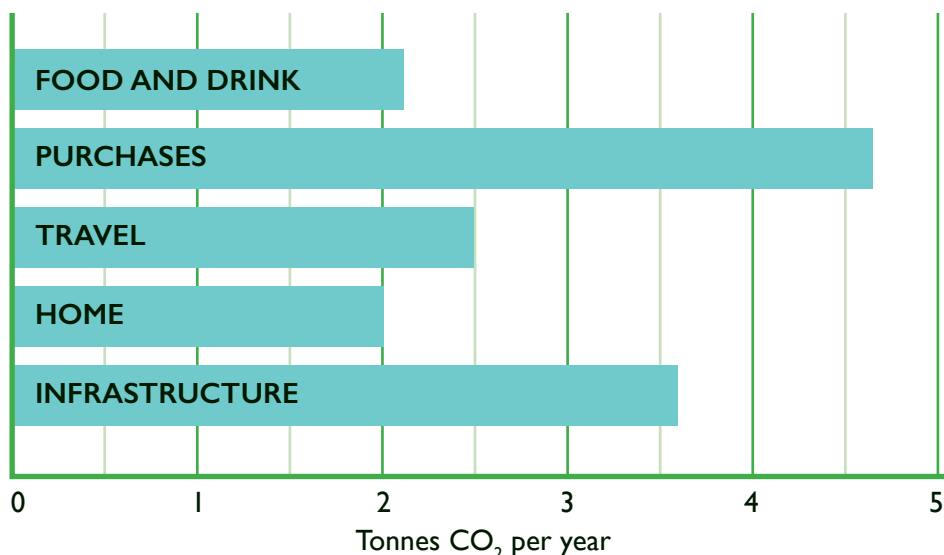
# 1: An introduction to carbon footprints

Carbon footprints are a way of describing our impact on the climate. They can be calculated for countries, industry sectors, organisations and individuals. They are measured in tonnes of carbon dioxide equivalents (CO<sub>2</sub>e) and include:

- **direct emissions** which come from burning fossil fuels like oil, gas or coal in your boiler, your stove or your car;
- **indirect emissions** which come from burning fossil fuels to make electricity;
- **embodied emissions** which come from the fuels used to make manufactured goods, services and food;
- **other greenhouse gases** (measured as CO<sub>2</sub> equivalents) like nitrogen oxides (which come from burning fuels), methane (which mostly comes from agriculture) and fluorocarbons (found in some parts of industry and some refrigeration systems).

The following graph shows how an average, individual, UK carbon footprint of 15 tonnes is made up.<sup>1</sup> This is the footprint for someone on an average income. Wealthier people usually have higher footprints because they tend to live in larger houses, travel more, replace consumer goods more frequently and generally make more purchases. People with a below average income will have a correspondingly smaller footprint.

Figure 1: CO<sub>2</sub>e in an average UK footprint



**FOOD AND DRINK (UK average: 2.1 tonnes)**

Eating a diet heavy in meat and dairy, using a lot of processed and imported food might create 5 tonnes of CO<sub>2</sub>. A vegan diet, mainly from local sources and with very little processed food might produce only 0.5 tonnes of CO<sub>2</sub>.

**PURCHASES (UK average: 4.7 tonnes)**

Spending £5,000 a year on carbon intensive purchases such as a new car or home improvements will produce 5 tonnes CO<sub>2</sub>. Spending the same amount of money on less carbon intensive purchases such as clothing, services (cleaning, gardening, education, health services) phone calls and IT will produce 1.5 - 2 tonnes CO<sub>2</sub>.

**TRAVEL (UK average: 2.5 tonnes)**

Driving 10,000 miles per year will produce 3-4 tonnes of CO<sub>2</sub>. A return flight to New York will create 3 tonnes of CO<sub>2</sub>. Cycling to work, using trains and buses and taking no flights may produce less than 0.5 tonne.

**HOME (UK average: 2 tonnes)**

Someone who lives alone, in a large, un-insulated home with the thermostat set high and old, inefficient appliances, might be responsible for 5 tonnes CO<sub>2</sub>. Someone who lives in a highly insulated, fully occupied home with efficient appliances used carefully, might be responsible for only 0.5 tonnes.

**INFRASTRUCTURE AND PUBLIC SERVICES**

**(UK average: 3.6 tonnes)**

The government emits CO<sub>2</sub> for you through the services it provides such as building roads, running hospitals and schools and maintaining the army.

## Measuring your impact

People's reactions to measuring their footprints are complex. It's easy to feel defeated by a high figure, puzzled by questions that don't quite fit your circumstances, or to disagree with the assumptions behind some questions.

Calculating a footprint is complicated and you will see both lower and higher figures than the ones we use. Many of the lower figures ignore the embodied emissions, don't include figures for land use and deforestation or don't take account of the emissions associated with international transport and with importing consumer goods and food. We've chosen to use some of the higher figures because we think they give a more realistic picture. The ones in the chart above come from the Open University, who also offer a good discussion of the issues involved.<sup>2</sup> In the later sections of the pamphlet we also draw extensively on the work of Mike Berners-Lee (Berners-Lee 2020), particularly when offering figures for particular products.

The first step in lowering your impact is to get an idea of your starting point. There are two calculators we recommend.

The Open University's calculator is part of a free open access course, [Environment: treading lightly on the earth](#) and is our favourite. Developed by Peter Harper and Robin Roy it is a development of the calculator *Carbon conversations* used. It is detailed on housing, good on accounting for income and includes an allowance for government expenditure made on your behalf. You have to register for the course but this is simple. You don't have to complete the course to use the calculator but you may find it useful to do so. The calculator is in Section 3:1.<sup>3</sup>

The [World Wildlife Fund for Nature's calculator](#) is quick and easy to use and is also available as an app. The questions are more limited than the Open University's and there is less explanation of the method used and the results. It offers simple carbon-saving hints.<sup>4</sup>

Both these calculators estimate your carbon emissions based on some easy to answer questions. If you want more exact answers it's straightforward to measure your own direct and indirect emissions. Reading your gas and electricity meters, checking how much petrol you buy and counting the mileage from journeys made by train, bus, ferry and plane will give you quite an accurate figure. An online calculator which allows you to enter figures from your energy bills is [Carbon Savvy's full calculator](#).<sup>5</sup>

Calculating the impact of food and other goods and services is a little harder. Researchers have two ways of doing this which are sometimes called 'bottom-up' or 'cradle to grave' analysis and 'top-down' or 'input-output' analysis.<sup>6</sup> The figures we use in this handbook come from both methods and are the best we have been able to find.



Remember that the purpose of measuring your footprint is to give you a broad sense of your impact. If you'd like a clearer picture you can take actual measurements of your direct emissions (gas, oil, petrol etc.) and your indirect emissions (electricity).

### What's a good target?

Different countries produce different amounts of CO<sub>2</sub> and there are huge inequalities. People in the developed world are the biggest polluters. The United States, has 5% of world population, but is responsible for about 25% of global CO<sub>2</sub> emissions. Here are some figures for average CO<sub>2</sub> emissions per person each year<sup>7</sup>:

- USA . . . . . 21 tonnes
- UK . . . . . 15 tonnes
- India . . . . . 1.5 tonnes
- Tanzania . . . . . 0.3 tonnes
- World average . . . . . 7 tonnes

At present, the world can absorb roughly 2.5 tonnes of CO<sub>2</sub> per person each year. As world population grows, this figure will fall to 1 or 1.5 tonnes per person per year. The UK's Climate Change Act commits the country to reducing carbon emissions by 78% from 1990 levels, by the year 2035. At least a third of this relies on the public making changes to their travel patterns, diet, home energy and purchases.<sup>8</sup> If this goal is achieved it should get the average carbon footprint down to around 2 tonnes. Many scientists and environmentalists say these reductions need to happen sooner. They suggest we should aim for an individual limit of 1 or 2 tonnes per person, by 2030 at the latest.

Government and industry need to plan for major shifts towards a sustainable or steady state economy. This means decarbonising the energy supply, halting airport expansion, developing public transport, reducing meat production and producing longer-lasting, more efficient, repairable goods. Individuals and families need to embrace lives which involve less travel, less meat and dairy produce and fewer consumer goods. Employment needs to switch from high-carbon areas such as tourism and fossil fuel production to low-carbon work in new industries like battery production and in revalued, older ones like social care. Taking steps towards this now can restore your sense of integrity. It can demonstrate to others that a low-carbon life is an enjoyable one and produce carbon reductions which are valuable in themselves.

### Aim to halve your footprint

We suggest you put to one side the 3.6 tonnes that the government emits on your behalf. Then - if you have an average footprint - aim for a limit of 5 or 6 tonnes in the rest of your life - and see how close to that goal you can get. This gives you a goal of around 1 tonne each for your home energy, travel and food and 2.5 tonnes for the goods and services you buy.

*Remember that the purpose of measuring your footprint is to give you a broad sense of your impact.*

If your footprint is larger than average, ignore the 3.6 tonnes of government-related emissions and try to halve the rest. For example if your starting point is a 25 tonne footprint you should aim for about 10 or 11 tonnes.

If your footprint is smaller than average, you are already on the journey. Aim for 5 tonnes.

Don't expect to achieve your goal immediately. Many changes need to be planned and negotiated with others, and can't all happen at once. Most people with an average footprint can achieve a three tonne reduction fairly quickly. There is then a slower process of organising the harder changes. Four or five years would be a reasonable time-scale.

### Rebound

It's important to be aware of the risks of rebound.<sup>9</sup> Although energy efficiency reduces emissions, the savings are often less than hoped for. At industry level, better fuel efficiency has led to cars becoming bigger. At the personal level it encourages people to feel longer journeys are OK. Similarly one study of home upgrades found that 5-15% of the energy savings were lost through rebound, mostly through money saved being spent elsewhere.<sup>10</sup> And while a vegan diet may save you money, if you then spend that money on something with a higher carbon cost (for instance a flight or some cheap clothes) you may actually increase your total carbon emissions.<sup>11</sup>

### Off-setting

Many people are attracted to the idea of off-setting. Off-setting companies offer to compensate for the carbon you emit by funding carbon reduction elsewhere, usually in the form of planting trees or providing efficient cooking stoves to poorer countries. For such a scheme to be valid it has to prove additionality – that the tree planting or provision of stoves would not otherwise have happened. This is difficult to do and few schemes achieve it. They are also criticised because they shift responsibility from those who are the cause of the problem to those who are not, whether this is poorer people or the rest of the natural world. In addition, the amount charged is rarely enough to compensate for the full impact of the emissions. Flight offsets for example usually only take account of the fuel used and ignore the effect of its use at high altitudes, the embodied emissions of the aeroplane or the emissions associated with fuel production and the airport itself. If you have to take an unavoidable flight (for instance to see family overseas) it is better to cut out the middleman and donate money to a tree-planting charity instead.

### Star-ratings

People often ask: 'How much carbon will I save by insulating my loft/ giving up meat/taking the train instead of the car?' There is no one answer. The carbon saved by insulating a loft will vary depending on the size of

*Most people with an average footprint can achieve a three tonne reduction fairly quickly.*

your house, the amount of insulation already present, other energy-saving measures taken and how you deal with the rebound effect. Some actions are always big however and some are always tiny. At the end of each section you will find a chart for that area of your carbon footprint with lists of possible carbon-reducing actions. Each has a star-rating against it. One star is a small saving, five stars is a big one. In general, each extra star doubles the savings. Use these as a guide to what to do.

## The difficulty of change

Many carbon-reducing actions are straightforward but some are not. Some of the difficulties are practical and systemic. People are made complicit in systems they hate by the lack of alternatives. You may lack the money to upgrade your home. Your pension may be invested on your behalf in fossil fuel industries. You may have a long car journey to work because rents in the city centre are high and public transport doesn't fit your shifts. The demands of family and work may simply mean that you lack the time and attention to really consider your carbon impact.

Many of the difficulties are also psychological, rooted in relationships with family and friends or in the losses and challenges of making major life-style changes. It can be painful and shocking to realise that many of the ordinary pleasures of day-to-day life are damaging. What do you do when it's no longer OK to hop in the car to buy milk? How to cope if burgers for supper move off the menu? Or if the pleasure of splashing out on a cheap dress is spoiled. Your sense of identity may feel threatened if it's tied up with having moved to a more affluent lifestyle than your parents, with overseas travel or a top job in a polluting industry. Relationships with family and friends can be another source of trouble. Your family may object to what feel like restrictions. Friends can be dismayed that you are no longer keen on high-carbon activities you used to jump at. In the face of these difficulties many people retreat.

Sometimes people overestimate the value of their current carbon-reducing activities. They may imagine that cycling to work compensates for an annual flight for example, or think that as long as you do your recycling you're in the clear. Alongside this many of us underestimate our power to change, focusing on the obstacles instead of the possibilities.

Another common retreat is to focus on the culpability of other players – government, industry, the USA or China – and to join with others in a comforting agreement that there is little to be done.

The truth is that change is often difficult. Taking one path means letting go of another and there is often a lingering regret for the path abandoned. Even in changes that you welcome, loss is involved. Sadness, anger and frustration can waylay you and sabotage your best efforts. Nonetheless, when you succeed, particularly when a change is tough for you, the rewards are significant. There is real pleasure in knowing that you are taking steps towards a low-carbon future and maybe influencing others along the way.

Things which are likely to help are:

- connecting with your motivation and concern;
- connecting with others who are pursuing a low-impact life;
- talking about the difficulties;
- planning for change and being realistic about what you can manage.

You will have explored your values and motivation during the group meetings and it can help to feel grounded in these. Remind yourself why climate matters to you. Is it your love of the natural world? Your belief in fairness and equality? Your desires for your children's future? Something else? Usually these reminders help but people sometimes feel guilty that they are not living up to their ideals, upset by a critical, inner voice that tells them they ought to do more than they easily can. Guilt can be a cruel and paralysing emotion. Think instead in terms of mobilising your care and concern. Empathy for others, a sense of your relationship to the rest of the natural world and a proportionate sense of responsibility are likely to be more helpful than a punishing sense of failure.

Talking openly with others usually helps. Sharing your attempts, successes and difficulties with like-minded friends can support you through tough patches. Talking with those you share your life with can help overcome their opposition and often reveals support you didn't know was there. The group sessions on communication should help you approach these conversations constructively.

Finally, assess how realistic the changes you intend to make are. One way of doing this is to use force field analysis, an approach devised by Kurt Lewin for exploring how to make changes in complex situations.<sup>12</sup>

### Using force field analysis

In any system, some forces are pushing for change and others are preventing it from happening. The system in question could be your own inner world, your workplace, your family, a wider social system (such as transport) or some combination of all these. The status quo is maintained when these forces are evenly balanced, keeping the system in equilibrium. If you want to see change, you have to decide how you will affect these forces. The example below shows a young woman, Jane, thinking about commuting by train instead of by car. On either side are brainstormed lists of the driving forces (which are pushing for the change to happen) and the restraining forces (which are preventing it from happening). She has scored each force on a scale from 1 (weak) to 5 (strong) to show how powerful the opposing forces are.

It is always more effective to remove or weaken the restraining forces rather than to increase the strength of driving forces. Think of it as the difference between trying to open a locked door by pushing against it and sliding the bolt to let it swing free. In Jane's case the forces

*Guilt can be a cruel and paralysing emotion. Think instead in terms of mobilising your care and concern.*

are fairly equally balanced. She scores twenty-two on the driving side and twenty on the restraining side. Jane could try to weaken the restraining forces by talking with her parents, finding out more about the costs of the train and how busy it is, looking for support from her new friends in the climate movement and accepting that she might occasionally need to use the car.

Figure 2: Jane's force-field analysis



## Conversations

If you've got a carbon-buddy, are meeting in a self-help group, or talking with your family about how to reduce your footprint, the following discussion suggestions may help you.

**Measure your carbon footprints** and share what you've found. People often have complex feelings about the results, particularly if they feel that a high figure is unfair. Try to support each other in using the measurements to move towards change.

**Talk about the conflicts** you feel about reducing your impact. Try to help each other open these conflicts up and reflect on them, seeing them as challenges rather than as reasons to avoid trying.

## Frequently asked questions

***Why should I bother when my neighbour drives an SUV?*** Answers we have heard include: 'because it's the right thing to do'; 'because it makes me feel better'; 'to live by example'; 'to be prepared for changes that will have to come'; 'to show I'm serious'; 'to walk the walk, as well as talk the talk'.

***What's the difference between an ecological footprint and a carbon footprint?*** An ecological footprint measures the amount of the earth's resources your lifestyle consumes.<sup>13</sup> It measures this in hectares, or by telling you how many planets would be needed if everyone in the world lived like you. UK lifestyles typically consume about three planets. A carbon footprint measures only the amount of greenhouse gases you are responsible for. It is measured in tonnes of CO<sub>2</sub> equivalents.

***I was shocked to see how tiny the Tanzanian footprint is. Surely they need to be using more energy not less?*** You are right. There are big questions of justice and equality to be considered. One reason highly developed countries like the UK need to reduce their footprints so much is to allow countries like Tanzania to catch up and create a decent standard of living for their people.<sup>14</sup>

***Surely the real problem is the grip of fossil fuel companies over the government?*** The lobbying power of the fossil fuel industry is enormous and they have spent the last fifty years opposing attempts to address climate change. Research reveals a revolving door between government, fossil fuel industries and big financial institutions. There is definitely work to be done in forcing them to change but it doesn't preclude addressing changes you can make yourself.<sup>15</sup>

***Is carbon trading and the government's pursuit of net-zero another example of off-setting?*** Carbon trading can be seen as off-setting on a grand scale, with a market in selling the carbon savings from activities like reforestation and peatland reclamation. Reforestation and peatland reclamation are essential and the intention behind carbon-trading was to allow countries and industry to compensate for small amounts of carbon emissions that they could not get rid of. Unfortunately carbon-trading is increasingly being advertised and sold by fossil fuel companies and other industrial players as an alternative to reduction. The government's pursuit of net-zero needs to be carefully monitored to ensure that it is not playing the same game.<sup>16</sup>



# 2: Food

Food is not only essential to life but central to relationships, community and culture. It often evokes strong feelings. We mark cultural and religious festivals with celebratory meals demonstrating our sense of belonging or respect. People show love by giving food and rejection by refusing it. Family battles for control can be played out over the dinner table by insistent parents and picky teenagers or toddlers. Memories of love, home and meaning are often encoded in particular dishes that are central to our lives.

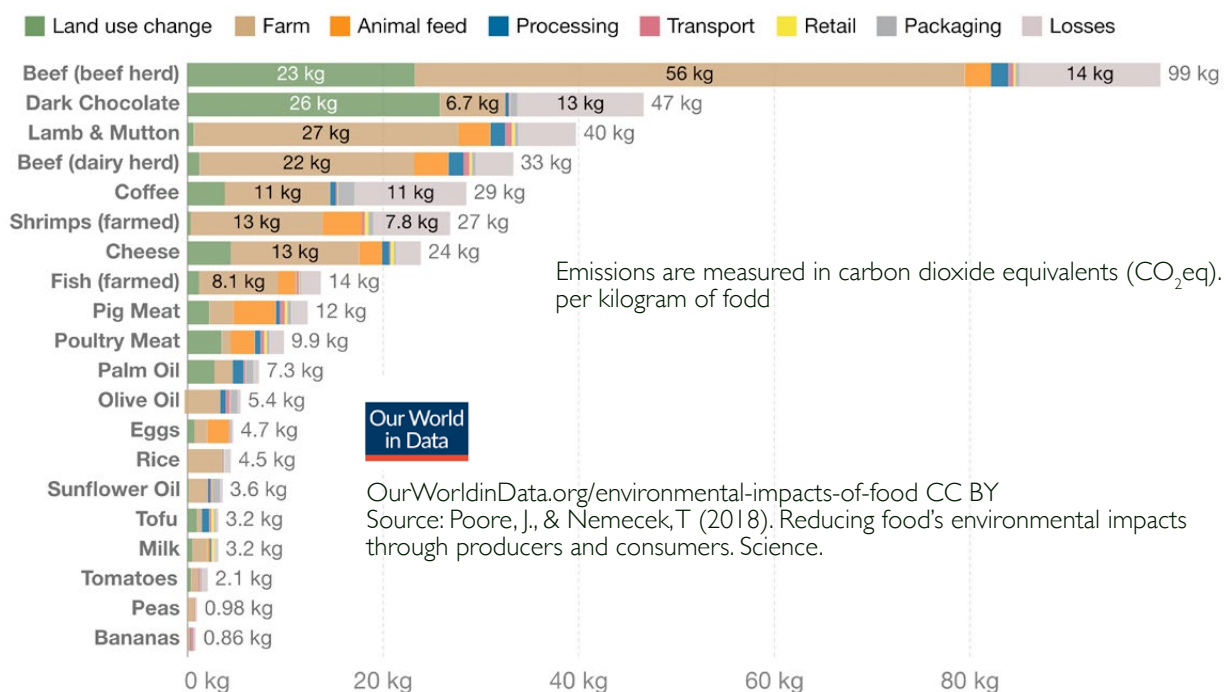
Globally, food accounts for 26% of all CO<sub>2</sub>e emissions.<sup>17</sup> The food system is also responsible for deforestation, water stress and loss of biodiversity.

The food system has many destructive elements. Modern diets encourage obesity and diabetes. Supermarkets rarely pay a fair price to farmers. Small producers are edged out in favour of big corporations. Livestock production gobbles up wild areas and forests. Intensive farming methods, long supply chains, poor regulation of pesticide and fertilizer use add to the interconnected problems. It is however an area where you can make a big difference quite easily.

## The impact of different foods

The chart below shows the impact of different foods and where there the emissions come from.

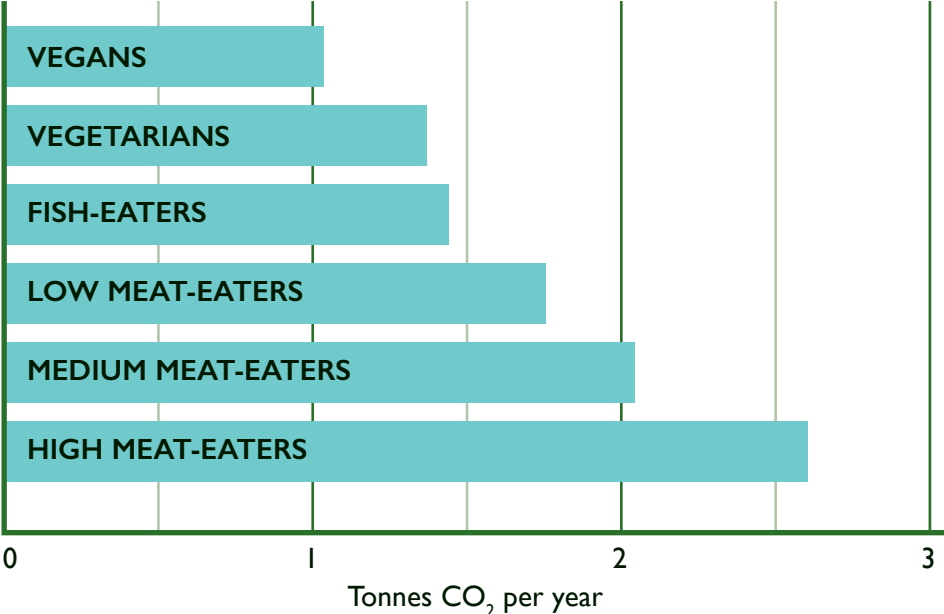
Figure 3: Food greenhouse gas emissions across the supply chain





Meat, fish and dairy produce are the biggest culprits. Grains, fruits and vegetables have minimal impact. Figure 4 shows the impacts of a range of diets.<sup>18</sup>

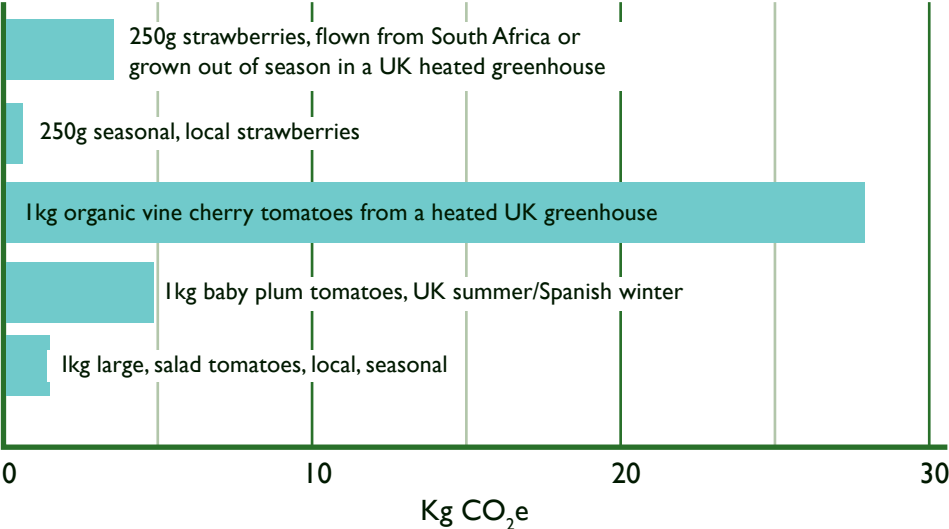
Figure 4: Impacts of a range of diets



Reducing or eliminating meat, dairy produce and fish from your diet will make a big difference. Other issues to look out for are how your food has travelled and whether it is in season. Most food (grains, wine, apples and bananas, for example) travels by sea where the transport emissions are relatively low per kilogramme so are not a problem. Air-freighted items have very high impacts however and are most likely to be perishable foods which are not in season. In the winter green beans, asparagus, strawberries and grapes come from as far away as Zimbabwe or Peru. Try to avoid these.

Other out of season foods like peppers, aubergines and tomatoes often come from heated greenhouses in the Netherlands or the UK during the winter months, so again are best avoided. Here are a few examples from Mike Berners-Lee’s book *How Bad are Bananas?* (Berners-Lee 2020).

Figure 5: High and low emissions tomatoes and strawberries



Berners-Lee's book also has detailed information about the footprints of over 80 common foods and a table showing what is in season when.

- Perishable items from outside Europe (green beans, grapes, blueberries for example) usually come by air.
- Perishable items from within Europe usually come via refrigerated truck and roll-on/roll-off ferry.
- Non-perishable items and items with a long storage life (for example, dried lentils, wine, bananas, apples) from outside Europe usually come by bulk sea carrier and then by truck.
- Non-perishable items from Europe usually come by truck and ferry.

## Eating healthily

It is important to be sure that your low-carbon diet is also healthy. Fortunately the foods which you should eat plentifully for the sake of your health - fruit, vegetables, bread, rice, pasta and other starchy foods - also have a low CO<sub>2</sub>e impact.

For health reasons it's a good idea to avoid highly processed food (anything with more than five ingredients). It's also a good idea to avoid unnecessary packaging, though this makes up a tiny part of the impact of food. The highest impact packaging in terms of CO<sub>2</sub> emissions is aluminium cans, followed by glass and tin, followed by plastic, card and paper. Some plastic packaging such as the annoying plastic round cucumbers actually reduces emissions as it prolongs the shelf life of the cucumber and so reduces waste.

## Conversations

Food evokes strong feelings. It can be the site of family arguments, battles for control, expressions of love, as well as celebrations of culture and special occasions. If you've got a carbon buddy, are meeting in a self-help group, or just talking with your family about how to reduce your footprint, the following discussion suggestions may help you.

### Explore your feelings:

- What has influenced your food choices? Think about childhood patterns, religious rules, family attitudes.
- Who decides what you eat? Think about who shops, who cooks, who has special food needs or who makes a fuss in your family or household group.
- How do you use food to express or cope with feelings? Think about rewards, comfort, approval and celebrations.

**Talk about what you really eat.** Most people imagine their diets are more sustainable than they really are. Keep a food diary for a week, or check the receipts from your shopping to see what you actually buy.

**Look at the list of possible actions** which follows and help each other choose some things to do.

*...the foods which you should eat plentifully for the sake of your health - fruit, vegetables, bread, rice, pasta and other starchy foods - also have a low CO<sub>2</sub>e impact.*

**Talk about local collective action.** There may be a community farm or growing project you could join, local growers you can support or campaigns to make school, workplace or hospital food more sustainable.

**Figure 6: Practical steps: food**

		I'm already doing this	I would consider this	This would be really hard
Adopt a vegan diet	*****			
Stop eating meat	****			
Reduce meat consumption by 50%	***			
Stop eating cheese and butter	***			
Reduce cheese and butter consumption by 50%	**			
Stop drinking milk and yoghurt	**			
Cook vegetarian meals four times a week	**			
Eat only seasonal fruit and vegetables	**			
Reduce milk and yoghurt consumption by 50%	*			
Cook vegetarian meals twice a week	*			

Remember that five stars will make a high reduction and one star a small reduction

## Rules of thumb

**A sustainable diet is a healthy diet.** Following a sustainable diet is also good for your health.

**Avoid meat, fish and dairy.** Reduce the amount of meat, fish and dairy produce you eat. Substitute beans, pulses, nuts and seeds.

**Eat more fruit and veg.** Prioritise foods from the bottom two layers of the pyramid. Put vegetables, fruit and grains at the heart of your diet.

**Avoid air freight: choose local and seasonal.** Out of season, perishable fruit and vegetables clock up high emissions as they are usually flown in. Seasonal fruit and vegetables have the lowest emissions.

**Avoid waste.** Only buy fresh foods you are sure you will use. Learn to use up leftovers. Reduce the amount of food you throw away.

## Frequently asked questions

***If I was going to do just one thing to reduce my food footprint, what should it be?*** Reduce the amount of meat and dairy produce in your diet.

***Are there any risks from a vegan diet?*** You need to be careful to include sources of iron, calcium and vitamin B12. The NHS website has good advice.<sup>19</sup>

***Is it better to buy food produced closer to home?*** Transport is not the biggest source of food's impact but local produce will have a smaller footprint. The exceptions come with some out of season foods. During winter, the emissions from tomatoes grown outdoors in Spain and trucked to the UK will be lower than the emissions from tomatoes grown in Holland in heated greenhouses and trucked here. Similarly, if you want to eat out-of-season apples in July, the new crop imported from New Zealand by sea will have a slightly smaller footprint than British apples that have been kept in cold storage for 9 months.<sup>20</sup>

***How can you tell where something has come from?*** Individual items like fruit and vegetables should be labelled with the country of origin.

***Does organic food have a lower footprint?*** Organic agriculture has higher soil quality, reduced nutrient or pesticide leaching and uses less nitrogen fertiliser, thus reducing its impact. However it tends to be less productive per hectare so requires more land.<sup>21</sup>

***Do the vegetables I grow myself have a lower footprint than the ones in the shops?*** Not necessarily. You can clock up a surprising footprint driving to an allotment or having manure delivered. Lack of experience can also mean crop failures which wouldn't happen to an experienced farmer. Despite this, growing your own vegetables is a wonderful experience that brings you closer to nature and makes you appreciate where your food really comes from.

***Is it OK to drink bottled water?*** The water that comes from your taps is perfectly wholesome and, if you don't like the taste, you can filter it quite easily. Packaging and transporting water in bottles from one end of the country to another and across continents creates CO<sub>2</sub> for no purpose.

***What about eating out?*** Fast food restaurants are part of a highly mechanised industry and usually sell a lot of meat. The food is intensively grown and highly processed. Independent restaurants that are part of the local economy and which offer vegetarian and vegan menus are a better option.

*Most people imagine their diets are more sustainable than they really are. Keep a food diary...*

**Will reducing food waste help reduce our carbon emissions?** Yes. Globally, between 30 and 50% of all food produced never reaches a human stomach.<sup>22</sup> In 2018, 6.65 million tonnes of edible food was wasted in the UK. The average household throws out about 3 kg of useable food each week (160kg a year). It happens because people buy too much, fail to plan meals, don't store food properly and lack confidence in using up leftovers.<sup>23</sup>

**You say ships are a good method of transport for bringing us food but aren't they responsible for other pollution?** Yes. Some of the dirtiest oil is burnt by the shipping industry, producing sulphur emissions which cause acid rain and upset the balance of many ecosystems. New EU and international limits came in force in January 2020.<sup>24</sup>

## More information

### I'd like to know more about...

**...vegan diets.** Look at the [Vegan Society](#) website<sup>25</sup>

**...the carbon footprints of particular foods.** Mike Berners-Lee's *How bad are bananas?* (Berners-Lee 2020) and Sarah Bridle's *Food and climate change without the hot air* (Bridle 2020) have lots of numbers.

**...the food system.** Felicity Lawrence's *Eat your heart out: why the food business is bad for the planet and your health* (Lawrence 2008) remains a good place to start. George Monbiot's *Regenesiis* (Monbiot 2022) brings the story up to date.

**...community growing schemes.** The [Community Supported Agriculture](#) site and the charity [Social Farms and Gardens](#) both list schemes.<sup>26</sup>



# 3 :

## Consumption and waste

This section covers one of the trickiest aspects of your carbon footprint. In order to reduce your emissions from consumption and waste you will need to think about your deeper reasons for making purchases, the effect of your income and the effect of any wealth that you have.

The psychological pressure to consume (and then to waste) goods and services is huge. Shopping can be sold as a pick-me-up, a reward, a solution to all manner of social ills and even as a right. Marketers are adept at exploiting our insecurities and our longing to be accepted.

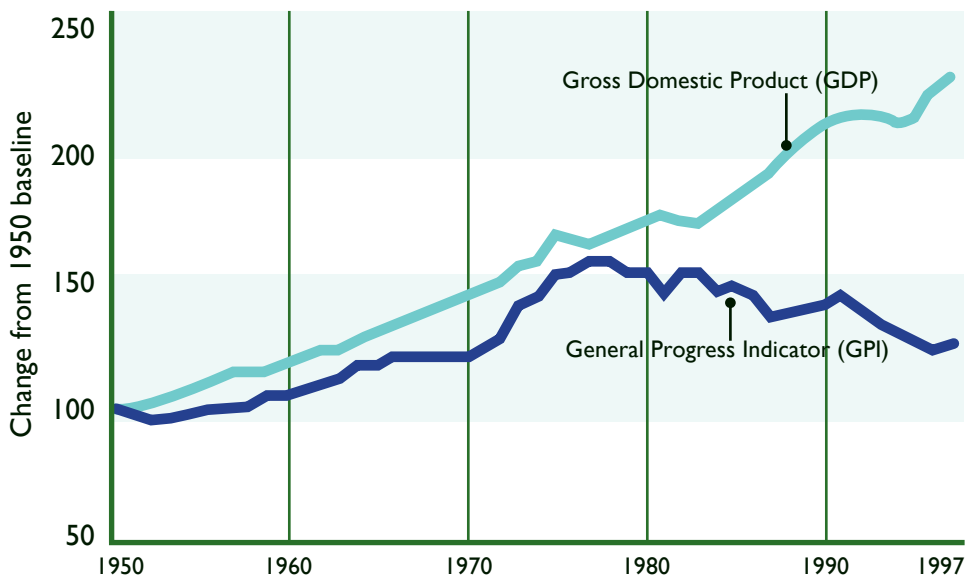
Added to this is the fact that British people rarely talk openly about how much money they earn or how much wealth they possess. This taboo hides inequalities in wealth but also hides inequalities in carbon emissions. It can feel shameful or exposing to bring the subject into the open.

Spending money 'spends' CO<sub>2</sub> as well. The average UK citizen is responsible for about 4.7 tonnes of CO<sub>2</sub> through their purchases of household goods, home improvements, clothes, entertainment and other services. If you want to reduce your impact it's helpful to understand the carbon impact of the particular items you buy. It's also important to understand how people's individual decisions are shaped. The economic system, the effects of wealth and income and the psychological pressures of status and consumerism all matter.

### The economic system

The modern economic system is dependent on growth. It hungrily seeks new products and new markets, creating new needs and new desires. It pushes up consumption, depletes resources, creates pollution and drives carbon emissions. Continued growth on a finite planet is a problem and economists disagree on what to do. Some hope that growth can be decoupled from our use of resources. They argue that the economy can be decarbonised through greater efficiency, more renewables and cradle to cradle recycling.<sup>27</sup> Others say that more fundamental changes are needed. They argue that we need a steady-state economy, one which doesn't grow, focuses on basic needs, prioritises fairness and takes accounts of earth's limits.<sup>28</sup> It's useful to understand that beyond a certain limit increased growth doesn't bring increased quality of life. Figure 7 shows the difference between a quality of life measure (GPI) and economic growth in the UK.

Figure 7: United Kingdom 1950-1996 GDP versus GPI



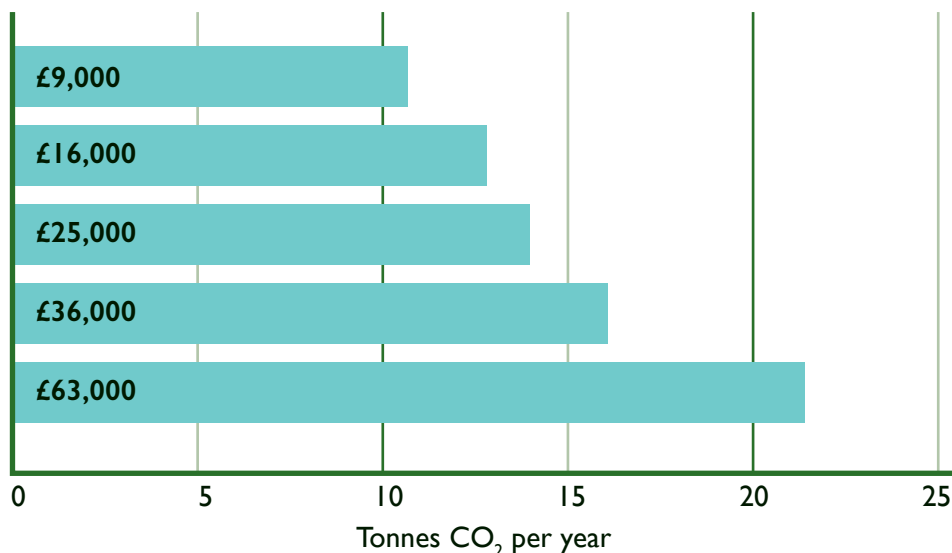
Graph adapted from C. Hamilton, *Growth Fetish*, Pluto 2003.  
 Original source: Jackson, Tim et al (1997). *Sustainable Economic Welfare in the UK: 1950-1996*.  
 University of Surrey

### Wealth and income

The fruits of economic growth aren't evenly distributed however and research shows that there is a strong correlation between wealth, income and carbon emissions.<sup>29</sup> Globally, the wealthiest 10% of people produce 50% of emissions. The middle 40% are responsible for 44%. The poorest 50% are responsible for a mere 7%.<sup>30</sup> In the UK 20% of the population count as high consumers.<sup>31</sup> Many middle-class people who see their lives as ordinary are in fact living very high consumption lives.

As household income rises, so do carbon emissions. Wealthier people have bigger houses, refit them more frequently, have more cars and change them more often. They eat out more, spend more on entertainment, take more holidays and flights and generally buy more of everything. The chart below shows household incomes in pentiles (fifths) from the poorest to the richest, alongside the typical carbon emissions for that household income. The chart assumes an average size household (2.6 people).<sup>32</sup>

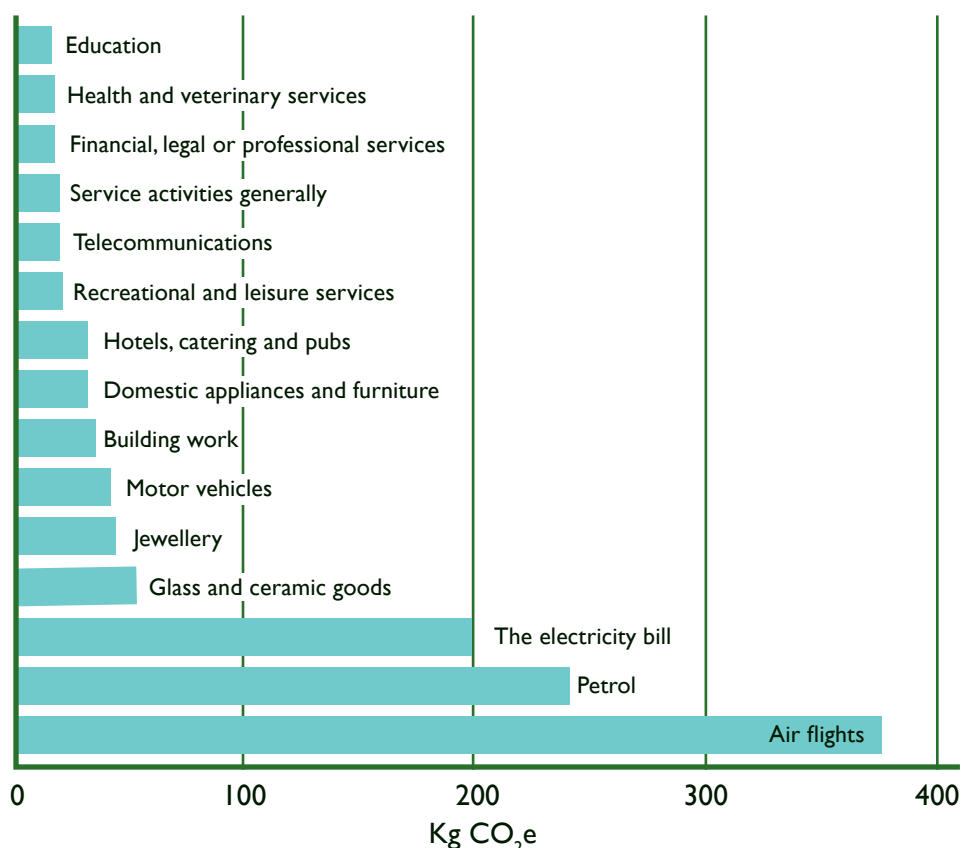
Figure 8: Household income pentiles and total CO<sub>2</sub> emissions per household



## Carbon emissions by sector of the economy

It's helpful to know whether you are spending your money in a high-carbon or lower-carbon part of the economy. In general, money spent on services will have a lower impact than money spent on items that take a lot of energy to make such as carpets, white goods, cars and building work. Second-hand items and services such as baby-sitting, gardening and education also have a lower impact. The table below uses figures given by Mike Berners-Lee in his excellent book *How bad are bananas?* (Berners-Lee 2020).

Figure 9: Amount of CO<sub>2</sub> generated by £100 spend per sector



Figures extracted from *How Bad are Bananas?* Mike Berners-Lee, Profile Books, 2020, updated using Office for National Statistics data. Recent inflation and price volatility (November 2022) mean that the lower bars on this chart (electricity, petrol and air travel) may be slightly inaccurate by the time you read this.

## Carbon emissions of some particular items

Calculating the carbon emissions of particular items is complex and the best source of information about this is Mike Berners-Lee's book *How bad are bananas?* He lists over one hundred items, from babies' nappies to a new car, helping you get a clear sense of which are the big items to worry about and which are the small ones you shouldn't fret over. For example a new, small car has a footprint of four tonnes but a new SUV comes in at about twenty-five tonnes. Both have huge footprints but the small car is a dramatically better option. Similarly, he helps you see that a single web search has a tiny footprint but that multiplied over time, web use builds up to something significant. We'd suggest that you buy a copy of Berners-Lee's book if you are interested in understanding the detail of your purchases.



## Consumption in a fairer world

Climate change requires richer people to consume less but this doesn't mean that life has to become boring or uncomfortable. Some good questions to ask yourself are:

- how much do I need this?
- how was the natural world valued as this product was made?
- how long will it last?
- what will I do with it when I no longer want it?
- who benefited from its production?
- who suffered or was exploited?
- is there a lower-carbon option?

## Waste – reduce, repair, re-use, recycle

Once you've finished with an item it has to be disposed of. Everyone knows they should recycle but it's the other parts of the slogan that matter more. Postpone the need to recycle by repairing products, re-using them, keeping them until they are completely worn out, or passing them on if you don't need them. Many modern products are designed for a short life and many are composite products that can't be recycled so try to buy the best quality you can afford and make it last. Avoid disposable items like razors, nappies and coffee cups and investigate local repair services and repair cafes.

Getting rid of waste accounts for about 3% of an average carbon footprint.

## Conversations

People's sense of themselves, sense of belonging, status and self-respect are often caught up their purchases. If you've got a carbon buddy, are meeting in a self-help group, or just talking with your family about how to reduce your footprint, the following discussion suggestions may help you.

**Share** what your favourite objects are. How long have you had them? What do they mean to you?

**Explore** your reasons for buying things. Think about:

- needs and desires – what's the difference?
- the role of belonging, the approval of others, self-esteem and status in what you buy;
- getting hooked by advertising/falling for spin;
- using shopping to cope with painful feelings like depression and anxiety.

**Explore alternatives to shopping** to help you feel good. The New Economic Foundations [Five ways to wellbeing cards](#)– Connect, Be active, Take notice, Keep learning, Give – are a useful guide.<sup>33</sup>

**Watch** the film *The story of stuff* together. It's a great 20 minute explanation of the problems.<sup>34</sup>

**Watch** the one-minute film *The impossible hamster* to see why continued economic growth is a bad idea or watch Kate Raworth talk for three minutes about why *Growth is not enough*.<sup>35</sup>

**Look at the list of individual actions** and help each other choose some things you will do.

**Talk about collective action.** There may be a disinvestment campaign you could join, or a local Green New Deal group pressing for changes to the economy.

## Practical steps

The table below gives star ratings for a number of actions you could take. Some of them only apply to high earners with money to spare. If you're on a low income your carbon footprint will not be very big and the list below may not be appropriate to you at all. As before, the greater the number of stars, the greater the impact the action is likely to have. What might you do?

**Figure 10: Practical steps: consumption**

		I'm already doing this	I would consider this	This would be really hard
Work less, earn and spend less, enjoy more leisure time	*****			
Invest £2,500 in renewables	*****			
Spend £1,000 less a year	****			
Look for low-carbon entertainment - e.g. substitute time with friends or self-entertainment for energy-intensive trips and purchases	***			
Look for low-carbon sport/exercise - e.g. exercise outdoors rather than at the gym	***			
Donate £500 to charities alleviating the effects of climate change	***			
Recycle everything that can be recycled	**			
Spend more money on labour-intensive items and services and less on high-carbon goods	**			
Reduce total amount of waste by 50%	**			
Shop for items that will last	*			
Buy goods made from recycled materials	*			
Avoid disposable items	*			
Use items until they are worn out	*			
Get items repaired or repair them yourself	*			

**Remember that five stars will make a high reduction and one star a small reduction**

## Rules of thumb

**Try to live on less.** Remember that spending money 'spends' CO<sub>2</sub> as well.

**Think before you buy.** Avoid impulse buying.

**Shop for items with a long and flexible life.** Try to make them last.

**Be careful what you do with any money you save.** Look for green and ethical investments.

**Remember your 'R's':** Reduce, Repair, Reuse, Recycle.

## Frequently asked questions


***My mortgage/rent eats all my money – is that carbon free?*** Your mortgage is a combination of interest and capital repayment. The carbon cost of the interest is 18 kg per £100. Some of your rent is your landlord's profit and counts towards his/her footprint, not yours. The rest is loans and administration which again comes in at about 18 kg per £100.

***If building work involves that much CO<sub>2</sub> doesn't that make eco-renovation a bad idea?*** Eco-renovation saves CO<sub>2</sub> in the long-term as the building's energy demand is reduced. Doing this work sooner rather than later is important as it speeds up the date at which CO<sub>2</sub> begins to be saved. Some building methods and materials have less embodied carbon than others. Timber-framed houses, lime mortar and organic insulation materials are all good.

***What about my savings?*** The goods that companies make, using your savings, will be bought by others and count towards their footprints. When you cash in your savings or spend the interest, whatever you buy counts towards your footprint. It's worth looking for ethical investments. The magazine *Ethical consumer* covers this issue regularly.<sup>36</sup>

***Should we be worried about the impact of IT?*** Globally the IT industry is a heavy emitter. At a personal level what matters is the amount of time you spend online. Keep this as low as you can.

***I enjoy my job but it earns me a lot of money. What should I do?*** Make your house low-carbon. Invest in ethical, low-carbon savings and pensions. Give generously to environmental and development charities that help countries suffering from the effects of climate change. When you do buy goods and services focus on high-quality, energy-efficient ones.



**I'm on a low income. What should I do?** People earning under £15,000 usually have low carbon footprints so don't worry. Concentrate on reusing and repairing, sharing with others and buying good quality goods when you can. You can also campaign, lobby industry groups and write to your MP, demanding more sustainable products at fair prices.

**Isn't the real problem population growth?** No. The problem is the amount of resources used by each person. If that can be reduced, population itself is not the issue. Globally, the rate of population growth is slowing as better education and a raised standard of living lead to people having fewer children. World population is predicted to stabilise at around 9 billion. For explanation look at Hans Rosling's documentary *Don't panic*, or his Ted talk *The best Stats you've ever seen*.<sup>37</sup>

## More information

### I'd like to know more about...

**...economics.** Try Kate Raworth's book *Doughnut economics* or visit her [website](#) which is full of excellent explanation, videos and podcasts. Look also at the most recent *Green new deal* report which has a transition plan for the UK.<sup>38</sup>

**...campaigning.** The [Green New Deal group](#) campaigns for a sustainable green economy and has local groups.<sup>39</sup> Internationally look at the work of [Global Justice](#).

**...ethical and sustainable consumption.** Fred Pearce's *Confessions of an eco-sinner* (Pearce 2009) is a gripping story about the supply chains of household goods and the people who make them. Clive Hamilton's *Growth fetish* (Hamilton 2004) is a lucid account of the connections between growth, environmental damage and human happiness. *Ethical consumer* magazine evaluates products and companies on a range of ethical criteria.

**...repairing, sharing, swapping and reusing.** [Restart](#), and [iFixit](#), have workshops, tutorials and online manuals about how to repair electronics and other everyday items.<sup>40</sup> [Read It, Swap It](#), lets you swap books.<sup>41</sup> [Streetbank](#) will help you share skills and borrow items from your neighbours while [Freecycle](#), and [Freegle](#), help you give away unwanted possessions and find goods you need for free.<sup>42</sup> [LETS](#) (Local Exchange and Trading Schemes) and [Time Banks](#), help people swap their skills without money changing hands.<sup>43</sup>



# 4 :

## Travel and transport

Most people have to travel – for work or to stay in touch with family and friends. Many people also love to travel – for excitement, for holidays, for pleasure and for new experiences. Reducing your travel footprint means reflecting on the role of travel in your life and how this relates to your sense of yourself.

Travel makes up about a quarter of the average UK footprint and most of that comes from motor vehicles. Many of the issues affecting your travel footprint are embedded in car culture and the national infrastructure, but there are still huge opportunities to reduce your own footprint. Adopting slower modes of transport and reducing the overall distance you travel will make the biggest impact. Looking at the bigger picture the policies<sup>44</sup> to push for are:

- better and cheaper public transport;
- more footpaths and cycleways;
- residential streets closed to motor traffic;
- congestion charging, low-emission zones and road pricing;
- co-ordinated developments of housing, shops and small businesses which eliminate the need for some travel;
- rationing of air travel;
- shortening of supply chains.

Diesel and petrol cars are currently being phased out in favour of electric ones, while heavy freight looks likely to move to being powered by hydrogen. Despite this, road transport will remain a problem due to the amount of clean electricity needed and the continuing air pollution from vehicle tyres. Air travel may become more efficient but the lack of a carbon-free fuel and the distances covered means it will still be a high carbon option. Getting used to slow, less frequent travel matters.

### Monitoring your travel

If you want to reduce your travel emissions, it is helpful to know your starting point. People often underestimate their routine travel. Keeping a diary for a week or two may be illuminating. Simply jot down all your journeys, what mode of transport you used and how far you went.

### One tonne travel

A good goal for your travel emissions is just one tonne of CO<sub>2</sub>. If this feels too hard, look at how to get there bit by bit, perhaps making a 15% or 25% reduction each year. Planning ahead and factoring carbon into big decisions such as where to live and work will help. Figure 11 below gives

*A good goal for your travel emissions is just one tonne of CO<sub>2</sub>. Planning ahead and factoring carbon into big decisions such as where to live and work will help.*

the emissions for the main modes of transport you are likely to use. Figure 12 gives some examples of how far one tonne will take you. You will see the dramatic differences that come from slower modes of transport, from sharing journeys and travelling less far.

In thinking about the figures below remember that there are 1000 grams in 1 kilogram, and 1000 kilograms in 1 tonne!

**Figure 11: Typical transport emissions<sup>45</sup>**

	<b>CO<sub>2</sub> emissions per vehicle<sup>46</sup></b>	
	Grams per kilometre	Grams per mile
Large car, driven fast	760	1260
Average UK car	320	530
Small car, driven carefully	170	290
Electric car	110	180
	<b>CO<sub>2</sub> emissions per passenger<sup>47</sup></b>	
	Grams per kilometre	Grams per mile
Urban bus/underground	20	40
Train	50	80
Long-distance coach	30	50
Domestic flights	270	450
European and international flights <sup>48</sup>	170	290
	<b>CO<sub>2</sub> emissions per passenger, sea crossings<sup>49</sup></b>	
	Grams per kilometre	Grams per mile
Cruise liner	700	1,100
Car passenger on a car ferry	400	640
Foot passenger on a car ferry or cargo ship	20	32

## How far for a tonne?

**Figure 12: Transport**

**Each of the following represents one tonne of CO<sub>2</sub>:**

- Fewer than 2,000 miles in a large petrol or diesel car on your own;
- A return flight from London to Greece (appx 3,000 miles);
- 5,700 miles in a medium-sized car with three people sharing;
- 11,000 miles in a small electric car with two people sharing;
- 12,000 miles travelled by train (i.e. commuting 30 miles each way to work);
- 20,000 miles travelled by long-distance coach;
- 25,000 miles travelled by local bus/underground.

## Conversations

If you've got a carbon buddy, are meeting in a self-help group, or just talking with your family about how to reduce your footprint, the following discussion suggestions may help you.

**Try to disentangle the reasons** for your current travel choices. Try talking about the importance of convenience, freedom, status and safety as well as the practical reasons, such as lack of alternatives, for your travel decisions.

**Talk about the losses** you will feel if you change your travel pattern and how you will cope with these. What dreams are you giving up? What inconveniences can you cope with?

**Talk about the truly insurmountable problems** that you face, such as being part of an international family or being unable to afford to move closer to work.

**Look at the list of individual actions** and help each other choose some things you will do.

**Talk about collective action.** There may be organisations and campaigns that would welcome your support protecting bus services, planning cycle routes, or protesting about road building and developments that increase car use.

**Figure 13: Practical steps: smarter travel**

		I'm already doing this	I would consider this	This would be really hard
Take the bus, tube or train to work instead of the car	*****			
Trade the car in for an electric model, the smallest possible	*****			
Trade the car in for a smaller, more efficient model	*****			
Drive at a maximum of 60 mph on motorways and at no more than 50 mph on other roads	****			
Walk or cycle to work every day	****			
Join a lift-sharing scheme & share your commuting	****			
Keep to the speed limit	**			
Drive smoothly, avoiding unnecessary changes of speed	**			
Walk or cycle to work in summer	**			
Walk or cycle for short trips	**			
Combine more trips together	**			
Share the school run with other families	**			
Check tyre pressures regularly	*			
Remove heavy items/roof rack from the car when not in use	*			

**Remember that five stars will make a high reduction and one star a small reduction**



**Figure 14: Practical steps: lifestyle changes**

		I'm already doing this	I would consider this	This would be really hard
Shorten your car commute by 20 miles a day by changing your job or moving house	*****			
Shorten your train commute by 50 miles a day by changing your job or moving house	*****			
Halve your car mileage	*****			
Stop flying altogether	*****			
Get rid of the car	****			
Holiday in the UK, instead of abroad	****			
Take the train if you're going to Europe	****			
Reduce your flights by 50%	****			
Negotiate working from home one or two days a week	***			
Reduce your flights by 75%	***			

Remember that five stars will make a high reduction and one star a small reduction

## Rules of thumb

**Distance matters.** Long journeys, whether for commuting or for overseas holidays, cause the greatest emissions. Reduce them as much as you can.

**Slow is good.** Choose a slower means of transport: walk or cycle instead of driving; take the train rather than flying; if you drive, reduce your speed. Enjoy the journey.

**The more the merrier.** Full cars and buses are more efficient per passenger. Offer and accept lifts as often as you can.

**Is your journey really necessary?** Consider the alternatives before reaching for the car keys.

**Choose with climate front of mind.** Whenever you have a choice, keep the effect on your CO<sub>2</sub> output in mind.

**Air travel is always worse than you think.** Avoid using the plane whenever possible.

## Frequently asked questions

**Can't I offset my air travel?** Off-setting schemes offer to compensate for the CO<sub>2</sub> you have emitted by offsetting it against carbon saved elsewhere. For an offset scheme to be effective, it must fund activities that would not otherwise have taken place - they must be additional. It is very difficult to prove additionality and few schemes meet this standard satisfactorily. Off-setting passes the buck to other people, other places or the future. A tree planted today will take 50–100 years to absorb enough CO<sub>2</sub> to offset the fuel your flight burned.<sup>50</sup>

**Surely my holidays abroad support poorer countries?** Even eco-tourism brings very limited benefits. Profits mostly go to airlines and travel companies. Very little benefits local populations. Tourism frequently brings environmental degradation in its wake, stressing water systems and natural habitats. There are good explanations in Leo Hickman's *The final call* (Hickman 2008) and Pamela Nowick's *The nonsense guide to tourism* (Nowick 2007).

**I've seen different figures for transport CO<sub>2</sub>. Whose are right?** There are a number of different conventions used in published figures. Many of the lower figures miss important elements of carbon counting.

- Some figures only cover the CO<sub>2</sub> from the fuel used during travel, others allow for the additional energy and CO<sub>2</sub> involved in extracting, processing and transporting the fuel. Some figures add a share of the embodied CO<sub>2</sub> in the manufacture of the vehicle.
- For air travel, some figures give the emissions from the fuel per mile only, others take account of the greater fuel consumption at take-off and landing, and still others include the particularly damaging effect of emissions at high altitude.
- For coach and train travel, researchers account differently for factors such as occupancy, urban versus long-distance travel, age of rolling stock, type and size of vehicle.
- For car travel, results will differ between test conditions and real life driving. The figures on the VCA Car Fuel Data website relate to ideal conditions and only account for the fuel. In practice a car's emissions vary hugely depending on speed, driver behaviour and car maintenance, as you will discover if you monitor your fuel use.

**Should I scrap my old car for a new electric car now?** Probably. If your mileage is low or your car is small and efficient, it may be better to hang on to your old one for longer. Check out local car sharing schemes before deciding to buy any new car.

**Do home deliveries save CO<sub>2</sub>?** A study of internet shopping found that home deliveries of the goods ordered used less CO<sub>2</sub> than a trip to the shops for the same items.<sup>51</sup> We don't have figures for supermarket deliveries of food shopping but the same logic should apply.

***I'd like to cycle but is it really safe?*** You can do a lot to increase the safety of your journeys by picking quiet routes, avoiding busy junctions and roads used by HGVs, and making sure you are properly equipped with lights, reflective gear and a helmet. Cycling is also good for your health and on quiet routes and in daylight carries little risk. It is also safer in cities where more people cycle.

## More information

### I'd like to know more about...

**...the big policy issues.** George Monbiot's *Heat* (Monbiot 2008/21) is a good place to start.

**...campaigning.** The [Campaign for Better Transport](#) works to 'create transport policies and programmes that give people better lives'. [Sustrans](#) manages and promotes cycle networks and safer streets.<sup>52</sup>

**...car clubs.** [Carplus](#) supports communities who want to set up their own car club or car-share scheme. [Como](#) supports all kinds of shared transport.<sup>53</sup>

**...finding good routes by public transport.** If you want to avoid Google's route planner, try [Transport Direct](#), 0871 200 2233.<sup>54</sup>

**...cycle and walking routes.** The [National Cycle Network](#) has a map of routes across the UK, as does [Open Cycle Map](#). [Cyclestreets](#) offers quiet routes.<sup>55</sup> Most local authorities publish maps of cycle routes in their areas.

*Getting used to slow, less frequent travel matters.*

*Off-setting passes the buck to other people, other places or the future.*



## 5: Energy at home

Home energy is responsible for about 25% of your carbon emissions.

British houses waste an enormous amount of energy. Many are also cold, damp, draughty, uncomfortable, hard to heat and bad for people's health. This may be painful to hear because the idea of home is wrapped up in ideas of comfort and security.

The average UK house uses 18,000 kWh of energy each year and emits around 4 tonnes of CO<sub>2</sub>.<sup>56</sup> Much of the heat goes straight out through the walls, roof, floors and the gaps round doors and windows. Meanwhile it's common to buy more and more electrical appliances. Some of these appliances are more energy efficient than in the past but many are also larger.

## Unimproved UK house

- draughty doors and windows
- solid brick walls
- unfilled cavity walls
- poor insulation
- ancient boiler
- single glazing
- lights left on
- inefficient appliances
- uninformed owner or tenant

six tonnes CO<sub>2</sub> out



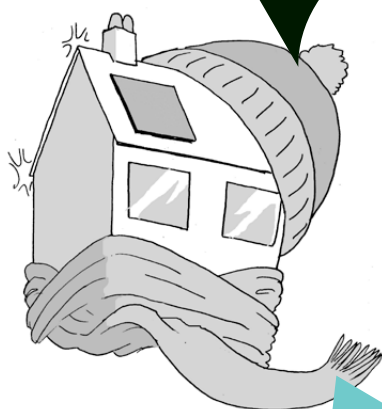
26,000 kWh energy in

Although there are higher standards for new houses, much UK housing is old and will still be here in fifty or a hundred years. Even modern houses are not being built to the standard needed for 2050.

All houses need to be upgraded so that the average UK house emits no more than 2.3 tonnes of CO<sub>2</sub> by 2030 and almost nothing by 2050, making them healthier and more comfortable as well as climate compliant.

## Low carbon house

one tonne CO<sub>2</sub> out



- everything draught-stripped
- super-thick insulation
- triple glazing
- heating from a renewable source
- heat recovery ventilation
- solar panels
- LED lights
- smart meters
- efficient appliances
- energy-conscious owner or tenant

5,000 kWh energy in

## Policy issues

Energy and housing policy seems to have been going backwards. Since 2010 the rate at which energy efficiency measures are installed has fallen by 95%.<sup>57</sup> Regulations such as the Code for Sustainable Homes have been abandoned. Many of the policies needed can be found in the Green New Deal reports.<sup>58</sup> They include:

- Generating all energy by renewables (wind, solar, hydro, tidal and geothermal) with coal and natural gas rapidly phased out and investment in batteries and pumped storage to solve the fluctuations in supply and demand.
- New building regulations so that new houses are built to the equivalent of the PassivHaus standard<sup>59</sup> (where almost no energy is used) and old houses are upgraded as close to this as possible.
- Support and training for a new retrofit industry which will install the insulation and new heating systems that are required.

## Practical action

Homeowners, landlords and tenants can all act to reduce the impact of their houses and flats. We suggest four levels of action:

**Good housekeeping** describes no-cost changes like remembering to turn lights and appliances off, lowering the thermostat, drying clothes outdoors, abandoning the ironing and taking short showers instead of baths.

**Jobs for the weekend** describes low-cost DIY jobs like checking all light bulbs are LEDs, draught-stripping doors, windows, cat-flaps and letter boxes and increasing loft insulation.

**Taking opportunities** has two aspects. The first is making sure you buy the smallest, most efficient appliances when something needs to be replaced. The second (if you are a home-owner) is keeping your home's energy performance 'front of mind' when you are redecorating or having building work done. It's easy to combine energy-saving measures with repainting, having a new kitchen installed or building an extension. The cost is reduced and disruption minimised.

**Major changes.** These are major projects like insulating solid walls and beneath floors, installing photovoltaic panels to generate electricity or putting in a heat pump to replace gas or oil central heating. These need to be carefully planned and may be expensive or disruptive.

*Energy and housing policy seems to have been going backwards. Since 2010 the rate at which energy efficiency measures are installed has fallen by 95%.*

Renters often feel there is little they can do but you should be able to act on the 'Good housekeeping' actions and some of the 'Jobs for the weekend'. You may be able to discuss other improvements with your landlord.

Whatever you decide to do, it helps to know how much energy you use. Read your meters regularly and record the fuel you are buying to get a clear picture of how big a problem your home is.

## Conversations

Homes are intensely personal places. They're the site of people's emotional security and their aspiration for a good life. They can also be places of conflict and dispute. If you've got a carbon buddy, are meeting in a self-help group, or just talking with your family about how to reduce your footprint, the following discussion suggestions may help you.

**Talk about what home means to you.** Try remembering the different places you've lived and how you felt about each. Think about the part played by the neighbourhood, the outside spaces, the people you lived with, the comfort, decoration and style of each home.

**Look at the list of actions** and help each other choose some things you will do.

**Explore any conflicts** between being responsible in terms of energy and having the kind of home you love.

**Talk about collective action.** [Green Open Homes](#)<sup>60</sup> lists local projects that showcase upgraded houses and may welcome volunteers. [Green New Deal Rising](#)<sup>61</sup> is a youth activist organisation with many local groups. There may be a community energy group you can get involved with, exploring local energy-generation or offering advice to home owners and tenants. [ACORN](#) campaigns on both renters' rights and climate issues, particularly as they affect rental housing.<sup>62</sup>

### Figure 15: Practical steps: good housekeeping

These are changes in the way you use your home. They cost nothing but could bring up to a 20% reduction in energy use, depending on your current behaviour:

		I'm already doing this	I would consider this	This would be really hard
Turn the room thermostat down by 3°C	***			
Ensure the heating is turned off at night and when you are out or away from home	***			
Turn the room thermostat down by 1°C	**			
Take short showers instead of baths	**			
Turn off lights when you're not using them	*			
Halve the ironing you do	*			
Review and adjust the settings on thermostatic radiator valves	*			
Don't overfill the kettle	*			
Run the washing machine at 30 or 40°C and only run when full	*			
Run your dishwasher at 55°C and only when full	*			
Dry clothes outdoors	*			
Defrost fridge and freezer regularly	*			
Read your meters monthly to check how much fuel you're using	*			

Remember that five stars will make a high reduction and one star a small reduction

### Figure 16: Practical steps: jobs for the weekend

Many of these are simple DIY jobs.

		I'm already doing this	I would consider this	This would be really hard
Find out if you have an unfilled cavity wall and (if yes) have it filled	*****			
Draught-strip all external doors, windows and letterbox; seal the gaps round cat-flaps and pipes in external walls and seal open-fire chimneys when not in use with a chimney balloon	***			
Increase the insulation in the loft from 50 mm to 300 mm	***			
Check all lightbulbs are LEDs and replace if not	**			
Put up DIY secondary glazing on appropriate windows	**			
Insulate hot-water pipes	*			
Fix shelves above radiators on external walls, put foil behind and adjust curtains to sit on the shelves	*			

Remember that five stars will make a high reduction and one star a small reduction



**Figure 17: Practical steps: appliances**

		I'm already doing this	I would consider this	This would be really hard
Whenever you buy electrical goods, choose the most efficient based on the energy label	*			
Buy the smallest appliance you can manage with	*			
Check that new lamps/side lights have LEDS	*			

**Remember that five stars will make a high reduction and one star a small reduction**

**Figure 18: Practical steps: building work**

Keep your home's energy performance front of mind when you are redecorating or having building work done. It's easy to combine energy-saving measures with repainting, having a new kitchen installed, or building an extension. Try to improve the insulation beyond the demands of current building regulations.

		I'm already doing this	I would consider this	This would be really hard
When replacing windows, insulate solid walls internally at the same time	*****			
Choose high-performance double or triple glazed windows and doors	****			
Make sure kitchen and bathroom extractor fans include heat recovery	**			
Upgrade central-heating controls	*			
Install a low-water-use shower and toilet	*			

**Remember that five stars will make a high reduction and one star a small reduction**

**Figure 19: Practical steps: major changes**

These are the changes people often think of when they imagine a greener home. They are major projects that need to be carefully planned. Some are expensive and some may cause disruption. You will need to do some of these if you own your home and want to make it truly low-carbon.

		I'm already doing this	I would consider this	This would be really hard
Dry-line all external solid walls	*****			
Insulate external solid walls from the outside	*****			
Install a ground-source or air-source heat pump	*****			
Install solar panels for hot water	****			
Install photovoltaic solar panels for electricity	****			
Replace all windows and any glazed doors with high-performance, double or triple glazed units	****			
Insulate beneath the ground floor	**			
Externally insulate flat roofs	**			
Replace front and back doors with high-performance, insulated doors	*			

**Remember that five stars will make a high reduction and one star a small reduction**

## Rules of thumb

**Small is beautiful.** The smallest you can manage with is the best. Smaller houses, smaller appliances and shorter showers are all winners.

**Monitoring is a must.** If you measure it you can manage it. Unless you have a smart meter or read your meters regularly you won't be able to see whether the changes you are making are having the effects you hoped for.

**Insulation! Insulation! Insulation!** Insulated lofts, walls, floors and pipes are all winners. Heavy curtains and window shutters will also help. It's difficult to overdo insulation. Aim to need no heating at all.

**If in doubt, switch it off.** It's never more efficient to leave things running when you're not using them.

**Ditch dinosaurs.** It's sometimes better to get rid of an inefficient appliance, even though it still works.

**Build tight, ventilate right.** Draughts are not a good way of getting the fresh air you need. Make sure your house is airtight and also has the necessary ventilation in the form of fans, and windows that can be opened.

**Recognise expertise.** Look for builders and architects with real experience of low-energy construction. Don't get confused by chat on the internet.

## Frequently asked questions

***How will we heat zero carbon homes?*** The two options are heat pumps and hydrogen boilers. Heat pumps will require a big insulation programme and huge capacity of sustainable electricity. Hydrogen fired boilers will need a massive programme of green hydrogen production and upgrading existing homes.

***Are wood and other forms of biomass a sustainable solution?***

The CO<sub>2</sub> emissions from burning wood are greater than from gas or sustainable electric heating and there is the additional problem of particulate pollution. Some people think bio-mass is sustainable because the carbon has been sequestered when growing the crops, but you must also allow for the emissions in farming, processing and transporting the fuel. Using land to grow biomass crops also takes land away from agriculture, has damaged ecosystems and contributed to deforestation.

**What about nuclear power?** Nuclear power has some strong advocates, including in government. We're not keen because of the time it takes to build new nuclear plants, the high costs and the unresolved waste disposal issues and security risks. Renewables are a safer, quicker option.

**Should I replace my old fridge/TV/ gas boiler with a more energy-efficient model now, or wait until it breaks down?** Don't wait for appliances to break down as you will end up buying what is available rather than the most efficient. Plan for their end of life and scrap them if they are already old and inefficient. The embodied energy in white goods and electrical goods is high so don't replace relatively efficient appliances and save up to buy the best. Berners-Lee (2020) has good explanations for a number of appliances.

**How should I dry the washing in winter?** Try to reduce the amount of laundry you do and dry it outside when you can. Drying clothes indoors cools the house down and may require additional ventilation to stop the windows steaming up and the house getting damp. If you use a tumble dryer, get a more efficient heat pump driven one.

**Are there any dangers in stopping all draughts?** Rooms with open fires or old gas fires or boilers need a fixed air supply, usually provided by an airbrick or a window ventilator. There is a risk of carbon monoxide poisoning if you ignore this. If you buy new furniture or carpets or have building work done involving particle board, you may need to ventilate the room to get rid of volatile organic compounds (VOCs) used in their manufacture.

**My house doesn't feel draughty. Do I really need draught-stripping round the windows?** It may not feel draughty if the house is generally warm. This doesn't mean that there is no air movement. Heated air will be going out of the gaps around your windows and doors! Draught-stripping will stop this waste of energy.

**Can I put temporary double glazing on any window?** Almost. You must not cover any fixed ventilation for fires or heaters. You should not put fixed panes over windows that might be used as escapes in case of fire.

**My home is listed, what can I do?** It is vital to get advice from architects and to employ builders who have experience of historic buildings and their thermal improvement. A good architect will also have the experience to negotiate with local authority conservation officers and find the best solution for your home. While it may not be possible to refurbish an historic building to the standard of a 21st century home, all the advice on efficient heating systems, lighting, appliances and good housekeeping still applies. Hunt and Suhr's *The old house eco handbook* (Hunt & Suhr 2013) is a helpful guide.

## More information

### I'd like to know more about...

**...energy efficiency and retrofitting.** Look at the [Centre for Alternative Technology's](#) online Information Service, [The Centre for Sustainable Energy's](#) resources and [The Energy Saving Trust](#) guidance, 0300 123 1234 (England, Wales and NI) or 0800 512012 (Scotland). Some useful books are Nigel Griffith's *Eco-house manual* (Griffiths 2012), Martin Cook's *Energy efficiency in old houses* (Cook 2009), Janet Cotterell & Adam Dadeby's *The passivhaus handbook* (Cotterell and Dadeby 2012), Keith Hall's *The green building bible* (Hall 2008), Sophie Pelsmaker's *The environmental design pocketbook* (Pelsmaker 2012,) and David Thorpe's *Sustainable home refurbishment* (2021).<sup>63</sup>

**...how to find an architect or builder.** Check out the [Association for Environment Conscious Building](#), the [PassivHaus Trust](#), or the [Green Register](#). In Scotland look at the [Net Zero Scotland](#) site, and at [Changeworks](#).<sup>64</sup>

**...examples of low-energy homes.** Look at [Superhomes](#) (UK wide), [Green Open Homes](#) (England) and the [Green Homes Network](#) (Scotland) who all showcase numerous homes that you can arrange to visit.<sup>65</sup>





6 :

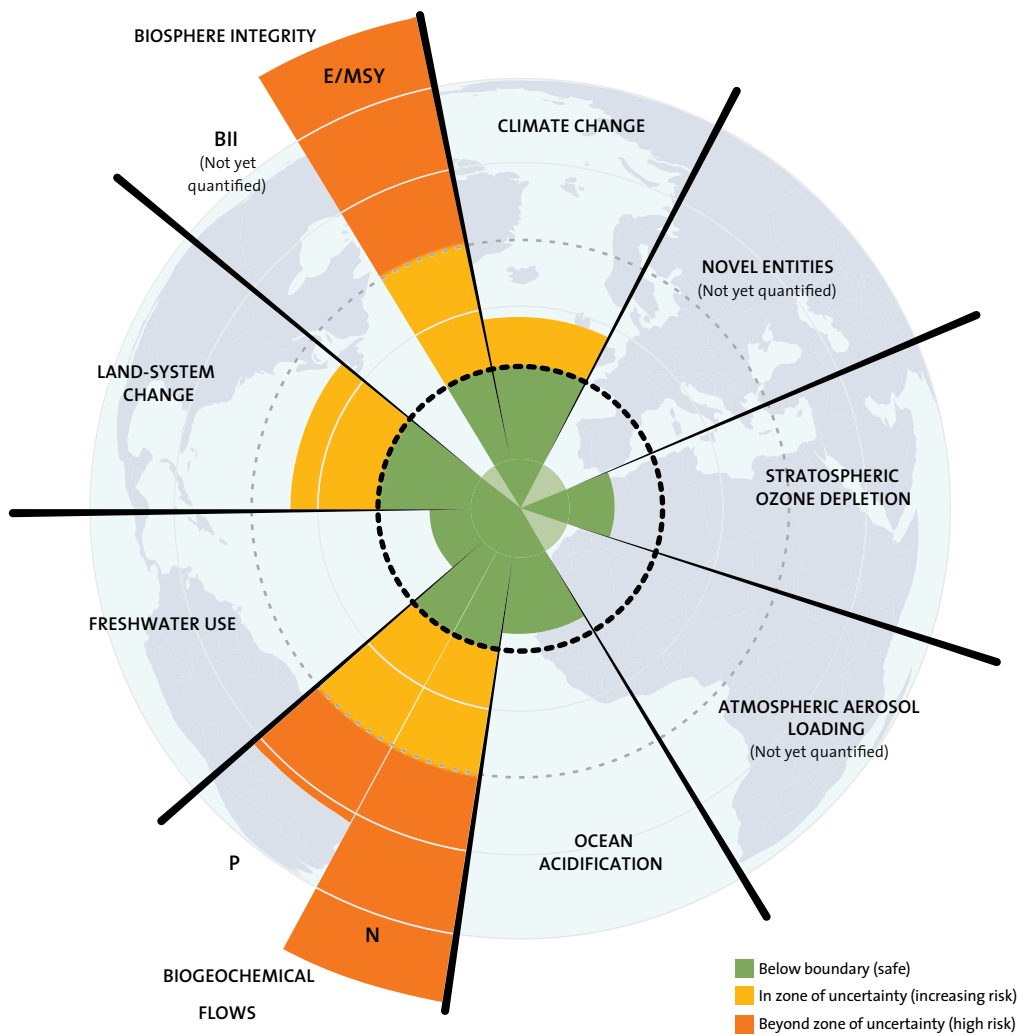
## Other environmental issues

The climate crisis is often spoken of in the same breath as the biodiversity crisis – the catastrophic loss of animal, plant and insect life that we are witnessing. It can be helpful – though deeply painful - to look at how climate change and the need for carbon reduction intersect with other issues such as biodiversity loss, chemical pollution, water use and the damaging effect of plastics.

A useful way of understanding this is through Johan Rockstrom's idea of planetary boundaries.<sup>66</sup> These describe the conditions that have allowed humanity to flourish for the last 10,000 years. Currently five of the boundaries have been breached, those for climate change, biospheric integrity, land use change, novel entities (this includes plastics and chemical compounds which don't appear in nature) and bio-geochemical flows (which includes the nitrogen cycle).

**Figure 20: The Nine Planetary Boundaries**

Image: J. Lokrantz/Azote based on Steffen et al. 2015. Licensed under CC BY 4.0.



In general actions that reduce carbon have a positive effect on these other issues but occasionally they are in conflict. Try not get preoccupied with the conflicts. If it all feels too complicated you may throw up your hands in despair and do nothing. Staying aware and doing what you can is the important part.

## Plastics

Plastic has been in the news a lot in the last few years with high levels of concern about plastic rubbish in the oceans and micro-plastics in the air we breathe and in the water we drink. The paradox is that in certain uses, plastic reduces carbon emissions. Clothing made from synthetic materials (basically plastics) has a carbon footprint many times smaller than clothing made from cotton.<sup>67</sup> Synthetic clothing is however a major contributor to micro-plastics in the water system as fibres detach through washing. Similarly, because it is lightweight, plastic is a good packaging material. It costs less to transport than the heavier glass or steel. However if it doesn't get recycled or properly disposed of, it too breaks down into long-term plastic waste whose effects are only beginning to be understood.

## Water

Water is another difficult issue. People often concentrate on the wasteful use of water in British homes but this is tiny compared to virtual water, the water embodied in anything that has been grown or manufactured.<sup>68</sup> In the UK, the average person uses between 44 and 88 tonnes of water per year in their home. (Between 120 and 240 litres per day.) But the water needed to grow the crops which feed and clothe that person amount to a staggering 1,500 – 2,000 tonnes a year, or about 5,000 litres per day. Most of this is used producing meat. Eating a vegetarian diet reduces your water footprint to 2,700 litres per day.<sup>69</sup>

Poor countries often export their precious water in the form of goods sold to wealthier nations: wheat and soy for animal feed; cotton; rice, coffee and thirsty vegetables such as avocados and tomatoes. Avoiding produce grown in water-stressed regions of the world is a good idea.

Meanwhile pollution of water courses and the sea through run-off from muck spreading and sewage discharges adds to our problems.

## Conflict minerals

Many of our goods are made with 'conflict resources'<sup>70</sup> – raw materials sourced from countries where their extraction is tied up with corruption, armed conflict, human rights abuses and disregard for the environment. Although there has been progress in the last ten years in regulating the use of these materials, the minerals used to make car batteries and consumer electronics remain a concern. So, although an electric vehicle is a good option if you need individualised transport it's important to recognise that it may come at an environmental cost. Do all you can to make anything with a battery or electronics last as long as possible.

## Land use

Huge tracts of land that were once barely touched by people are now under cultivation, with all the threats to biodiversity which that brings. The destruction of the Amazon forest for cattle grazing and soya production is well known but there are also threats to savannah lands, waterways and wetlands. The main driver of this is growing feedstuffs for animals. A more recent issue is the growing of biofuel crops in the belief that these are a low-carbon solution. Recent research<sup>71</sup> suggests that this is only the case where there is no land-use change and that even then the gains are minimal. At an individual level the best you can do is to adopt a meat free or low meat diet and contribute to campaigns for bio-diversity.



## More Information

**I'd like to know more about...**

**...campaigns on plastic pollution.** Check out [Greenpeace](#), [Earthday](#) and [Plastic Free July](#) who all run campaigns.<sup>72</sup>

**...water.** Look at Tony Allan's book *Virtual water* (Allan 2011) and the website of the charity [Water Footprint](#) for international information. [River Action](#) campaigns to clean up river pollution in the UK.<sup>73</sup>

**...conflict minerals.** [Global Witness](#) is a campaign group with good information.<sup>74</sup>

**...land use.** Land use issues appear in the work of many different organisations for example, campaigns about deforestation, palm oil, livestock and farming. Greenpeace's page on [Challenges](#) is a good place to start exploring this. [Rewilding Britain](#) campaigns for more sustainable land use in the UK.<sup>75</sup>

## Conversations

By the time you read this section of the handbook you may be getting involved in collective action as well as tackling your individual footprint. You will probably also still be dealing with the loss, grief and other complex feelings of really letting yourself understand the climate crisis. These feelings never go away completely but they do get easier. If you've got a carbon buddy, are meeting in a self-help group, or just talking with family and friends the following discussion suggestions may help.

**Explore the conflicts you feel.** People sometimes feel overwhelmed by the number of possibilities, the sense of responsibility and the dilemmas that come up. Take time to talk about what you feel.

**Make space for vulnerability, care and concern.** Respect and empathy for other people and the natural world can be a source of strength and help you open up to wider possibilities.

**Remember the importance of balance.** Your group hopefully explored this together. Revisit this. Think about how to challenge yourself without becoming overwhelmed. Share practices that help you feel better. Meditation, time in nature and allowing yourself the ordinary joys of life often come high on people's lists.

**Finally, congratulate yourself and each other on getting this far.**

*People sometimes feel overwhelmed by the number of possibilities, the sense of responsibility and the dilemmas that come up. Take time to talk about what you feel.*



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## NOTES

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- <sup>2</sup> These issues are discussed in the *Open University's Environment: treading lightly on the earth* op cit.
- <sup>3</sup> See <https://www.open.edu/openlearn/nature-environment/environmental-studies/environment-treading-lightly-on-the-earth/content-section-0>
- <sup>4</sup> See <http://footprint.wwf.org.uk/>
- <sup>5</sup> See <https://calculator.carbonsavvy.uk/calculator/full>
- <sup>6</sup> A bottom up/cradle-to-grave analysis looks at each stage in the manufacture of an item and works out the energy used at each stage. A top down/input-output analysis starts from national and industry statistics for the inputs to each industry sector and uses this to work out the total amount of fuel and emissions that belong to their outputs.
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- <sup>48</sup> The figures for flights assume economy seats.
- <sup>49</sup> It is hard to find good figures for ferries and cruise liners. There is not a lot of good research and there are huge differences between different boats. Our figure for cruise liners is the average from a New Zealand study which found a range from 250g to 2200g per passenger km. Howitt O.J.A. et al, (2010) 'Carbon Emissions from International Cruise Ship Passengers' travel to and from New Zealand', *Energy Policy*, [http://www.physics.otago.ac.nz/space/cruise\\_ship\\_EnergyPol.pdf](http://www.physics.otago.ac.nz/space/cruise_ship_EnergyPol.pdf) For comparison, George Marshall calculated 700g per passenger-km for the Queen Elizabeth II and gives a figure of 500g per passenger-km for fast ferries and 100g per passenger-km for slow ones.

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- <sup>53</sup> See <http://www.communitycarshare.org/carplus.htm> and <https://como.org.uk/>
- <sup>54</sup> See <http://www.transportdirect.info>
- <sup>55</sup> See <https://www.sustrans.org.uk/national-cycle-network/>, <https://www.opencyclemap.org/> and <https://www.cyclestreets.net/>
- <sup>56</sup> Figure from Committee on Climate Change <https://www.theccc.org.uk/wp-content/uploads/2016/07/5CB-Infographic-FINAL-.pdf>
- <sup>57</sup> Elliott L. et al (2019) *The Green New Deal: A Bill to make it happen*. London: The Green New Deal Group. P. 24 [https://greennewdealgroup.org/wp-content/uploads/2019/09/GND\\_A\\_Bill\\_To\\_Make\\_It\\_Happen.pdf](https://greennewdealgroup.org/wp-content/uploads/2019/09/GND_A_Bill_To_Make_It_Happen.pdf)
- <sup>58</sup> Elliott, L. et al op.cit.
- <sup>59</sup> See <https://www.passivhaustrust.org.uk/>
- <sup>60</sup> <http://www.greenopenhomes.net/>
- <sup>61</sup> <https://www.gndrising.org/>
- <sup>62</sup> See their Renters' Manifesto and their COP26 Platform of Demands at <https://www.acorntheunion.org.uk/>
- <sup>63</sup> See <https://cat.org.uk/info-resources/> and <https://www.cse.org.uk/resources>
- <sup>64</sup> See <https://aecb.net/>, <https://www.passivhaus.org.uk/>, <https://www.greenregister.org.uk/>, <https://www.netzeronation.scot> and <http://www.changeworks.org.uk/>.
- <sup>65</sup> See <https://superhomes.org.uk/>, <http://www.greenopenhomes.net/> and <https://energysavingtrust.org.uk/tool/green-homes-network/>
- <sup>66</sup> Rockstrom, J.W. et al. (2009) 'Planetary Boundaries: Exploring the Safe Operating Space for Humanity,' *Ecology and Society* 14(2): 32, 2009 and Persson, L. et al (2022) 'Outside the Safe Operating Space of the Planetary Boundary for Novel Entities' *Environ. Sci. Technol.* 2022, 56, 3, 1510–1521.
- <sup>67</sup> According to Berners-Lee (2020) a pair of polyester trousers has a footprint of 8 kg while a pair of jeans clocks in at 19 kg.
- <sup>68</sup> Allan, T. (2011) *Virtual water: tackling the threat to our planet's most precious resource*. London: IB Taurus.
- <sup>69</sup> The charity Waterfootprint produces detailed information about the water use of different products and different lifestyle choices. <https://www.waterfootprint.org/en/>
- <sup>70</sup> See Global Witness for an explanation <https://www.globalwitness.org/en/campaigns/conflict-minerals/>
- <sup>71</sup> Jeswani, H.K. et al (2020) 'Environmental sustainability of biofuels: a review' *Proc. R. Soc. A.* 476: 20200351
- <sup>72</sup> See <https://www.greenpeace.org.uk/challenges/plastic-pollution/>, <https://www.earthday.org/campaign/end-plastic-pollution/> and <https://www.plasticfreejuly.org/>
- <sup>73</sup> See <https://riveractionuk.com/>
- <sup>74</sup> See <https://www.globalwitness.org/en/>
- <sup>75</sup> See <https://www.rewildingbritain.org.uk/> and <https://www.greenpeace.org.uk/challe>



