In time for tomorrow?

the **international** carbon conversations handbook

Rosemary Randall and Andy Brown

Carbon
Conversations

The International Carbon Conversations Handbook

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Why is climate change so easy to ignore? Carbon Conversations offers empathy, encouragement and a practical path to anyone who feels concerned but lost, angry or powerless about this urgent topic.

The groups help people grapple with difficult questions and move towards the low-carbon lives that we all need to be living. They provide the safe space that lets people explore the issue without fear of judgment. The groups focus on the way people feel in response to climate change, on the psychological process of change, and on the social contexts that make change difficult. The meetings explore the key areas of an individual carbon footprint in a supportive and non-judgmental fashion, allowing people to make plans that feel right for them and which will halve their carbon footprints.

"This lovely handbook covers it all, with sage guidance on delving into climate debates, reducing your own carbon footprint, and encouraging community action. It reckons honestly with the psychological impacts of a crisis that is far too easy for many of us to deny in our everyday lives and can help anyone to take the first step towards joining this crucial conversation."
Naomi Klein, author of *This Changes Everything* and *The Shock Doctrine*.

"Carbon Conversations is about so many worthwhile things: acting at a community level, helping people envision a low carbon future, achieving real change. For me its greatest value, in which it is truly remarkable, is that it provides a framework for people to share the real reasons why they act the way they do - their motivations, their blockages, and beyond this, their concerns about the world. *In Time for Tomorrow?* goes far beyond prosaic arguments about saving energy and explores the landscape of hope. This is why it generates such lasting enthusiasm from participants. "
George Marshall, co-founder of Climate Outreach and author of *Don't Even Think About It: Why Our Brains Are Wired to Ignore Climate Change.*

"One of the twenty most promising solutions to climate change."
The Guardian

The authors

Rosemary Randall is a psychotherapist and group facilitator who has been involved in the environmental movement for many years. She writes and lectures widely on the psychological aspects of climate change.

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Preface to the international version

International interest in Carbon Conversations has led us to create this new version of *In Time for Tomorrow?* The original book was written for the UK Carbon Conversations project, a scheme that brings people together in small groups to explore climate change and the impact of their personal lives on the problem. The original book combines a sophisticated understanding of the psychological issues involved in carbon reduction with detailed information about UK carbon emissions, UK carbon footprints and UK policies. It also features stories from British people recording their feelings about climate change and what they have done to reduce the carbon emissions they are in control of. For this international edition we have removed all the UK specific material. It is made available under a Creative Commons licence so that it, and the other materials used in Carbon Conversations, can be easily translated into other languages enabling Carbon Conversations groups to be run in other parts of the world.

Anyone wishing to run a Carbon Conversations group internationally will need to create their own country-specific manual to accompany this handbook, using the original *In Time for Tomorrow?* as a guide to the kind of technical and practical material that is needed and the kinds of personal stories that will bring it alive. They will also need to consult, and if necessary translate, the *Carbon Conversations Facilitator's Guide*, the *Carbon Conversations Participant's Workbook*, and the online foot-printing tools. They may also wish to create their own versions of the Carbon Conversations games which are described in the *Facilitator's Guide.*

Good group facilitation is essential to Carbon Conversations and we would encourage anyone wishing to use it internationally to look at the information about this at www.intimefortomorrow.co.uk/p/international-possibilities.html and to involve people with experience of therapeutic group work when training facilitators.

Picture credits

Grateful acknowledgment is made for permission to reprint the following images. P. 5 Planetary Boundaries, Azote Images/Stockholm Resilience Centre. P. 5, Doughnut, Kate Raworth (2012) *A Safe and Just Space for Humanity: Can we live within the doughnut?* Oxfam Discussion Paper, Oxfam International, http://www.kateraworth.com. P. 37, The Circular Economy: The Ellen Macarthur Foundation.

Introduction

Information has long been the chosen tool of campaigners. The belief that telling people what is wrong with the world will lead to change, dies hard. It remains in place despite decades of experience showing that most people do not respond to tales of disaster with the energy to transform the situation, but with indifference, despair or the shrug of 'what do you expect me to do?'

Assembling facts is straightforward. Creating the situations where people can hear them, and are willing to change their own lives or the society of which they are part, is much harder. People fail to act, not because they are selfish or unwilling but because they feel they have no power, because the things that are wrong are part of complex social and political systems and because as individuals we are each a complex mix of competing desires. Altruism is mixed with self-interest, compassion is tempered with frustration, duty conflicts with pleasure. We want life to change but we don't want to suffer in the process.

Faced with unwelcome news the human mind is good at suppressing awkward facts. We are skilled at only seeing what we want to see, and have many tricks for maintaining our illusions. We screen out information that doesn't fit with our world view. We rationalise our part in systems that cause harm. We reject ideas that challenge our sense of our own identity. We turn a blind eye to anything which clashes with our feelings that we are basically good people. We repress the facts that make us feel upset or guilty. We do much of this unconsciously. We don't notice ourselves do it, and we can be surprised and offended if someone points it out.

Meanwhile, our ideas about what is right and good are formed in the societies of which we are part. In the highly industrialised societies of Europe, the United States of America, Canada and Australia individualism is strong, the market is seen as a natural force, and increased consumption of material goods is seen as inevitable and desirable. This way of life seems normal to many, despite having developed over a remarkably short time.[1] The collective solutions and personal restraint that climate change may require, can feel hard to contemplate and even harder to achieve.

It is clear that many players are needed in the social transformations that are demanded by climate change. We require leaders who are not afraid to speak the truth; citizens and social movements who are forceful in their demands; businesses that are prepared to rethink their role in society; industry that is prepared to be inventive and take risks; states that are prepared to act in the collective interest; politicians who will plan for the long-term.

It is important to be clear that individuals on their own cannot make the changes to society that will solve climate change, and that there is no equality between the various players who need to act. We live in relationships of deep inequality. Programmes of behaviour change can all too easily shift responsibility away from the powerful, and dump it on people who have little power. In the same way that obesity is often framed as an individual weakness, it can also be convenient to blame unsustainable consumption on individual greed. With obesity it is the issues of poverty and the promotion of cheap, unhealthy food that are often ignored. With unsustainable consumption, it is the built-in obsolescence, the relentless pursuit of profit, and the complex social practices that grow up around goods and services that get side-lined. Vested commercial interests, weak politicians and structural deficits in the provision of public transport, housing, and sustainable manufacturing all need to be addressed.

Nonetheless, as we describe in more detail later, we think that most people can halve their individual carbon footprint. The rest of the reductions needed to create a low-carbon society have to come through political, social and technological change. Halving an individual footprint is likely to take some effort. It is a significant challenge and a far cry from the trivial 'top ten tips to save the planet' that frequently emerge from behaviour change initiatives.

Really reducing your carbon footprint requires reliable information. You can't live a low-impact life if you don't know why your current life is high-impact; you need to understand how your carbon footprint is made up. We have met many concerned individuals who have not realised that their cruise through the Norwegian fjords is as damaging as a flight from the UK to South Africa, or that the size of their house has an effect on their carbon emissions. Many people have no idea that a high income has a strong correlation with a high carbon impact, and it is news to others that meat is so damaging.

For information to be useful however, it needs to come at the right time, in the right place, in the right amount and with the right support. People need to be open to it, and willing to grapple with its implications. It took one of us many years of advising the building industry on low-energy construction to realise that it wasn't the information he provided that was critical, but his skills in persuading the entire team to agree to a process of change. When the other one of us first read that the average UK footprint needed to reduce by 80% from its current 15 tonnes, she found this unimaginable and reacted with disbelief, not wanting the facts to be true. As the disbelief passed, she felt criticised. The information seemed to accuse her of profligacy and selfishness. Only gradually did she

become able to disentangle the facts from her strong, emotional response and find a way of acting on them.

If you are not ready to process painful or difficult information, then your defences will kick in. You will shunt the unwelcome facts to a separate part of the mind, knowing and not knowing them at the same time. You will embrace views which tell you that the unwelcome facts don't matter, are wrong, can be dealt with later or are someone else's responsibility. This is the explanation for the common indifference with which climate change is greeted. We do not deny the reality of climate change outright. We simply park it somewhere so that it doesn't bother us too much, and get on with life as usual.

This means that most of us will need help in understanding our complex reactions to climate change, and a milieu where painful feelings can be explored and worked through. Reducing your carbon footprint means confronting your feelings about what makes a home a home, your assumptions about holidays, cars and the daily commute, your attachment to particular foods and your right to do what you like with the money you earn. We need to untangle the complex web of social forces, practical constraints and individual desires that keeps our lives as they are. We need to uncover what we think about a future that is likely to be quite different from the present. We may need to explore our personal values, our relationship to nature and our sense of justice. As we try to make changes to our lives we need to recognise that we are likely to make advances and retreats. We need to accept that

at times we will respond defensively, feel anxious or hopeless, want to give up or wonder if it is worth trying at all. Challenging the status quo is difficult, whether you are doing this politically or by trying to alter the fabric of your day-to-day life.

There is a long history of using groups as a milieu for support and change. Making bonds around a common challenge – whether it is pregnancy, weight loss, bereavement or delinquency – can bring comfort, new knowledge and the determination to find new solutions. When the group feels safe enough, free from harsh criticism, welcoming to those who are uncertain and tolerant of those who are confused, then people open up. They question old assumptions. They reflect more deeply on the past. They explore their feelings. They admit to vulnerabilities. Their attitudes shift. They try something new. Such groups come in all kinds of shapes. Our experience of running the first pilot groups of Carbon Conversations led us to concentrate on a model of time-limited, facilitated groups. We learned to use activities that would help people explore their feelings about climate change, understand the facts about their personal impact and grasp the possibility of doing something different.[2]

This book should help you understand the broad issues and reflect on the defences and obstacles in moving towards a low-carbon life. The practical information you need will be provided separately by the people organising Carbon Conversations in your country.

Chapter One: looking for a low carbon future

Climate change has moved up and down the political agenda since the late 1980s. Internationally, the world has struggled – and for the most part failed – to agree what should be done, although the talks which took place in Paris in 2015 were more hopeful.

Surveys show that most people are aware that it is a serious issue.[3] It is also clear that it is complex. Our way of life is dependent on fossil fuels and the changes needed are huge. Governments fear being unpopular. Business keeps it eye on profit. Individuals don't see why they should carry the can. Despite the urgency, it seems almost impossible for anyone to make an adequate response. Climate change raises questions about:

- economic growth;
- our relationship to the natural world;
- justice and equality;
- people's willingness to change.

In this chapter we look at some broad issues:

- What is climate change?
- Who should take responsibility for tackling it?
- What might a low-carbon future look like?
- Why do we find it so hard to act?

We also explore some practical questions:

- What is a carbon footprint?
- How can individuals contribute to the changes that are needed?

Climate change: the basics

In order to understand the problem we need to grasp some basic facts about what is causing climate change and what is likely to happen if it goes unchecked.[4]

Life on earth depends on there being carbon dioxide (CO_2) in the atmosphere. Along with other 'greenhouse' gases and water vapour, CO_2 traps the sun's heat, creating the conditions for plants and animals to thrive. We need the amount of CO_2 to stay stable. Too little brings on risky cooling; too much and the earth overheats.

CO_2 is the main 'greenhouse' gas. Other important greenhouse gases are methane and nitrous oxides. Their levels can be expressed as 'CO_2 equivalents' or CO_2e, for easy comparison.[5]
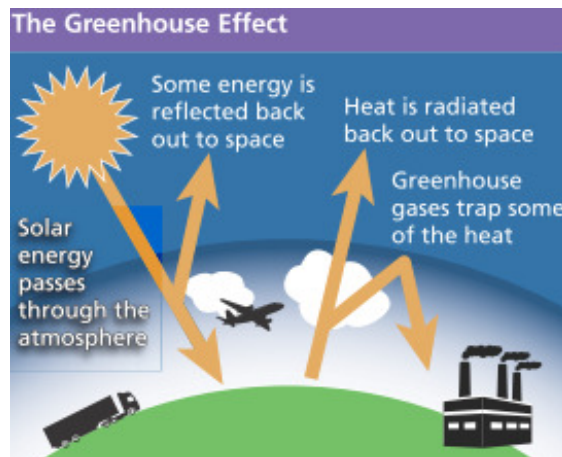
Since the start of the industrial revolution - about 250 years ago - the amount of CO_2 in the atmosphere has been steadily rising. The main cause is the burning of large amounts of fossil fuels - coal, oil and gas. Deforestation, agriculture and the way waste is managed also contribute. Since the 1950s, when global industrial production ramped up, the problem has rapidly increased. As CO_2 has risen so has the average global temperature as you can see in the graph 'CO_2 and temperature rise'.

CO_2 and temperature rise[6]
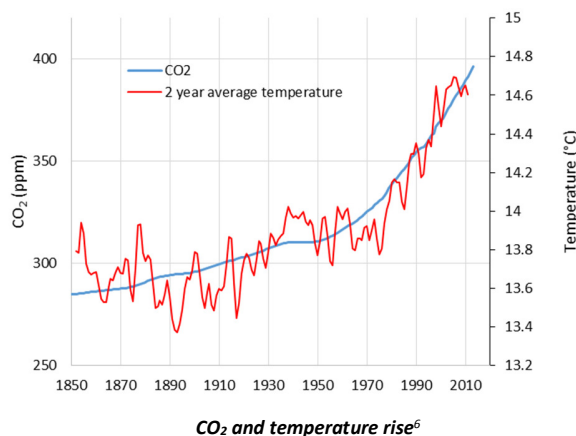
0 ºC or even 6 ºC isn't much when you're turning your central heating up or down but it's a different matter with global temperatures. Here, a rise of just a few degrees can have a huge effect, destabilising the climate.

Fossil fuels make modern life with all its comforts possible. But sadly, their use is destroying the natural world that we depend on. Scientists have no doubt that human actions are the cause of global warming. They also agree that the climate has started to change in ways that could be very damaging for human, animal and plant life.

- The planet could warm by as much as 6 ºC above pre-industrial levels by 2100.
- Sea level rises could make some islands and coastal areas uninhabitable - for example the Maldives and the delta regions of Bangladesh, home to 110 million people.
- Rainfall patterns will change, causing more droughts, storms and floods, and more variability, making agriculture more difficult in many areas. Crop yields will suffer.
- Changes to the availability of fresh water, increased heat stress, and the spreading of infectious diseases could all damage human health.
- Many plants and animals will disappear if they are unable to adapt to changing conditions.
- Social and political unrest are likely, as countries compete for resources and struggle with local effects such as droughts, storms and floods.

Scientists are worried

Climate change may not happen evenly or slowly. Scientists are worried about feedback effects that could bring runaway climate disruption. For example, rising temperatures could release methane now locked up in Siberian permafrost or cause rain forests to die back. Either would accelerate the heating of the global atmosphere dramatically.

In 2014 the world had warmed by 0.85 ºC since pre-industrial times. With a rise of 2 ºC the world will probably still be stable enough for human life although we can expect serious problems. Wet regions will become wetter and dry ones dryer. The Arctic will be ice-free in summer. Sea level rise will affect many communities. Agriculture will be adversely affected. With a rise of 3 or 4 ºC life for both people and the rest of the biosphere looks increasingly problematic. In general the poorer regions of the world are the most vulnerable and will find it most difficult to adapt. If 6 ºC is reached the outlook looks grim indeed.

Is it too late?

CO_2 emissions and average temperatures are both still rising. The temperature increase is currently on course to reach 2 ºC by 2050 and 4-6 ºC by 2100. We can't stop climate change but swift action could stop the worst effects. Emissions need to peak before 2020 if there is to be any chance of limiting temperature rise to 2 ºC.

In wealthy countries like those in Europe, the United States, Canada and Australia, this means that emissions need to reduce by somewhere between 3% and 10% a year.[7] This is an unprecedented task. The challenges are economic, political, technical and personal. The solutions are likely to involve a combination of:

- development of a low-carbon economy;
- social and political changes;
- better energy efficiency;
- reducing the demand for energy;
- use of new technologies;
- personal and behavioural changes.

The bigger picture

Climate change is not the only problem. It is part of a bigger picture. Work by Johan Rockström and colleagues identifies nine 'planetary boundaries'.[8]
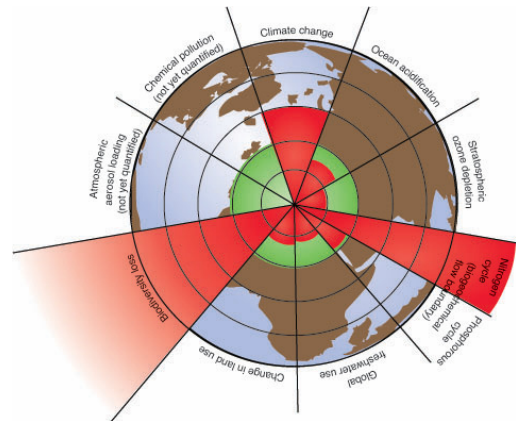
Planetary boundaries

These describe the conditions that have allowed human civilisation to flourish for the last 10,000 years. Currently three of these boundaries have been breached: climate change, biodiversity loss and the nitrogen cycle. Rockström emphasises the interdependence of these systems - degrade one and you undermine the others. Since the 1950s all these systems have been under pressure. Oxfam researcher Kate Raworth extends Rockström's ideas, arguing that humanity needs more than an environmentally safe space.[9]
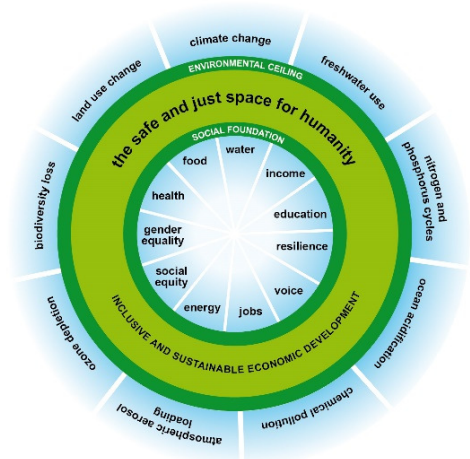
A safe and just space for humanity

At present, some people are putting more pressure on the planet than others: around 50% of the world's carbon emissions are created by just 11% of the world's people. Raworth argues that the environmentally safe space also needs to be socially just. Her doughnut diagram adds people's needs for food, water, energy, health and education.

In her view, inequality is the key problem. She makes a good case that dealing with most of the problems on the inside of the doughnut would cost very little in terms of carbon emissions if inequality was tackled. The lives of the world's richest consumers would have to change the most, but the lives of people on average incomes in developed countries would need to change too. In global terms many of us are wealthier than we think.

The economic system that drives these pressures also needs to change. Capitalism has brought innovation and progress but it is deeply implicated both in threats to the natural world and in inequality. Exactly how it should - or could - change is a matter for debate.

In the meantime your carbon footprint is a good measure of your impact on the world. If you can lower it, you will also lower your impact on the rest of the earth's resources.

Why is change so hard?

Surveys show that people across the world are clear that technology alone won't fix climate change and that people's lifestyles will have to change: globally, 67% of people say that lifestyle change will be necessary.[10] Despite this awareness, global emissions continue to rise[11] however and in developed countries like those of Europe, the US, Canada and Australia, which are responsible for the highest emissions, most people's lifestyles show little sign of change.

Perhaps we all secretly hope that someone else will carry the can. Perhaps - as we see the changes needed - we are overwhelmed. Maybe we are unwilling to give up a lifestyle we enjoy. Maybe our lives are so enmeshed in high carbon use we just can't see a way to change. Maybe we feel that our lifestyles are modest and not to blame. Maybe the whole subject makes us so anxious we would rather not think about it at all.

Shared responsibility

The reality is that action is needed from many players. The diagram 'Shared responsibility' below shows one way of thinking about this.

Shared responsibility
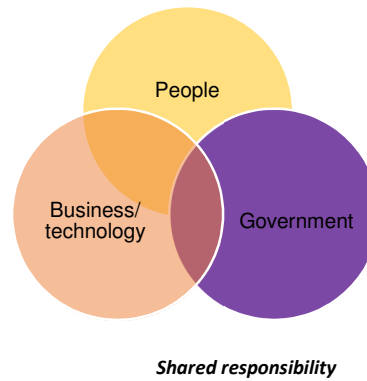
Globally, governments need to make international agreements. At home, they need to set national policies and enforce them. They need to invest in things like new public transport systems, upgrades to the housing stock and upgrades to the national grid. They need to set frameworks that will encourage business to develop low-carbon alternatives and make it easy for householders to adopt them. Business needs to learn how to live without fossil fuels. It needs to invest in the technologies that will deliver the low-carbon goods and services that people will need in the future.

But people also need to change. Figures from the International Energy Authority show that in the developed world individuals and households are responsible for almost half their country's emissions.[12] We have to shift our expectations and reduce our demands. People and their lifestyles matter.

Harm is not obvious

Many people find it difficult to accept that their lives will have to change. One reason is that the impact of our lifestyles is not obvious. We don't see the consequences of our everyday actions. For example, it's unusual to be aware of:

- the wars fought in the Congo, caused by mining the minerals used in our mobile phones;
- the devastation of the Aral Sea, which dried out as the water was taken to grow the cotton for our T-shirts;
- the air pollution caused in China as a result of manufacturing fridges, TVs and furniture for consumers in Europe, the US and Australia;[13]

Another reason is the intricate way in which our personal lives are entwined in global systems. It can feel as if you don't have much choice. For example:

- modern jobs often demand flexibility and a long commute;
- there are few food shops apart from the big supermarket chains;
- it's hard to know where the raw materials that make up products have come from;

- a normal social life often depends on high levels of consumption.

The facts hurt

But a third reason is that it is painful to take in the information. When people are made aware by a tragedy hitting the news, they are usually appalled. When a factory in Bangladesh making cheap clothes for European and US shops collapsed in 2013, killing over 1,000 of the workers, there was widespread shock and revulsion across the world. Most people had not asked themselves how their clothes could cost so little.

As the news passes, people quickly return to normal life. It's easy to feel defeated by the complexity of the systems we are caught up in and the lack of alternatives. Most of us neither change our shopping habits, nor become involved in campaigns to change the clothing industry. It is hard to be reminded every time you buy a pair of socks that someone has suffered to make them for you. Most of us prefer not to think about these difficult problems for very long.

Climate change is no different. It feels distant. It's not happening now. It's not happening on my street. It's a more abstract worry than how to put dinner on the table or pay the utility bills. If you allow yourself to think about it deeply, climate change is likely to make you anxious and troubled. You may worry about the future for yourself, your children or grandchildren. You may feel angry at the global systems that hold everything in place. You may feel guilty about your own comfortable lifestyle. You may feel powerless to have much effect. Faced with these kinds of feelings most of us look for ways of feeling a little bit better.

Avoiding the truth

When people talk of climate change denial, they are usually thinking of people who believe that climate change is not occurring. But there are more subtle forms of denial and most of use them, at least some of the time, to protect ourselves from a painful truth. You may be familiar with this state of mind. When something happens which is disappointing, alarming or downright life-changing you seem to simultaneously know it and not know it at all. One part of your mind acknowledges the reality. Another part behaves as if it isn't true. Therapists call this form of denial 'disavowal'.[14] The awkward knowledge is placed in a separate box and treated as if it can be forgotten, is unimportant or insignificant. For example amongst teenagers who have failed an important exam one may start by saying that it can't be true and then try to convince herself the result is a mistake. Another may tell you that she doesn't care, that it doesn't matter or that she didn't need the qualification anyway. If you try to raise the subject they will become irritated or avoid the conversation. Similarly people who are threatened with redundancy may try to persuade themselves that they won't be one of those

affected, carry on spending as if it's not true, say they don't really care or minimise the likely impacts. With climate change people will typically acknowledge the facts but:

Deny their meaning: "I don't think it's that serious."

Deny the implications: "People have coped with worse in the past. I doubt it will affect us much."

Deny the connection to their own lives: "It's not my responsibility – it's down to government."

Deny their emotional significance: "I'm not bothered - I've got more important things to worry about."

Deny the practical significance: "I know it's happening but I can't change my life because of it."

Deny the irreversibility: "I'm sure it can be sorted out later/we can adapt/science will find an answer."

Often people overestimate the changes they are making, or try to strike bargains with themselves:

- "I do eat meat, but it's all organic."
- "I know my flights are bad, but I cycle to work, so I'm sure it equals out."
- "The car's bigger than we need but it means I can collect manure for the garden."

People on low incomes, who have small footprints, may feel angry that those who have enjoyed a high-carbon lifestyle are stamping on their aspirations:

- "I've saved all my life for this cruise and now these green idiots are telling me I shouldn't go."
- "Why shouldn't I have a nice car, a decent home and a foreign holiday? I've worked hard for this."
- "People like me struggle to put food on the table – why should I suffer to clear up the mess other people have created?"

Anxiety, guilt and identity

When we interviewed some people about how they tried to live low-carbon lives, their replies were interesting. Several of them avoided simple behavioural changes because they were a reminder of their painful feelings about climate change:

- "Doing this kind of stuff makes me feel anxious – it makes me think about climate change and then I can feel that it's all hopeless. Frankly, if I'm truthful, I'd rather not think about it and constantly remembering to do things like not overfilling the kettle reminds me."
- "What about the times I forgot? I'd just feel so guilty. I'd think about all that carbon dioxide whooshing up into the atmosphere."

Others found that apparently simple behaviours were meshed with their sense of themselves or were a way of coping with another problem. One man always filled the kettle to the top

when he was at work. This was a way of getting a slightly longer break from his desk - stealing a few extra minutes from his employer. Putting in just the right amount of water removed his daydreaming time or left him hanging around in the kitchen feeling anxious that he would be challenged. An older woman overfilled the kettle in order always to be sure there was enough for anyone who happened to turn up. Putting in just the right amount of water made her feel she was being selfish. Her behaviour was deeply connected to her sense of herself as a generous person.

More complicated actions - such as choosing to holiday close to home instead of abroad, or using savings to upgrade the house - involve negotiations with family or friends. One woman told me sadly that she and her husband had agreed to holiday separately this year - he would not forgo his foreign holiday and she did not feel she had a good reason to step on a plane. Few people go this far. They are more likely to find themselves mired in, or avoiding, difficult conversations. We discuss this further in Chapter Three.

It can help to acknowledge that it is painful to face climate change and complicated to alter your lifestyle. Some people feel ashamed that they are not living up to their ideals. Some people feel resentful of others who they think are judging them. Some people feel upset by a critical, inner voice that tells them they ought to do more than they easily can. Guilt is often a cruel and paralysing emotion. It can be more useful to think in terms of mobilising your 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 being weighed down by the wrongs of the world.

Finding motivation

Exploring your positive motivations for acting on climate change can help you move away from feelings of guilt and shame. Discussing motivation with others can help you appreciate the many different sources of strength people use.

Connection to the natural world

Some people's motivation comes from a sense of connectedness to the rest of the natural world. They may feel a deep sense of awe and wonder at nature. Sometimes this is a spiritual or religious connection. They may draw on beliefs about stewardship of the natural world or about people's rightful place in the universe. Sometimes the connection is an ethical one. Some people feel that all living creatures have an equal right to life. They see nature as valuable in its own right, regardless of its use to people. Sometimes the connection is an aesthetic one, combining a sense of wonder with appreciation of nature's power and beauty.

Justice and equality

Some people's motivation comes from a sense of justice and the desire for equality. Sometimes this draws on existing political views and desire for change. For some people the connections to poverty and exploitation make climate change a natural field for concern. For others the focus is more on a sense of one's own good fortune and the desire to help others.

Enlightened self-interest

Some people's motivation arises from a sense of enlightened self-interest and the feeling that it would be stupid not to act on climate change. Who on earth would want a 4 °C world? The desire for security is often part of this, as is a concern for one's children and future generations. Being able to imagine and empathise with the lives of others is a powerful influence for some.

Challenge and creativity

Some people may see creative openings or business opportunities – the win-win of "good for me and good for the planet". Others may enjoy the sense of purpose that comes with a new project, the pleasure of rising to a challenge and the satisfaction of a task well done.

What about you? Reflect for a moment on what draws you to act on climate change.

Most people find they have a mix of motives pulling them to act on climate change, alongside a mix of motives that make them turn away from action. Principles and values can be hard to live up to. Most people experience conflict between their ideals and other factors in their lives. The conflict may be between:

- a value and a desire ("I care about the natural world but I love to travel and see it for myself");
- a value and the way society is organized ("I care about the environment but I can't get to work without driving)";
- two opposing values ("I want to reduce my footprint but I need to visit my mother in Pakistan").

Low-carbon futures

Technology, governments and individuals should all play a part in a low-carbon future, but one of the key issues to consider is fairness. Are there countries, organisations or classes of people who could easily use less fossil fuel? Are there some who need to catch up and burn a little more? Who are the big polluters?

What is a fair share?

Different countries produce different amounts of CO_2. 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_2 emissions. The chart below shows some figures for average CO_2 emissions per person each year:

Annual per capita emissions	
USA and Australia	20 tonnes
UK and Netherlands	15 tonnes
Spain	10 tonnes
India	1.5 tonnes
Tanzania	0.3 tonnes
World average	4 tonnes

You will see both lower and higher figures than these for per person carbon footprints.[15] Many of the lower figures don't take account of the emissions associated with international transport and with importing consumer goods and food. We've chosen to use the higher figures because we think they give a more realistic picture. Within countries, personal carbon footprints can vary a lot between different people. Income and wealth have a big impact - wealthier people usually have bigger footprints - but there are also variations with household size, age and region.[16]

At present, the world can absorb an estimated 2.5 tonnes of CO_2 per person each year. As the world population grows, this safe figure will fall to 1 or 1.5 tonnes per person per year. In the UK the Climate Change Act commits the country to reducing emissions by 80% from 1990 levels, by the year 2050. If this is achieved it should get the average carbon footprint down to around 2 tonnes. However, many scientists and environmentalists say these reductions need to happen sooner and suggest the UK should aim for an individual limit of 1 or 2 tonnes per person, by 2030 at the latest.

Internationally, all signatories to the 2015 Paris Agreement submitted comprehensive climate action plans explaining how they intend to reduce their emissions. If these plans are kept to, they will certainly have an impact on the problem but they are not yet enough to protect us from dangerous global warming. Check out what your country's plans are and how your government intends to involve its citizens. Under the Paris agreement, national governments should also be involving local government, civil society and the private sector in their plans so there may be opportunities for making your voice heard and for encouraging greater ambition.

What will it mean for us?

Does carbon reduction mean giving up everything that makes 21st century life comfortable? No. But it does mean accepting some changes. Technology should be able to solve some of the problems but a low-carbon future will probably mean:

- fewer consumer goods;
- less travel;
- almost no air travel;
- highly insulated buildings;
- more local production of food and other goods;

- carbon taxes or carbon rationing.

Will technology save us?

Some people hope that new technologies will allow us to maintain the lifestyles we have become accustomed to and a lot of hopeful, technological ideas have been suggested for solving climate change. Some are realistic but…

Some are scientists' pipe-dreams

Impractical ideas include: increasing CO_2 take-up of the oceans using iron filings; reducing the effect of the sun by scattering tiny mirrors in the upper atmosphere; building solar-power stations in orbit that beam microwaves down to earth. Despite the risks of these geo-engineering solutions, they are being seriously considered by some.[17]

Some are a long way in the future

Carbon capture at coal-fired power-stations, new nuclear power stations, and huge solar power stations in the Sahara connecting to northern Europe by a new high-tech grid may all help, but not soon enough.

Some bring their own problems

Biofuel is a good example of a solution with unintended consequences. Biofuels from plant sources such as corn and palm trees can be used instead of oil to make diesel. Wood chips can be used to replace coal in power stations, as is being done at Drax in the UK. There are problems however.[18] Most countries cannot grow enough biofuels to replace oil. Providing biofuel for UK road transport alone would require four times more arable land than the UK has in total. Sourcing biofuels overseas doesn't help either. Felling tropical forests to plant palm oil for biofuel results in an overall increase in greenhouse gas emissions as CO_2 is released from the soil. Large-scale wood-burning is polluting in itself and is causing damage to the ecosystems of the forests that are being felled to supply the wood. Meanwhile, world food prices have been pushed up as US farmers have switched from growing food to growing biofuels. Biofuels could play a helpful role in a low-carbon future, if they were limited to a small percentage of current demand.

Some might help

High-quality insulation materials, solar thermal panels, photo-voltaics, wind and wave power, more efficient cars and electric cars all show real promise. The difficult issue that has to be faced however is our high demand for energy. Technology can only help if we reduce this.

Finding the right policies

Regulation in one form or another will be necessary in moving to a low-carbon future.[19] Poor countries need help to reach a decent standard of living for their people. Rich countries need

help to curb their excess consumption. Some schemes need to be international. Others can be imposed by individual nations. CO_2 can be controlled:

- upstream, i.e. close to where fossil fuels are extracted or burnt in power stations; or
- downstream, i.e. close to the end-users (the people putting petrol in their cars or heating their homes, and the companies making goods for people to use).

Many of the schemes proposed for tackling climate change rely on energy efficiency and the power of markets for their effects. Energy efficiency rarely delivers all it promises because of the rebound effect while market-based systems don't tackle the underlying problem of unchecked economic growth. These are often hot topics for discussion in Carbon Conversation groups and we explain them further below.

Taxation

Taxation can encourage companies or individuals to be more fuel-efficient and the proceeds can be used to fund big projects (like wave or wind power or public transport). Taxation can be imposed either upstream, on oil companies and coal mines, or downstream on individuals and companies.

Investment

Many of the technological solutions need investment. Work by the New Economics Foundation suggests ways of doing this that would bring much needed work to local communities.[20]

Carbon budgets, rationing and caps

The 2013 report of the Intergovernmental Panel on Climate Change gave an estimate for the first time of the amount of carbon that can safely be burned if the world is to keep within a 2 °C limit.[21] Their estimates suggest that most of the known coal, oil and gas reserves need to be left in the ground. This suggests that the right to emit CO_2 needs to be rationed. Rationing can also be done upstream or downstream. Upstream rationing is usually referred to as a cap on the production of oil or coal, or a cap on the amount of CO_2 that an industry is allowed to emit.

The moment the idea of carbon budgets and rationing is introduced every country, industry and individual has their own idea of what a fair system would look like. Who should use less? Who should be allowed more? What is just? What is fair? Arguments about what a fair system would be and who should pay for it have bedevilled international negotiations for years.[22] This is one of the reasons why the negotiations which led to the Paris Agreement took a different route, that of allowing countries to make reductions pledges instead.

Carbon trading and individual allowances

Caps and rationing can be made more palatable, and possibly more efficient, by allowing carbon allowances to be traded. In carbon trading schemes a cap is placed on the amount of

pollution allowed, firms are allocated a certain number of credits and have to buy more if they pollute above their allocation. Firms who do well can sell their credits. Such schemes are dependent on the cap being accurate. The example of the European Emissions Trading Scheme has not been encouraging so far.[23]

You will also come across proposals for individual tradable carbon allowances. Here, each person would be given a carbon budget. Any purchases of petrol, gas, electricity or airline tickets would use up some of that person's allowance for that year.[24] The complexity of such schemes means that so far they have not found favour with governments.

Paying for nature's support systems

Another market-based solution places monetary value on nature's support systems, such as forests, as a way of recognising their importance, encouraging their protection and reducing the emissions that come through their misuse or degradation.[25] This is seen as a way of providing help to the Global South whose forests are often at risk of destruction. Critics make ethical objections to this but also practical ones. While it may be possible to put a price on the timber itself and on the forest's role as a carbon sink and flood defence, it is harder to price the forest's intrinsic value. Putting a price on it may actually be the next step towards further exploitation as these hard-to-measure benefits are ignored.

The problem of rebound

Many technical and policy solutions rely on energy efficiency as their key mechanism. The assumption is that increased efficiency will reduce the use of energy. In practice however, increased efficiency often leads to greater use. This phenomenon is called the rebound effect.[26] A simple example of direct rebound is the fact that as engines become more efficient, cars go further for the same amount of petrol and so drivers are happy to make longer journeys. Another example at the domestic level happens when someone saves money through insulating their house and then uses that money to take a flight. This is usually referred to as indirect rebound. Slightly more complex examples see industry making larger cars as they become cheaper to run and markets for consumer goods expanding as their falling prices make them accessible to more people. In both cases, the overall amount of energy used in the economy may not reduce as a result of the efficiencies. Occasionally energy savings are completely wiped out by increased use. This is usually called 'backfire'.

The extent of the rebound effect is hotly debated, but there is no doubt that it exists and that it is one of the reasons why improvements in efficiency have not seen the reductions in CO_2 that were hoped for.

Growth, contentment and GDP

Increasingly researchers are connecting environmental issues with wider global problems. Inequality, climate change, the financial crisis and numerous other problems seem to be connected. Some see economic growth itself as the problem: in a finite world, how can we go on expanding our use of natural resources?[27] Some focus on justice and equality. They argue that the economic system has unfairness built into it, allowing some countries and some people to prosper at the expense of others.[28] Some blame out-of-control global companies. The enthusiasm of oil giants like Shell and Gazprom for exploiting tar sands and the oil beneath the arctic, certainly suggests that market mechanisms may not be enough to deal with them. We discuss these issues further in Chapter Two. For now, take a look at the graph on the opposite page. High-spending, materialistic societies – the ones with high CO_2 emissions - don't produce contented populations.

CO_2 emissions are closely linked to a country's Gross Domestic Product (GDP). The more economic activity, the more CO_2 is produced. An increase in GDP is usually seen as a good thing, bringing more jobs, better goods and services and greater happiness. However countries with high GDP don't necessarily score well when quality of life is measured. A General Progress Indicator (GPI)[29] or Measure of Domestic Progress (MDP) score adjusts GDP by correcting it for costs that do not improve wellbeing or the health of the environment. The costs of dealing with pollution, road accidents or health problems like obesity are usually counted as part of GDP because they are part of the country's economic activity. When you take them out, the picture changes. The graph, taken from an article by Ida Kubiszewski and colleagues, shows how GPI and GDP have diverged worldwide since 1950. [30]
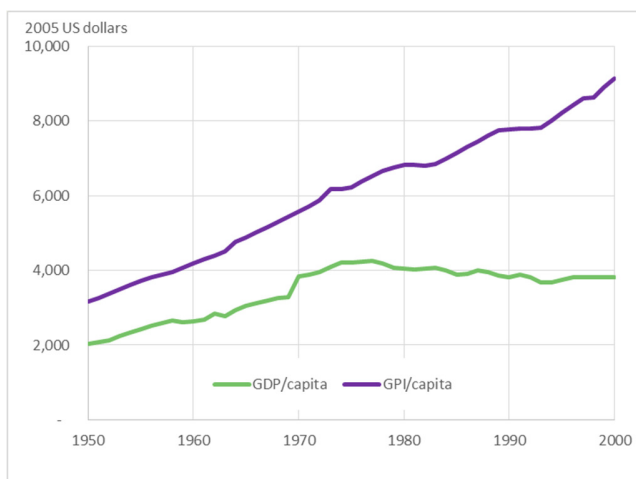
Global GPI/capita and GDP/capita

Visions of the future

Since people started telling stories, they have frightened ourselves with dystopias - tales of impending doom - and comforted themselves with utopias - dreams of an ideal future. The utopias often express longing for a lost past which it is hoped will return or at least provide inspiration for the future. The Romans dreamed of a Golden Age. Christianity mourned the loss of the Garden of Eden. The 18th Century Romantics yearned for pre-industrial rural life. More recently, you will find people who turn to a Palaeolithic diet or to other pre-industrial cultures for inspiration. There is a desire to find a way of life more in tune with nature, a belief that it existed somewhere in the past, and a powerful desire to re-create it, that runs through much of Western culture.[31] The dystopias often represent the dark sides of ourselves that we fear will escape and do harm, or our sense of powerlessness in the face of forces stronger than ourselves.

When people look to the past as a model for the future they often make this same split. Remembering my own childhood, I tell one story about the freedom to play out, the lack of traffic, the abundant wildlife and a slower pace of life. In another story I put the sexism, the misogyny, the slum housing, the racism and prejudice that feed my more dystopian imaginings.

It can be difficult to think about the future without bringing in both the longing for a lost ideal and the fear of horrors to come. The insecurity that climate change brings can push us to focus too much on our dreams and nightmares and make it hard to think realistically about what we want and about what might be feasible in a low-carbon future.

Five global scenarios

The report *Climate Futures* from the charity Forum for the Future [32] deals with a number of 'what-ifs'. What would the world be like in 2030 if:

- We make a rapid, high-tech transformation immediately?
- Carbon became the most expensive commodity in the world?
- Progress is redefined as well-being?
- Action is left very late?
- International agreements fail?

The five scenarios analyse current trends and look at different ways in which climate change, public attitudes, business, the global economy, natural resources, technology and political responses might interact and produce quite different futures for the world. Some of the scenarios create an individualistic, consumerist society while others do better at tackling inequality. Some feature high-tech solutions. Others go for low-tech options. Some are more stable than others. Some threaten civil liberties. One sees the breakdown of international co-operation followed by resource wars. Some of the scenarios have quite negative features, but they will

help you think about the seriousness and complexity of the situation.

What do *you* imagine?

Thinking about the future matters because it helps you to have a political voice. There are difficult choices to be made and most of us resist changes we fear will disadvantage us. Do you prefer wind turbines or nuclear power? How do you feel about the countryside changing as different crops are grown? How do you feel about being priced out of flying somewhere warm for your holidays? How would you feel if regulations brought restrictions on civil liberties?

Sometimes a feature that one person sees as an advantage fills another with horror. Would you welcome a reduction in travel because it would bring quieter streets and closer communities? Or would you hate the restriction on your freedom and the parochialism of small-town life?

Try talking with friends, family and colleagues about a realistic low-carbon future you could live with:

- What would you look forward to in it?
- What would you dislike about it?
- What would you miss from the present?

The process of change

The next chapter and the accompanying materials produced by your own country's Carbon Conversations project are concerned with the changes that individuals can make now. Government and industry need to supply:

- changes in energy supply, switching from coal, oil and gas-fired power stations to renewable sources;
- energy-efficient workplaces, and longer-lasting, more efficient goods;
- better public transport;
- a halt to road-building and airport expansion;
- reductions in emissions from government activity.

Individuals, families and communities need to do the rest. Our lives need to change in ways that may be quite challenging. This means more than just changing a few light bulbs or taking the occasional trip by train.

We may not always like change but life is full of it and most people have their own ways of approaching it. It may help to think about how you have handled:

- **Transition points** - such as changing school, leaving home, starting a new job, getting married, a new baby, children leaving home, retirement;
- **Crisis points** - such as financial difficulties, illness, divorce, redundancy, family conflict, bereavement;
- **Good resolutions** - such as working harder at school, doing a fair share of the housework, weight loss and exercise programmes, reducing alcohol or drug use.

You will probably find that the way you handled the change depended on:

- the amount of control you had over it - whether the change came as the result of choice, necessity or coercion;
- who else was involved - the opposition or support you received;
- the social pressures for or against the change.

Where the change was a chosen one, your success was probably dependent on:

- the strength of your motivation;
- how you prepared for the change, anticipated and planned how to deal with difficulties;
- how you managed your mixed feelings about making the change and dealt with your own resistance;
- the amount of support you had and the way you used this;
- how you negotiated conflicts and pressures from others, both those who supported you and those who may have opposed you.

Change often involves coming to terms with loss. This is obvious with bereavement or redundancy where change is forced on you. Here, shock, anger and the slow, painful processes of grief are inevitable. But it is also true in changes you welcome or plan. Taking one path means letting go of another and there is often a lingering regret for the path not chosen. The new path may be difficult. Sadness, anger and frustration can be likely accompaniments as well as a sense of satisfaction and achievement.

In the Carbon Conversations groups we try to create a safe space where people feel free to talk, without fear of judgment. We encourage people to talk about the strong and mixed feelings prompted by taking carbon reduction seriously. It's important to acknowledge that these mixed feelings exist. You may feel upset to realise the extent of your contribution to climate change. You may feel very sad if you decide to give up flights to places you've loved. You may feel anger towards friends and colleagues who remain unconcerned. If you push these feelings aside they will return in other forms. You may find yourself unable to stick to the changes you've planned, arguing yourself out of them or giving up in despair at the difficulties. If change is to stick, it has to be approached with recognition of what is involved practically, emotionally and socially too. Our experience is that when people are able to do this, then the outcomes are good.

Frequently asked questions: climate change

Hasn't the climate always changed? Isn't it just showing normal variation?

It's true that the climate has always changed. Scientists learn about changes over hundreds of thousands of years by studying ice cores from Greenland and Antarctica. Most of these changes have been caused by shifts in the sun's activity. The changes of the last 200 years are different however. They are much more extreme. Scientists have no doubt that they are caused by human activity and that they are dangerous.[33]

Can we prevent dangerous climate change?

This is an urgent political question. The answer depends on how fast governments act, and on how fast industry and individuals respond. You'll meet both optimists and pessimists in this debate.

Are the devastating hurricanes, typhoons and droughts of recent years due to climate change?

We can't say definitely that a particular weather event is due to climate change but we can be sure that we're going to see more extreme events over the next decades. Hurricanes, typhoons, droughts and floods are likely to be more severe.[34] The capacity of governments to respond is critical. The 2011 drought in East Africa is thought to have been partially caused by climate change, but the effect on war torn Somalia was much more severe than on Kenya and Ethiopia where aid agencies were able to organise help.[35]

Why should we bother when our governments plan to build more roads and increase air traffic?

You may want to take political as well as personal action. Carbon Conversations often helps people find the confidence to speak up. Add your voice to those who are objecting.

What is the IPCC?

The Intergovernmental Panel on Climate Change is a UN body, of scientists who regularly review research on climate change. It reports on the risks and options, and is generally thought to be trustworthy but cautious.

Why should I bother when others don't?

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". Try to start a conversation with people who seem to ignore the problem. Listen and try to understand them, rather than tell them what to do.

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.[36] It measures this in hectares, or by telling you how many planets would be needed if everyone in the world lived like you. European lifestyles typically consume about 2.5 planets, US lifestyles 4.1 planets and Australian lifestyles 4.8 planets. A carbon footprint measures only the amount of greenhouse gases you are responsible for. It is measured in tonnes of CO_2 equivalents.

Isn't 'Peak Oil' more important?

It's true that the world will eventually run out of oil and that we are currently passing the peak where more oil has been produced than can ever be produced again. The decrease in production this will bring won't happen quickly enough to solve the climate change problem however. As production from the most accessible oil fields slows, production from more difficult sources becomes profitable. Many of these, like the Canadian tar sands and the Arctic oil fields, carry huge environmental risks. There are also other fossil fuels to worry about. There are huge reserves of coal left and reserves of gas that can be extracted by the damaging process of hydraulic fracturing. Solving the climate change problem will deal with the peak oil problem but we can't expect peak oil to fix climate change. Fossil fuels need to be left in the ground. In order to prevent dangerous climate change 50 – 75% of the proven reserves need to be abandoned.[37]

Does 'fracking' for natural gas help reduce emissions?

Natural gas has lower carbon emissions than coal but it is still a fossil fuel. We need to move quickly to genuinely low-carbon sources of fuel. Fracking for gas diverts investment from the renewables that need to be developed.

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 the West needs to reduce its footprint so much is to allow countries like Tanzania to catch up and create a decent standard of living for their people.[38]

Will climate change create more refugees?

There are connections between climate change and the movement of people but also a lot of myths. Most people who are displaced due to climate change will move within their own countries. There are unlikely to be sudden mass exoduses.[39]

Surely the big problem is population growth?

The relationship between population and climate change is complex. The key factor is not population itself but the resources that the population consumes. Countries with high population growth also tend to be poor. They contribute little to climate change because their resource use is low. Globally the rate of population growth has been falling for some time. Under current trends world population should stabilise at around 10 billion within the next hundred years. The critical factor will be achieving low-carbon lifestyles worldwide.[40]

Surely the real problem is the grip of fossil fuel companies over the government?

Research by the World Development Movement reveals a 'revolving door' between governments, fossil fuel industries and big financial institutions. The lobbying power of the fossil fuel industry is enormous. So far, most fossil fuel companies have preferred to protect the status quo rather than face the need for radical change. There are also concerns about the way companies such as Exxon Mobil have funded climate change denying think-tanks like the US Heartland Institute. You are probably right to be concerned.[41]

Chapter two: thinking about your personal footprint

The average, individual carbon footprint for a particular country is calculated by taking a country's total CO2 emissions and dividing that figure by its population, with allowances made for the effects of importing and exporting goods.[42] As you saw in Chapter One, there are big differences between the individual footprints of different countries. There are also big differences between people who live in the same country. Some people have above average footprints, some have below average ones. This chapter describes the factors which make up an individual footprint and discusses the broad tactics for reducing the emissions from each one. Your national Carbon Conversations project will produce detailed information about carbon emissions in your country, along with suggestions for how to measure and reduce them in your day-to-day life.

Understanding footprints

There are five key areas of your life that contribute to your personal carbon footprint, your home, your travel, the food you eat, your purchases and your use of public services and infrastructure.

Tonnes CO$_2$ emitted per person annually, UK
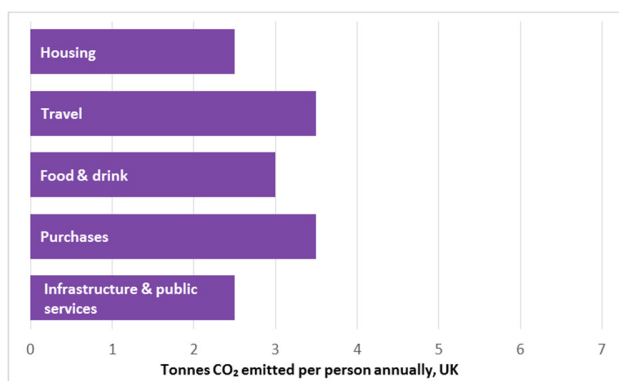
Almost all homes use energy to keep them at a comfortable temperature and to run the electric appliances – fridges, freezers, washing machines, TVs, electronic gadgets and so on – that we are used to. In Northern Europe, some parts of the US and most of Canada the biggest use of energy is in heating homes. In Southern Europe, Australia and the southern USA the main energy use comes from air conditioning. In most parts of the world the main energy source is still fossil fuel: coal, oil or natural gas.

Every time you step in a car, on an aeroplane, on a train or a bus, fossil fuel in the form of petrol, diesel or jet fuel is being used to get you from A to B. Driving 10,000 miles a year will produce 3-4 tonnes of CO$_2$. Taking a return flight from New York to London will add 3 tonnes to your annual carbon footprint.

A diet which is heavy in meat and dairy produce and which uses a lot of processed food or food which has travelled a long distance will give you a high carbon footprint. A non-meat, non-dairy diet with no long-distance items and few processed ones can make a dramatic difference.

In general the higher your income, the higher your carbon emissions: people who earn more usually live in larger houses and spend more on home improvements and upgrades as well as spending more on holidays and entertainment. It also matters what you spend your money on however. Building work, motor vehicles and domestic appliances are all high-carbon items. Services (such as education, health, social care or gardening) are low-carbon.

You can have quite an impact on each of the first four areas that make up your individual footprint. The fifth one is outside your direct control and covers the carbon emitted by government, providing the infrastructure and services that

Tonnes CO$_2$ emitted per person annually, USA
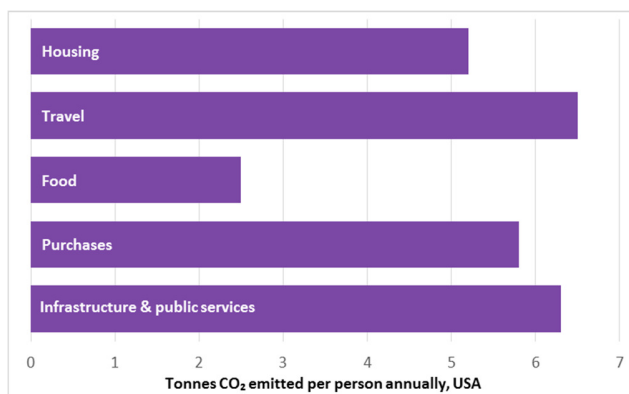
everyone shares: for example the roads, schools, hospitals, police force and army. Countries differ in how many of these services are publicly provided. The two bar charts show how individual UK and US footprints are made up.

What is your carbon footprint?

In your Carbon Conversations group your facilitator will calculate a rough footprint with you, using a calculator for your country. Then, as you go through the sessions, you will learn how to make a more accurate assessment of each of the

four areas you can affect directly. If your emissions are average or above average for your country, we suggest you try to halve them. If your emissions are already below average, we suggest you aim for a footprint that is no more than half the average for your country.

Don't expect to achieve your goal immediately. Many changes need to be planned and can't all happen at once. People who take part in Carbon Conversations groups in the UK typically 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 for reaching these targets.

How to count carbon

Some of the CO_2 emissions in your carbon footprint are direct, some are indirect, some are embodied and some are the equivalent figures for other greenhouse gases:

- direct emissions come from burning fossil fuels like oil, gas or coal in your boiler, your stove or your car;
- indirect emissions come from burning fossil fuels to make electricity;
- embodied emissions come from the fuels used to make manufactured goods, deliver services and grow, process, package and deliver food;
- the other greenhouse gases which contribute to your footprint are nitrous oxides (which mainly come from burning fuels), methane (which mostly comes from agriculture) and fluorocarbons (found in some parts of industry and some refrigeration systems). These can be converted into CO2 equivalents or CO2e.

It's relatively 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.

It's a little harder to calculate the impact of food and other goods and services and we explain how researchers do this later in this chapter.

The carbon intensity of electricity varies from country to country, as do the emissions from food, goods and services. Your country's Carbon Conversations organisers will have detailed information for you.

Remember rebound

One of the important things to remember as you work on reducing your footprint is the effect of rebound. (See Chapter One). This is the hidden factor in all our attempts to use less energy. If your energy bills fall due to better insulation you may respond (consciously or unconsciously) by leaving the lights on and keeping the heating on for longer, even though you don't need to, or by spending money you save on other energy-intensive items. A more efficient car can encourage you to drive further and if you save money by walking, cycling or making fewer journeys you will probably spend it elsewhere. These purchases will also be responsible for carbon emissions, though they are likely to be lower than the emissions from transport.

Work by Mona Chitnis and colleagues[43] estimates the rebound effect for a basket of typical home energy upgrades at 5-15% for an average UK house and household. An article by Angela Druckman suggests that the rebound factor for transport is about 12%.[44] There are similar issues with food and other purchases. Research by WRAP suggests that about half of the money saved when people stop wasting food is spent trading up to buy more expensive food and drink but the other half is saved or spent on other things.[45]

This means that it is important to think about the whole of your carbon footprint when you are making changes and to think carefully about what happens to any money you save. Although rebound has an effect on the carbon savings you make, it doesn't eliminate them and doesn't mean that they are not worth making.

If you do save money through the changes you make, try to spend it on further upgrades to your home or on goods and services with a low carbon intensity. See p.37 for more information about which sectors of the economy are the low-carbon ones.

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Energy at home

There are two ways of reducing the carbon footprint of housing.

1. Reduce the demand for energy by insulating, draught-stripping and shading houses, producing more efficient appliances and adopting less wasteful behaviour.
2. Generate the energy in ways that use less carbon, with renewables such as wind, solar, hydro, tidal and

geothermal, and with low-carbon options such as combined heat and power.

Both are essential. Neither is enough on its own but the first is the one where we can make most impact as individuals. We have quite a lot of control over our home energy emissions – particularly if we are home owners. Homes offer some of the easiest and cheapest ways to reduce emissions and also some of the most complicated and expensive. In cold climates good insulation, draft-stripping and triple-glazing can reduce the

demand for heating. In warmer climates, natural or passive stack ventilation and careful shading can reduce the dependency on air conditioning. In hot climates good insulation, draft stripping, window shutters and blinds, and light coloured roof and wall materials can reduce the demand for mechanical air conditioning. Changing our behaviour can also make a significant difference. In cold countries we may be able to turn the thermostat down and live a little cooler. In hot ones, we can turn it up a little, only letting the air conditioning kick in when we really need it. Buying the most efficient, smallest appliances we can manage with is also important, as is remembering to turn everything off unless it is really needed.

In some countries there is government support in the form of grants and tax breaks to encourage people to upgrade their homes and make them more efficient. In others you may have to go it alone.

However, our houses and apartments are also very personal places. We make them into homes and have strong feelings about them. We put a personal stamp on them. Most people don't like being told what they can and can't do at home and many people resist the idea that they should change their homes in the interests of the climate. Even if you are willing to upgrade your home you may be worried about how complicated it seems, confused by conflicting advice or anxious about the cost and disruption.

The meaning of home

When you are considering what you can do it can help to think about what home means to you. The style of decoration, the furniture and the use of space all help us say something about ourselves. This means that it's important to keep in mind what you want from your home *apart* from making it climate friendly.

What does home mean to you?

- "Closing the door, shutting out the day's stresses and difficulties..."
- "Running down the street in freezing rain, shedding my dripping clothes and slumping on the warm sofa..."
- "When I'm away, conjuring up the picture of family, gathered round the kitchen table…"
- "Someone to hug, someone to listen to me, someone to love…"
- "Privacy, solitude and silence…"
- "Looking at colour swatches, choosing paints, making this place feel it's ours…"

For most people, home means emotional security. Home is where we start from in childhood, venturing out bit by bit into a tougher world. At home, we expect to be able to relax, to feel ourselves, to get support and to have control. It's

somewhere to retreat to, the secure base which makes everything else possible.

This is, of course, an ideal. Home is also the place of family conflict, domestic violence, loneliness, neglect, problem neighbours, irresponsible landlords and substandard buildings. The ideal has power however. Everything else is matched against it. Our longing for the ideal home drives TV makeover programmes and fuels an industry of 'must-have' household goods. The importance of home to our sense of security also means that it is easy to feel violated when someone else suggests change.

When people decide to move house or alter their existing home, their first thoughts are often about how it will feel. Sometimes this is conscious. Will an extra bedroom stop the kids squabbling? Is the living room big enough for a family party? Can I squeeze in Granny's lovely old chest of drawers? More often it is a question of gut feeling – this is what feels like home. Anything that disturbs this will be resisted.

More than we realise, we are also caught up in social practices that define the 'right' way to do things at home.[46] In the UK in the 1950s bathing your children twice a week and putting them in clean clothes on Mondays was the sign of a good mother. In 2014, a bath, a shower and a clean outfit every day are the norm. Central heating, plentiful hot water, easy-care fabrics and washing machine technology all contribute to systems that seem natural but which actually arrived within living memory.

Some of the changes demanded in our homes by climate change do not fit easily with existing social practices or with people's aspirations. For example, drying clothes out of doors, living at lower temperatures and lighting only the rooms in use, can all upset people's deeply-held feelings about what makes a home a home. When change demands building work as well we can feel invaded at a very deep level. For weeks, home doesn't feel like home. The mess and disruption upset our basic feelings of security, causing anxiety and stress. Although we may be pleased with the result, the process is painful and we demand a trade-off. Borrowing thousands of pounds for a new kitchen may feel worth it. It's easy to anticipate the pleasure the kitchen will bring and to imagine showing it off to admiring friends. Borrowing thousands for insulation doesn't have the same attraction. There's nothing to show for the disruption and though the house will be more comfortable and fuel bills lower, there isn't the same anticipatory thrill. And of course if you are struggling with a mortgage or living in rental accommodation, the thought of spending thousands on anything will be a distant dream. You may simply feel irritated at the suggestion that there is anything that you can do.

So, before thinking about the detail of what you could do it may help to explore how your feelings about home connect to the features of the building and its location.

Home comforts

What makes a home feel right for you? Think about:

- the fabric of the house and its technical systems;
- space;
- location and community;
- design and style.

The fabric of the house and its technical systems

The fabric of a house refers to its walls, floors, windows and roof and what they are made of – usually, brick, stone, timber and tiles. Its technical systems are the plumbing, heating, air-conditioning, electrics and IT. If a house is well-constructed and its technical systems work well, most people don't pay much attention to these aspects of their homes. When a house doesn't work well, you will notice problems like high fuel bills, damp, draughts, condensation or overheating, noise, dark and dingy rooms, heating systems that don't warm the house and hot water that runs out before everyone has showered. Houses like this are hard work to live in and people often struggle to understand the cause of the problems.

- How much do you know technically about your current home?
- Were these technical aspects a factor in choosing it?
- Do you know what its annual energy use is?

Space

Space is a big issue for a lot of people. Some people live in cramped and over-crowded accommodation. Others crave more space for leisure activities, a home office, a spare room or simply somewhere to store an increasing number of possessions. Over the last 30-40 years households have got smaller.[47] Divorce and separation are one reason but rising expectations also play a part. Larger houses are more expensive to heat and light. If small houses are well-designed with good storage, size may feel less of an issue. Ask yourself:

- How much space do you need?
- What kinds of space do you need?
- Could better layout and storage solve any of your space problems?
- If you are stuck with a large house, could you share it with others?

Location and community

If the location of your home isn't right for you, you probably won't feel comfortable. For some people it's a garden that's important. For others, schools, shops, a 'good' neighbourhood or access to urban life, parks or the countryside are what matters.

There are energy issues here as well. Some people have little choice about where they live: they rent or buy where they can afford. Others make choices which have big impacts. Choosing a neighbourhood that is a long way from work or family means big travel bills and high CO_2 emissions.

- What do you like best about your current home's location?
- How close is it to your ideal?
- What would be the energy implications if you moved?

Design and style

Design and style can give you practical comfort and also make you feel good about yourself. They are often powerful reasons for choosing your house, its furnishings and appliances.

Good design can bring down energy costs but there are also times when fashionable design and energy efficiency clash. Recessed halogen spotlights, open fires, big picture windows or floor-level curtains that cover the radiator will all reduce your home's efficiency.

- What do you like best about your current home's design and style?
- How close is it your ideal?
- Have any past decisions turned out to be energy nightmares?

Planning for a low-carbon house

All houses and apartments can be improved but they vary in how easy this is to do and how low-carbon they can become. Some can be turned into zero-carbon homes. Others will be a challenge to get down to 2 or 3 tonnes and the work may be expensive. People who rent sometimes think that there is little they can do to lower their energy use. Although they have fewer options than home-owners there are still actions they can take.

- The way you use your home can make a big difference.
- You have choices over which appliances you purchase.
- You can talk to your landlord about upgrading the house or apartment and inform him or her about any financial help and tax relief that are available.

There are four steps to making a plan for a low-carbon home, whether you are a home-owner or a renter:

1. monitor your energy use;
2. get to know your house;
3. understand the things you can do;
4. draw up a plan.

Few home-owners do energy-efficiency renovations without doing other work as well. Most energy-efficiency tasks are piggy-backed onto other projects.[48] This means it is critical to understand your home, and how to make it 'climate-friendly'. If you don't, you will miss opportunities. It will help to make a plan – noting which energy-efficiency measures fit naturally with other upgrades. For instance, insulating a wall is easily done when new windows are being fitted. If you're re-fitting

the bathroom anyway, it's the perfect time to opt for a very low-flush loo, heat-recovery extractor fan and low-water use shower.

There are advantages to undertaking a complete eco-refurbishment but you do not have to do everything at once. Gradual changes can achieve the same result over a five to ten year period if they are well-planned.

Monitor your energy

The first step toward a climate-friendly home is learning how much energy you use. You need to monitor the gas, electricity, coal, oil and wood your home consumes.

If you monitor your fuel use, you can:

- see exactly how much you use;
- set some realistic targets for reduction;
- see the difference you can make.

Many factors affect how much fuel you use, such as:

- the season, outside temperature and number of daylight hours;
- the location, orientation and altitude of your home;
- the construction of your home and its insulation;
- the systems used for heating, hot water and lighting;
- how many electrical appliances you have, how efficient they are and how much you use them;
- the number of people in your household and how much time they spend at home;
- the choices you make about the temperature of the house and your hot water use.

In order to get a clear idea of how successful you are in reducing your energy use, you need to monitor over a long period, ideally over a full year or more. Your Carbon Conversations facilitator should have more information on the best way to monitor energy use in your country.

Get to know your house

A proper energy survey is quite technical. A good energy consultant would look at the features described below, make calculations, estimate your energy use, and make recommendations for what you should do. You may be able to employ an energy consultant to conduct a survey for you but if not create a file about your home and make a note of what you find by looking with your own eyes at the features described below and trying to answer the questions posed. Include any architect's drawings, details of building work done, and appliances purchased. Your Carbon Conversations facilitator should have details of how to do a more detailed DIY survey.

The construction and design

The construction of your house is fundamental. What are the walls made of – masonry or timber? Is it detached, semi-detached, in a terrace or an apartment block? How old is it and how big? Are the walls, floors and roof spaces insulated? How thick is the insulation? Are the windows single, double or triple glazed? Is there any damp or mould? Are there cold spots? Are there parts of the building that are uncomfortably hot in summer? How easy will it be to make changes?

Is the design open-plan to allow through ventilation in hot weather? Can it be divided up to create cosy spaces in cold weather? Is there enough shading and screening to keep the sun out in summer? Do the windows give solar gains in cooler seasons?

Ventilation

Ventilation allows fresh air into the house and stale air out but it needs to be properly controlled rather than happening as the result of gaps, leaks and draughts. In air conditioned homes leaks let in unwanted hot air, while in heated ones leaks let warm air escape. In hotter climates good ventilation will provide cool air circulation while in cooler ones it prevents heated spaces becoming stuffy. How much energy is wasted depends on whether ventilation can be controlled. Is there any fixed ventilation, such as airbricks or screens? Is there any draught-stripping round doors and windows and effective is it? How are the extractor fans controlled? Is there any mechanism for heat recovery?

Heating, cooling, hot water and cooking

How much energy is used for room heating, cooling and hot water hinges on the fuel used, (see the FAQs on p. 19 for details.), the efficiency of your equipment and the effectiveness of your controls. What fuel do you use? How old is the boiler? How old is the air-conditioning system? How good are the controls? How easy are they to use? Where are the thermostats? What temperatures do you set for heating and/or air-conditioning?

The amount of hot water used depends on: the number of baths, showers, sinks and basins; whether these have any water-saving features; and the number of people in the house and their typical behaviour. What do you know about the systems in your house? Do you go for long, hot showers or a quick in-and-out? Do you have solar hot water heating and does this affect the best times to use the hot water?

CO_2 emissions from cooking are affected by whether gas, electricity, solid fuel or microwave is used as well as the size and efficiency of the cooker.

Lighting and appliances

Energy use for lighting is affected by the number and type of light-fittings; whether these are suitable for energy-efficient

light bulbs, how many are already in place and whether they are turned off when not in use.

Energy use by appliances is affected by how many appliances there are (particularly heavy energy users like a tumble drier) as well as their age and energy ratings. Is it easy to turn appliances off when they are not in use? What are their energy ratings and how old are they? What is the household's pattern of use?

Do you have photo-voltaic solar panels providing electricity? Can you choose the best times to use your appliances so you take advantage of them?

Draw up a plan

You can divide the actions to take into four categories and plan how or when you can carry them out:

Good housekeeping covers the host of small changes that cost nothing and will reduce your energy use. Things like changing the temperature you live at, remembering to turn lights and appliances off when you are not using them, and reducing the amount you use the tumbler dryer and iron can all make a significant difference.

Jobs for the weekend refers to all those little things which you could do but don't get round to: replacing the light-bulbs with efficient LEDs, draft-stripping doors and windows and adding insulation all come under this category.

Taking opportunities means remembering energy efficiency well in advance. Research the most efficient appliances well before you need to replace them or you will find yourself buying what is available when something breaks down, rather than the best. Keep your home's energy performance 'front of mind' when you are having building work done as well. Its easy to combine energy-saving measures with repainting, having a new kitchen installed or building an extension.

Big changes are the major projects people imagine when they think of a greener home, things like photovoltaic panels, wood pellet boilers or a complete home refurbishment. They need to be planned well in advance.

Your Carbon Conversations facilitator will have more details about the things you can do and how to go about them

Rules of thumb

Small is beautiful

The smallest you can manage with is the best; smaller houses, smaller appliances, shorter showers are all winners.

Monitoring is a must

If you measure it you can manage it. Unless you read your meters regularly you won't be able to see whether the changes you are making are having an effect.

Insulation! Insulation! Insulation!

Insulated lofts, walls, floors and pipes are all winners. Heavy curtains and window shutters will also help. It's hard to overdo insulation. Aim to use no heating or air conditioning at all.

Plan for the sun

Remember that solar gains are good in cold weather. Plan for shading to prevent overheating in hot weather.

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 fresh air! Make sure your house is air tight and 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 internet chat.

Be kind to yourself

Your green solutions are more likely to succeed if they are also comfortable and convenient.

Talk, plan, do

Talk to the people you live with, make plans together, act on them.

⁉️ Frequently asked questions: home energy

Which form of home heating creates least CO_2?

Per kWh, going from best to worst: natural gas, heat pumps, liquid gas, oil, coal, electricity. Wood and other forms of biomass are often considered low-carbon because they absorb CO_2 as they grow. However, as wood burns it emits a similar amount of CO_2 to coal so you may want to consider other low-carbon heating methods, combined with super-efficient insulation. Heat pumps and electricity will become better solutions as the grid is decarbonised.

Aren't wood and other forms of biomass a sustainable solution?

Even if you see them as low-carbon, wood and biomass can only solve a small percentage of global energy. They may be acceptable as an interim measure, particularly if you have a good source of local timber or scrap wood for your stove.

Is a wood pellet boiler a good solution?

Wood pellet boilers are more efficient than wood-burning stoves and can be used for central heating if mains gas is not available. However, wood pellets often come from unsustainable sources. Make sure you know what you are buying.

I love an open fire – is it a good way to heat my home?

Open fires are one of the least efficient forms of heating. Warm air from the house is drawn up the chimney with the smoke. Turn off any other heating if you use your fire, so you are not sucking already heated air up the chimney. A flue baffle will stop warm air rushing up the chimney when the fire is not lit. Coal is a very high-carbon fuel and there are concerns about burning wood as we describe above.

What about nuclear power?

Nuclear power has some strong advocates. We're not keen because of the time it takes to build new nuclear plants, unresolved waste disposal issues and security risks. We think renewables provide a safer, quicker option.

Is it worth fitting a solar water heater and photovoltaics?

Yes: when you can afford them and if you have a suitable roof.

Is it better to replace my old fridge with a more energy-efficient model now, or wait until it breaks down?

If your fridge is quite old (over 8 years) it is worth checking its energy-performance. Look at its energy-label or check its performance with a plug-in power meter. A new fridge could save 200 kWh per year. This will rapidly make up for the energy used in manufacturing it.

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. Try to dry clothes in an unheated room where you can open a window when needed without losing heat. In a modern, completely airtight house it may be better to use a tumble drier. Make sure you run it for the shortest time possible.

If I stop up all the draughts, won't the house get awfully stuffy?

Be in control of your ventilation. You need a system where you can open windows on a ventilation catch, rather than relying on a general draughtiness to get fresh air. Stuffiness is often caused by the air being dry and cold, rather than stale. It often happens when cold, dry air is leaking into the house.

Are there any dangers in stopping all draughts?

Rooms with open fires or old gas fires or boilers need a fixed air supply. This is usually provided by an airbrick or a window ventilator. There is a risk of carbon monoxide poisoning, particularly from gas fires, 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 because the house is generally warm. This doesn't mean that there is no air movement. Heated air will be going out of your windows! Draught-stripping will stop this waste of energy.

My friends say one thing, my builder says another, my plumber has a third opinion and the internet offers a dozen more. How do I decide what to do?

Look for people with real experience of low-energy building. This might be a builder or an architect or others who have had low-energy renovations done. Look for best-practice guides and standards for low-energy housing such as Passivhaus.[49]

Is it better to wash up by hand or with a dishwasher?

Don't wash up under a running tap – use a bowl. Whether a dishwasher or washing-up by hand uses less water depends on your washing-up style. Hand-washers use 10–50 litres depending on how they go about it. Dishwashers use 15–30 litres, depending on the model.[50]

Travel and transport

It's quite easy to work out how big your travel footprint is but harder to know how to reduce it. The main issue is the distances people travel. Most of this takes place by car, one of the least efficient means of transport. Cars are woven into every aspect of life, promising freedom but producing traffic jams and frustration. They encourage people to make longer journeys. Those without a car can be excluded from opportunities that others enjoy such as the choice of where to work, where to live and where their children go to school.

The problems with transport and travel come from a difficult mix of corporate self-interest, failed government policy, and the dreams of freedom and fulfilment that car use and foreign travel offer. Oil companies, car manufacturers and governments have worked together since the Second World War to sell a dream that most people have been happy to embrace. In most developed countries, people now travel further than in previous generations and the numbers of journeys made on foot or by bicycle have fallen. Until recently, the downsides of congestion, road accidents and pollution may have seemed a reasonable price to pay. Changing the complex, inter-related systems that revolve around road transport will not be easy, but climate change means that it is essential that we do so.

Status, belonging, security

The way we travel is clearly associated with status. Car ownership is often associated with masculinity and success. The popularity of Jeremy Clarkson's high-octane celebration of petrol and bloke-ishness in the Top Gear TV programme offers a stereotype that many identify with and enjoy.

Conversations about travel are also important to social bonding, whether this happens at work or over a drink with friends. We show that we are part of the group by moaning about congestion, comparing notes on car mileage or swapping experiences of holiday destinations overseas. These are usually easy conversations that follow predictable patterns. People who don't fly or don't own a car find themselves outside the friendly circle. It may be assumed that they are poor or lack aspiration. Worse still, it may be assumed that they are puritanical environmentalists who want to make others feel bad. One woman recounted how she had overheard a colleague say to others: "Pipe down about your holidays girls – here comes Jeannie!" She was treated with frosty politeness because it was known that she didn't fly.

Comfort and security can be equally important. Take for example a young woman whose car is her cocoon. She has chosen it for its colour and style. She fills it with personal comforts – her music, a favourite rug, a mascot, water-bottle and tissues within easy reach, radio tuned to her favourite station. Snug inside, she feels safe. At the start of the day, it helps her make the transition from sleepy, child-like dependence to independent, responsible, working woman. At the end of the day its privacy comforts her from the bruises of working life. Its outward gleam and shine speak of her success. Its inner warmth and comfort acknowledge her fragility. It both protects and expresses her identity. The suggestion that she might take the bus to work or lift-share with colleagues will not be appealing.

International families

An increasing number of people are part of international families. 13% of the UK population, 28% of Australia's population and 13% of the US population were born overseas. [51] Most have families in their home countries whom they want to visit. For example, 1.3 million people who were born in the UK now live in Australia, a long, carbon-heavy journey away.[52]

In the past, emigration meant separation. Families might not see an absent member for decades. Letters were the only connection. Cheap flights and social media have changed that. Europeans who have moved to another European country expect to visit their families several times a year. People whose relatives are in another continent expect to visit at least once a year. The pain of separation is less acute for these families than for those who emigrated in the 1950s or '60s. Sadly, climate change means that being part of an international family may once again bring painful experiences of separation as flights are likely to become more expensive and harder to justify. Anyone who is concerned about climate change and is also part of an international family faces difficult decisions.

Need, freedom and choice

Many of us feel that our travel choices are not negotiable. It can be difficult to organise life without a car and hard to imagine not flying. Jumping in the car, whenever you wish, isn't just convenient. It's associated with freedom and choice. This state of affairs is full of paradoxes. One person's freedom to drive is another person's traffic jam. Busy streets have made it hard for children to walk to school and play outside unsupervised. In many cities walking is a nightmare of dusty dual-carriageways and noisy lorries. Government research in the UK shows that a commute of over half an hour lowers people's life satisfaction and increases their sense of anxiety

and unhappiness.[53] In reality much of the freedom that cars originally brought has vanished.

In the long term, social and policy change is needed. This can make it easy for us to shrug our shoulders and hope that someone else – government, bus and train companies or just a vague 'somebody' - will pick up the tab. Sometimes we dress up our desires and our personal convenience as need. It feels normal to put a good school, interesting work or a pleasant neighbourhood at the top of our wish list and disregard the implications for travel that may be involved.

Taking personal responsibility for the way you travel is not easy. It can:

• be practically difficult;
• put you at odds with colleagues, family or friends;
• involve painful choices.

If society as a whole were to make the shift towards sustainable transport there would be advantages however. We might see:

• quieter, safer streets;
• shorter journeys to work and shops;
• less congestion;
• a healthier population as people walked and cycled more;
• more interesting holidays offered nearer to home.

It will take a mix of technical changes, policy changes and personal action to deliver a sustainable transport system.

Low-carbon solutions

There are differences of opinion between experts about the mix of solutions needed for low-carbon travel. All agree that there will have to be some mix of:

• technical solutions;
• policy changes;
• reduction in travel.

Some are optimistic about the technical possibilities. Others emphasise the power of a shift to public transport or a rationing scheme. A third group see reducing everyone's travel as the safest and quickest option. It's the interaction between all three that is most likely to bring the answers that are needed.

Technical solutions

There are a number of technical approaches to low-carbon travel.

More efficient vehicles

Modern vehicles are much more efficient than those made 15 or 20 years ago, with further improvements expected. Efficiency alone can't solve the problem though. Firstly, there

is a limit to how much more efficient vehicles can get and we are already quite a long way there. Secondly, as engines become more efficient and cheaper to run, people opt for larger cars and longer journeys – an example of the rebound effect. Taxes that encourage people to buy smaller, less powerful models may be needed to counteract this effect.

Biofuels

In principle biofuels, made from crops, can provide low-carbon travel. By 2020, the EU aims to have 10% of the transport fuel of every EU country coming from renewable sources such as biofuels. There are serious problems with this however. Worldwide, the demand for biodiesel is leading to the expansion of palm-oil plantations in Asia and the destruction of native forests and their wildlife. Food supplies are also threatened as land once used to grow food is given over to other biofuel crops. Processing some biofuels is also so energy intensive that it does not provide much net gain.[54] Algae are another possible source of biofuel but there are still technical challenges to be solved and it is likely to be 10 or 15 years before we see mass production.

Biofuels may have a small role to play but can't provide the whole answer.

Electric and hybrid vehicles

Electric cars and buses may be the vehicles of the future. They are about three times as efficient as diesel or petrol vehicles and further development could increase this advantage. At present electric cars are expensive and can only be used for journeys of under 100 miles, although their range is improving. A good network of charging points or battery-swap points would allow them to be used easily for long journeys. In principle there are no technical problems in creating this new infrastructure. The price of electric cars is falling as more are produced.

The electricity powering the cars needs to come from renewable sources so they are only a solution if the electricity grid is de-carbonised. As we also need renewable electricity for our homes and industries, some reduction in people's average mileage will also be necessary.

A hybrid car is a cross between a petrol car and an electric car. During part of the driving time, the petrol engine charges a battery. At other times, the car uses that stored electricity. This makes it very efficient in urban driving when you start and stop a lot. On the motorway, the efficiency is not much better than that of an ordinary car. Some hybrids with larger batteries can also be charged at home from the grid.

By 2050 most cars should be electric. HGVs and off-road vehicles such as tractors and diggers would still need to use some liquid fuels. As long as the numbers of these vehicles was reduced and their use minimised, biofuels could be used to power them.[55]

Hydrogen

Hydrogen could be a useful fuel for transport if it was made by electrolysis rather than from coal or gas, and if the electricity used in the electrolysis came from renewable sources. This technology is still being developed and may take several decades before making a significant contribution. Its best use will probably be powering buses.

Policy changes

Many of these solutions require legislation. Some need regulation. Some need incentives, like tax breaks or subsidies. Regulation is rarely popular. Politicians are often nervous about taking on vested interests like the supermarkets or the road-transport lobbies.

Patterns of living

Urban sprawl and out-of-town shopping both place increased demands on the transport network. The centralisation of services like hospitals, and the loss of local amenities add to this problem. Policies to press for include:

- more mixed development, with employment, shops and housing clustered together;
- urban expansion only allowed if it is linked to provision of public transport and good walking and cycling routes;
- health, education and other government services planned with sustainable transport higher up the agenda;
- more local sourcing, reducing the need for road freight;
- more home-working – already popular with some large employers, thanks to the internet;
- more electronic communication, such as Skype, to avoid the need for face-to-face meetings;
- harmonised working hours, so that car-sharing and bus travel are more practical.

Integrated low-carbon transport

A variety of forms of public transport (buses, trams, tubes, coaches and trains) plus good facilities for walking and cycling are the key ingredients of a low-carbon transport system. All the elements need to work together. Services need to be frequent, fast and reliable. Vehicles need to be comfortable and accessible. Timetables need to be harmonised so there are good connections. Car use needs to be discouraged and public transport made more attractive. Policies to press for could include:

- congestion charges, like those in London, Stockholm and Singapore, linked to better provision of buses and bus lanes;
- serious investment in public transport;
- provision of better cycle and pedestrian routes;
- city bike hire schemes, like those in London, Amsterdam, Berlin and Paris where you can pick up a bike for a very small fee, dropping it off somewhere else if you wish;

- encouragement of car clubs, where people can hire a car by the hour when they need one, rather than owning their own vehicle;
- real support for rural transport schemes like school buses, car-sharing schemes, dial-a-ride services, and off-road cycle routes;
- workplace transport plans, with car-sharing schemes, workplace bus services and encouragement of cycling all forming part of the mix.

Cities differ hugely in their dependence on car transport. In a European survey London ranks poorly, along with Rome. Stockholm, where 79% of peak hour trips are made by public transport, came top followed by Helsinki and Prague.[56]

Investment and taxation

Significant investment is needed to provide the infrastructure for low-carbon travel.

Taxes on fuel or carbon use are often suggested as they might also help to discourage excess travel. However when tax is put on essential items, like fuel, it can hit poorer people hard. Schemes which directly link tax with better public transport are likely to prove more acceptable. London's congestion charge is a good example. It has proved successful and popular though it was bitterly opposed at the start and still has its detractors. Road pricing, where people are charged for using particularly congested routes, could have similar effects.

One idea for a fairer scheme is that of personal carbon allowances. Personal carbon allowance schemes would give each person a yearly allowance of carbon dioxide. Everyone would have a carbon-allowance card, rather like a debit card. Whenever they purchased fuel or used public transport, units would be deducted from their card. People who used less than their allowance would be able to sell the units to others who wanted to use more. Research is being done into such systems.

Currently aviation fuel is not taxed. Taxing aviation emissions requires international agreement. A first step was made in 2012 when the EU brought aviation into its Emissions Trading System. It is hoped that this will save 176 million tonnes CO_2 in the period to 2015, but many think this is optimistic.

Reduction

It's important to help people:

- reduce the distance they travel;
- reduce their use of the most carbon-intensive modes of travel (cars and aviation);
- use their cars in the most carbon-efficient ways.

Lower speed limits

It is estimated that cutting the motorway speed limit from 120 to 110 km per hour would reduce fuel consumption by 12 %

for diesel cars and 18 % for petrol cars.[57] Slower speeds are also good for road safety.

Less car travel

Research by transport analyst Lynn Sloman found that 40% of current car journeys in the UK could easily be made by bike, on foot or by public transport.[58] A further 40% could be made this way if facilities were improved. Only 20% absolutely need a car.

Fewer empty seats

More people per car would mean fewer cars on the road. The same is true of buses, trains and planes. For car travel, lift sharing through social media may help.

Fewer, shorter journeys

Changes in patterns of work, home and shopping should help here. Tradable allowances would encourage people to look for the energy-efficient options.

More efficient driving

Avoiding harsh acceleration and braking can knock 30% off your fuel consumption. Keeping your tyres at the correct pressure, and removing unnecessary items such as the roof rack or work tools left in the boot will also help.

Less air travel

Sadly there is no easy solution to the problem of air travel. Despite improvements in aircraft efficiency and the use of biodiesel in the fuel mix, flying will remain unsustainable. We should expect the end of cheap air flights and to fly much less. Flying will not disappear but, within 30 years, it is likely to be restricted and expensive. European countries will return to their old connections using good train and coach links. Intercontinental trips will become rarer events and perhaps mainly the preserve of people visiting family overseas.[59]

One tonne travel?

In a low-carbon future people will travel much less but if you choose a low-carbon option, you can still cover quite a distance! The list below shows roughly how far you could go using no more than one tonne of CO_2. Travelling by train, bus or in a fully occupied car gets you the furthest.

Each of the following represents one tonne:

- a return flight from London to Greece;
- 2,325 miles in a large petrol or diesel car on your own;
- 5,500 miles in a medium-sized petrol or diesel car with two people sharing;
- 5,882 miles travelled by local bus/underground;
- 10,000 miles travelled by train;
- 10,714 miles in a small petrol or diesel car with three people sharing;

- 12,500 miles travelled by long-distance coach.

How life might change

What transport patterns are compatible with climate change? What would life with low carbon transport actually be like?

Our imaginary future[60] is a world of quieter streets where people live closer to their work. An efficient public transport system takes most of the strain. Traffic density has decreased by 25% from 2014 levels. Cycling is usually a pleasure as most cities now have a good network of prioritised cycle lanes. Walking has become the norm for many short journeys, and safer streets mean that children can make their own way to and from school. The rising price of fuel has made car travel a luxury for many. In the big urban centres, many people have given up owning their own car and hire cars by the hour or day when they really need them. Large-engine cars are now found only in museums. People who do own cars choose the smallest, most efficient model they can find. Most cars and all urban buses are electric.

A focus on local production has reduced some of the need for road freight and much of what remains has been transferred to the rail network. For long-distance journeys, coach travel is now an attractive option. Local buses take you to pick-up points on the motorway system, which has dedicated lanes for fast, efficient coaches. On the main motorway routes, you rarely have to wait more than five minutes for a coach.

The speed limit has been reduced to 80 kilometres per hour on motorways, 35 kilometres per hour in built-up areas and 65 kilometres on other roads. Thanks to the reduction in congestion, overall journey times are nonetheless shorter than at present.

All forms of transport have seen some modest efficiency gains. As both public transport and private cars are more often full, the emissions per passenger mile have reduced quite a lot. Domestic air travel has disappeared and most European journeys are made by train. Long-haul flights are expensive.

How would you live in a system like this? If your travel footprint is already low, you will probably see it as having some advantages but if your travel footprint is high – because you are part of an international family, because you have a long commute, or simply love overseas holidays - you are likely to look at it with horror or believe it to be impossible.

A smaller travel footprint now

Whatever you think about our imaginary future, there are steps you can take now which will reduce your current travel footprint. This will probably:

- require planning;
- need the involvement of family and/or close friends;

- challenge your sense of self or your expectations;
- be a gradual process.

More than with any other aspect of your footprint, travel requires you to plan ahead. For big changes you will need to acquire information, talk with family and friends and possibly take difficult decisions. Allowing yourself time to do this is essential. Without advance planning you will find that decisions overtake you. If you are under pressure to sort out a holiday you will book a flight. If you are desperate for work you will accept a job with a long commute. If you are faced with a written-off car you will go for the first one within your budget. Try to make time for conversations with those you love, about:

- including your travel footprint as a factor in decisions about jobs, housing or schooling;
- how and why you use your car;
- taking days out by public transport;
- holidaying closer to home;
- train and ferry alternatives to air flights.

Sometimes it's a question of developing new skills and knowledge. Using public transport, cycling and even walking require different sets of skills from driving. Familiarity with apps for the weather forecast and public transport timetables, having suitable shoes for walking, keeping a set of smart clothes at the office, and knowing how to decide if it's too wet to cycle are just a few of the skills that separate car drivers from low-carbon transport users.

It can also take a while to establish a new routine and you may need to be patient as you discover how to make it work for you and those close to you. Research suggests that it takes about two months for a simple change in habit to become automatic.[61] This is likely to apply to a number of the smaller actions such as changing a habit of harsh braking or reducing the speed you drive at. Don't expect to manage it consistently. Look for ways of reminding yourself of your intention and don't beat yourself up if you sometimes forget.

It is also easier to make changes with the support of others. If your family, friends or colleagues are not on board you will find it much harder. Talk about what you are doing and why you are doing it. Look for people who are sympathetic. Share your experiences with other members of your Carbon Conversations group.

Rules of thumb

Distance matters

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

Is your journey really necessary?

Consider the alternatives, before reaching for the car keys.

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.

Look at your lifestyle choices

Keep the effect on your CO_2 output in mind.

Air travel is always worse than you think

Avoid using the plane whenever possible.

Frequently asked questions: travel

Can't I offset my air travel?

Carbon-offsetting schemes offer to compensate for the carbon you have emitted by offsetting it against carbon that is saved elsewhere. When you take a flight, you pay for a tree to be planted or for more efficient cooking stoves in one of the poorer countries in the world. The projects themselves may be worthwhile but there is little to suggest that they compensate in any meaningful way for your emissions.

For an offset scheme to be effective, it must fund activities that would not otherwise have taken place– they must be additional. It is particularly difficult to prove additionality and few schemes meet this standard satisfactorily. Carbon-offsetting schemes are also ethically questionable: they shift the burden of reducing CO_2 emissions to other people, other places or other times. If you fly to New York today, your trail of gas starts warming the planet immediately. A tree planted today will take 50–100 years to absorb enough CO_2 to offset the fuel your flight burned.[62]

Surely my holidays abroad support poorer countries?

Tourism brings very limited benefits. Most of your money goes to the airline and travel company, very little helps the local population at your destination. Tourism frequently brings environmental degradation in its wake, stressing water systems and natural habitats.[63]

What should I do about my business flights?

Your business flights don't count as part of your personal footprint. The emissions from them become part of the embodied carbon in the products or services that your company produces. This doesn't mean that you should ignore these flights however. Look at ways of influencing your workplace to use video-conferencing whenever possible and question it when you are asked to fly abroad.

Is it true that driving more slowly creates less CO_2 and also creates less congestion?

Yes. Less fuel is used when you drive more slowly and at slower speeds drivers have more time to react and so shock waves and flow breakdowns are less likely. On a busy motorway the best flow rate can be as low as 65 kilometres per hour. Variable speed limits, which you may see displayed on busy stretches of motorway, use complex monitoring and modelling to identify the best speed[64]

What's a good efficiency for a car?

The figures for car efficiency are usually published in grams of CO_2 per kilometre. If you are buying a new car, look for 100 g/km or less. The performance of a car is usually a little worse than the published figures because the tests are done under ideal conditions.

Should I buy an electric car?

Electric cars may be the vehicles of the future. At present they are expensive and the network of charging points or battery-swap points that would allow them to be used for longer journeys is in its infancy. Buy one if you can afford to and like experimenting with new technology. The price will fall as more are produced. If a way of swapping batteries in much the same way as we fill up with petrol can be introduced, they could make a real contribution. To be really effective they need to be powered by electricity produced from renewable sources. As we also need this electricity in our homes and in industry, electric cars are also only viable if everyone reduces their mileage.

Why are passenger ships such a problem?

Ships vary from dreadful to not-so-bad. The worst, such as cruise ships, travel great distances, carrying few passengers at great speed. If they slowed down and stuffed in the passengers like sardines (like troop ships in the 1940s) they would do better. A cruise liner propels a huge amount of steel per passenger against water resistance, so the energy used is very high. Ferries and freight ships usually do better. Most ferries only travel short distances, so if you take a slow one, don't worry about its emissions. Freight ships dawdle along while carrying huge amounts of cargo so are a good option for transporting goods.

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Food and water

Food and water are two of the essentials of life. Both are threatened by climate change. The natural water systems in many parts of the world are likely to alter, producing droughts in some places and floods in others.[65] World food production will be affected and substantial drops in world crop yields are likely.[66] Meanwhile the global food system and the typical Western diet are responsible for large amounts of greenhouse gas emissions. Our eating patterns themselves need to change.

What's the problem with food?

The food system has a surprisingly large impact on greenhouse gas emissions and is also responsible for deforestation, water stress and loss of biodiversity. It's not just that fossil fuels are used in growing, processing, packaging and transporting food. Deforestation, caused when land is cleared for food production, leads to an increase in emissions as the forests no longer absorb CO_2 and create more CO_2 as their wood is burned or left to rot. Food production is also responsible for other greenhouse gases, methane and nitrous oxide. Methane is produced when livestock belch (something

which ruminants like sheep and cows do a lot). Nitrous oxide results from the use of nitrogen fertiliser and from cultivation of the land. For simplicity's sake, we talk about CO_2 equivalents or CO_2e.

The impact of food is not obvious. It is hidden, caught up in all the processes that bring your dinner to your plate – growing the crops and rearing the animals, processing and packaging the food, transporting it from the farm to processing plants, shops and homes.

Food choices can feel purely personal or cultural. But since the 1960s, most developed countries have seen huge changes in the kinds of foods that are available, where they come from, how they are produced and how they are prepared. Ask someone who was a child in the 1950s or 1960s what they ate then. It is likely to be very different from today's diet. There was probably less meat, less variety, fewer out-of-season fruits and vegetables, less processed food and fewer ready meals. Many people didn't have refrigerators and home freezers were rare. Many of these changes have increased the contribution of food to climate change.

Your food choices can make a difference. For example the difference between a high meat and a low meat diet is about 1.2 tonnes a year and the difference between a high meat diet and a vegan diet is about 2.6 tonnes a year.[67] A low-carbon meal, based on grains, vegetables and fruits which are seasonal and locally grown, will have half the impact of one based on meat or dairy products and on non-seasonal produce which may have travelled a long way.[68]

It can be hard to work out exactly how much CO_2e a particular item embodies. There is research into how to label food to show this, but it is still in its early stages.[69]

The meaning of food

Food evokes strong feelings. It's part of relationships and embedded in culture. From the very start of life, when a baby first sucks from breast or bottle, it means more than just nutrition. People show love by giving food and rejection by refusing it. It's common to make a special cake for a child's birthday or to celebrate an anniversary with a meal. Parents feel pleased when their children eat well and fret if they don't. Sometimes food is used to provide comfort or is given as a reward. A sweet is offered to a child with a grazed knee. A trip to a fast-food restaurant is seen as a reward for good behaviour. An adult who is feeling miserable settles down with some pints of beer or treats themselves with a cake.

Battles for control are often played out over the dinner table. Emotions that are hard to express are hidden in subtle – and not so subtle – actions around food. A toddler becomes picky, a teenager refuses breakfast, a partner is late for a carefully prepared supper. Anger, resentment and protest can all be concealed in the way food is prepared, eaten, offered or refused.

On the positive side food is associated with love and kindness, affection and celebration. No special occasion is complete without an appropriate meal. Food is also strongly cultural. Although we might appear to have embraced an international cuisine each sub-group has its own 'good' and 'bad' foods, its dishes for feasts and special occasions and its food rules and taboos. Understanding the place food plays in your life and that of your family can be important in tackling its carbon emissions.

- 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.

Food worries

Food is also a source of anxiety. It can seem that scarcely a day goes by without another food scare. It can be difficult to know

what is really good to eat – whether we are talking about a healthy diet, farming or Fairtrade. The list of food worries below was created from discussions with people in Carbon Conversations groups. Which would feature on your list of food worries? Are there others that you would add?

- Junk food – people eating too much fat and sugar and not enough fresh fruit and vegetables.
- Poor quality food in schools, prisons and hospitals.
- Eating disorders – anorexia and bulimia.
- Health risks from the typical western diet – obesity, diabetes, heart disease and cancer.
- Livestock-farming methods – battery chickens, intensive pig farming.
- The spread of major animal diseases like BSE, foot-and-mouth and bird 'flu.
- Food safety – problems like *Salmonella*, *Listeria* and *E. coli*.
- Chemical additives in food.
- Residual pesticides and herbicides on food.
- Unhealthy chemicals – like dioxin or growth hormones – getting into the food chain.
- Genetically modified foods.
- The dominance of big supermarkets and the loss of small, local shops.
- The destruction of the marine environment through overfishing.
- Treatment of small farmers across the world.[70]

Connected problems

Many of the items on the list above are connected. They are linked to intensive farming practices, the influence of large corporations and the global supply system. We may be grateful for our reliable, cheap food but it comes with hidden costs.

- The **environment** suffers from the use of pesticides, fertilisers and other chemicals; from the high demand for water of some crops; from forest clearance for soy and livestock production; and from the loss of bio-diversity.
- Our **health** suffers because many of the more profitable foods are also high in fats and sugars and low in fibre and fresh ingredients.
- **Small farmers** across the world suffer, as they are driven out of business by large corporations and the demands of supermarkets.
- **Control** over the system is lost as supply chains become longer and it becomes hard to maintain responsibility for standards.
- It is a **greenhouse gas-intensive** system and a key cause of climate change.

Recent years have seen increasing demands for an alternative to the current globalised, industrial system, not just because of climate change but because of many of these inter-related

issues.[71] Protests across the world have given rise to a movement for food sovereignty - a system that would be ecologically sound and which would put the people who produce, distribute and consume food at the heart of decisions about food rather than the corporations and market institutions. Exactly what the changes should be is a matter for debate. Understanding how the food on your plate relates to climate change and to the current food system may help you make up your mind.

Where's the CO_2e in food?

We can look at the CO2e in food in four stages that bring it from the farm to our kitchens.

- Production – everything that happens on the farm.
- Processing – everything that happens to turn raw ingredients into the products we buy in the shops, including chilling and freezing them.
- Packaging – the tins, bottles, plastic and cardboard that keep food fresh and allow it to be transported.
- Transport – the journeys that food takes, from the farm, to the processing plant, to the shops and to our homes.

There are also CO2e emissions associated with food waste but we discuss those later on in the section about consumption and waste.

Production

Growing crops and rearing animals is responsible for the largest part of your food footprint. In the UK it is responsible for about 45% of the total.[72] It takes energy to produce food and, when energy is used, CO_2 is emitted. Energy may be used in:

- manufacturing and using farm equipment (tractors, combine harvesters, slurry-management facilities etc.);
- manufacturing fertilisers and pesticides – roughly 1% of the world's energy production is used in creating nitrogen fertiliser;[73]
- protecting crops to extend the growing season by using heated greenhouses and polytunnels;
- growing crops to feed animals;
- heating or cooling cowsheds, battery henhouses and other animal housing.

This direct use of energy is not the biggest problem however. Simply bringing land into cultivation, fertilising the soil and keeping animals causes greenhouse gases to be released.

- Forests, savannah and pasture land are carbon sinks – absorbing more CO_2 than they release. When this land is converted to grow crops, ploughing releases the stored carbon back into the atmosphere as CO_2 and it stops acting as a carbon sink.

- The use of nitrogen fertiliser leads to the release of nitrous oxides.[74]
- Methane is released when cattle and sheep burp, is produced in the manure of all farm animals and is released when rice is grown in paddy fields.

Nitrous oxide and methane are particularly powerful greenhouse gases. Although methane is relatively short-lived, a tonne of methane causes far more damage than several tonnes of carbon dioxide.[75]

Livestock production is particularly damaging. Overall it may be responsible for about 14.5% of all human-made greenhouse gases.[76]

So does this mean we should give up all meat, fish and dairy produce and become vegans? No. Climate-friendly food production needn't exclude meat and dairy altogether. Rational, climate-friendly food-production would probably mean:

- less reliance on meat, fish and dairy produce;
- a return to less intensive forms of farming;
- greater diversity in farming – less monoculture and more mixed farms;
- more support for smaller, less mechanised farms.

Processing

Once the crops have been grown and harvested, or the animals are mature, a lot of food is processed: animals have to be slaughtered, butchered and finished. Other crops may be dried, fermented, pasteurised, bottled, tinned, refrigerated or frozen Food needs to be processed to make it edible, to keep it safe, or to make it last longer. But not all processing is done for these essential reasons. It is also done to meet demand from consumers for convenience and because it is extremely profitable. All processing requires energy and produces CO_2.

Some food manufacturers have argued that less CO_2 will be used if food is processed and cooked in factory units. Other research shows that if you do a proper life-cycle analysis which looks at all the CO_2 in all the stages – from production, through processing, packaging and distribution - then, highly processed food has a higher carbon footprint.[77] A good rule of thumb is that the more ingredients in a processed item, the higher its CO_2 impact. Much of this will come from the travel involved in assembling all the ingredients. There are also good health reasons for eating less processed foods as they tend to be high in sugars, salt and fats.

Freezing and refrigeration are particular problems. Refrigeration features at almost every point in the chain which brings food from the farm to our plates. We eat more perishable foods, like salads, which need to be kept cool. Changes in patterns of work mean that people shop less frequently and need to store more food at home. Meanwhile,

the homes themselves are warmer and so a fridge is a necessity.[78] Freezing is extremely energy-intensive. Freezing vegetables adds around 2 kg CO_2 per kilogram of food.

Packaging

Packaging takes energy to produce, it adds to the weight of the goods being transported and it needs to be disposed of. All these factors add to the CO_2 burden of food. However packaging is responsible for only a small part of your food footprint – about 7% in the UK for example – and some of it is necessary in order to keep food fresh and prevent damage.

In terms of CO_2, aluminium cans are the worst offenders because of the huge amount of electricity used in smelting. Steel cans and glass come next, followed by paper, card and plastic.[79] Disposal of plastic is a problem. Much of it is hard to recycle and consumers are often confused about which types can be recycled. Bottled water – almost unheard of in much of Europe till the 1990s - is an example of the way packaging has transformed a need that used to be met more cheaply and with a lower CO_2 burden. There is no evidence that bottled water is superior to tap water and both the packaging and the transport have serious CO_2 impacts.

Transport

Transport is the final aspect of your food footprint. 'Food miles' is a phrase many people are familiar with now and refers to the distance food has travelled to get to your plate.

It is important to take account of the mode of transport used. Some foods that have travelled a long way have come slowly, on a bulk carrier ship, and their transport emissions can be surprisingly low. For example 1 kg of lentils, shipped by bulk carrier from India to Europe have travelled 11,657 km. Their transport emissions are 46 grams of CO_2. In contrast, 1 kg of strawberries flown 8,774 km from California have transport emissions of 6 kg.

Here are some useful rules of thumb for guessing how your food was transported.

- Perishable items from another continent (green beans, grapes, blueberries for example) usually come by air.

- Perishable items from within your own continent usually come via refrigerated truck.

- Non-perishable items and items with a long storage life (for example, dried lentils, wine, bananas, apples) from outside your own continent usually come by bulk sea carrier and then by truck.

- Non-perishable items from within your own continent usually come by truck and ferry.

Easy steps to a healthy, low-CO_2 diet

Remember that food is a complex, emotional matter. Changing your diet to reduce your carbon footprint is no easier than changing your diet to lose weight:

- crash diets don't work;
- faddy diets don't work;
- diets that make you miserable don't work;
- a pattern of bingeing and dieting gives you the worst of all worlds.

The changes that are most likely to work are the ones that:

- you choose yourself;
- fit your daily routine;
- make you feel good about yourself;
- you adopt gradually and steadily.

The pyramid diagram below[80] is a guide to a healthy, sustainable diet.

A Sustainable Healthy Diet

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_2e impact. Increasing the amount of these foods and reducing the amount of high-fat and sugary foods in your diet will make you healthier and more climate-friendly. Reducing the amount of meat and dairy produce by substituting beans, pulses, nuts and seeds will make an even bigger difference. If you also try to eat as much local and seasonal food as you can and avoid heavily processed food you should reduce the carbon impact of your diet considerably.

Water and climate change

Water is already a problem in many parts of the world. Rivers have dried up, inland lakes have shrunk, and underwater reserves have been emptied and will not refill.[81] Over 750 million people have no reliable access to clean drinking water.[82] Climate change is likely to make matters worse. It will bring changes in patterns of rainfall, causing droughts and floods in different parts of the world. The places that will suffer most include some of the poorest, such as sub-Saharan Africa and Bangladesh, where water problems are already severe.

Virtual water

In Europe, the average person uses between 40 and 80 cubic metres of water each year in their home.[84] (Between 120 and 240 litres per day.) Australians use 103 cubic metres per year[85] and in the United States the figure is similar.[86] But this use is tiny compared to virtual water - the water embodied in anything that has been grown or manufactured.[87]

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 a mere 2,700 litres per day. Still more water is used by industry, bringing us goods we sometimes take for granted. Some of the water is used in growing crops used to make clothes. Some of it is used in industrial processes such as steel-making.

Poorer countries often export their precious water in the form of goods sold to wealthier nations: wheat and soy for animal feed; cotton; rice and coffee. Sometimes these crops take precedence over growing essential supplies for local people.

The relationships are complex but water problems are yet another reason for thinking about our heavy use of meat and dairy produce, our reliance on imported food and our throwaway attitude to clothes and other goods. They also suggest that water-hungry bio-fuel crops may not be the answer to our transport problems.

What can you do?

A diet of local foods with less meat and dairy will help both your carbon footprint and your consumption of virtual water. At home, a sustainable target for water use is 60 - 80 litres a day, which is most easily achieved by installing low-water use toilets, dishwashers, washing machines, taps and showers and following common sense advice. Take short showers rather than baths, don't leave the tap running, clean the car with a bucket of water not the hose, only run the dishwasher on a full load and fix any dripping taps.

How much water does it take to make…[83]		
Item	Quantity	Water required for production (litres)
Petrol	1 litre	70
Biodiesel from soy	1 litre	11,4000
Coffee	1 cup	140
Potatoes	1 kg	280
Bread	1 kg	1,608
Milk	1 litre	1,000
Rice	1 kg	2,500
Cheese	1 kg	3,178
Beef	1 kg	15,000
Cotton for one t-shirt	250g	2,500
Car	One	80,000

Rules of thumb

A sustainable diet is a healthy diet

Following a sustainable diet is also good for your health.

Go easy on meat, fish and dairy

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

Fruit and veg are fantastic

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. Local, seasonal fruit and vegetables have the lowest emissions.

Favour fresh and unprocessed

Reduce the amount of processed foods in your diet, especially frozen foods and items with multiple ingredients.

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: food and water

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.

Does organic food have a lower footprint?

Some research suggests that it does, mainly because it uses less nitrogen fertiliser. Other research suggests that it doesn't, mainly because it is less productive per hectare. Research (and debate!) on this issue continues.[88] If you are taking wider health, environmental and biodiversity issues into account organic small-scale production has advantages.

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 that 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. Do it if you enjoy it.

Local? Seasonal? Organic? Fairtrade? Which is the best?

Local is best in terms of the CO_2 in transport. Seasonal is best in terms of the CO_2 in storage. Organic may better in terms of the CO_2 in production. Knowing which is best for a particular product is difficult, so aim for food that is local, seasonal and if you wish - organic. For items that can't be grown in your home country, you can support Third World producers by choosing Fairtrade products where they are available.

Is it OK to drink bottled water?

In most developed countries the water that comes out of 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_2 for no real purpose.

If climate change brings food shortages, will GM crops help solve the problem?

Probably not. A 2008 UN report by the IASSTD (International Assessment of Knowledge, Science and Technology) representing the views of 400 scientists found little place for GM crops in solving world food problems.[89]

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, highly processed and has probably clocked up a lot of food miles. That's before you examine what is in it and who was exploited to bring it to you. Local, independent restaurants that are part of the local economy, offering a low-carbon menu and trying to source ingredients locally are something else entirely. Enjoy celebrating there![90]

Will reducing food waste help reduce our carbon emissions?

Globally, between 30 and 50% of all food produced never reaches a human stomach.[91] Some of these losses occur in production, some at the processing stage, and some from retailers, restaurants, commercial organisations and domestic households. In the UK for example each household could save 640 kg of CO_2e a year by avoiding unnecessary food waste.[92]

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 have been set recently.[93]

Food sovereignty or food security – what's the difference?

Food security is defined by the World Health Organisation as a situation where "…all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life."[94] The idea has become contentious as fears have grown that plans for food security are dominated by large corporations and their search for profits. For example the G8's 'New Alliance on Food Security and Nutrition'[95] has been widely condemned as a move that will lead to expropriation of land and the impoverishment of small farmers.

The movement for food sovereignty is an alliance of small producers, peasant farmers, local consumers and environmental organisations. Its best known representatives are La Via Campesina.[96] Advocates of food sovereignty argue that the people who produce, distribute and consume food should be at the heart of decisions about the food system – not the big corporations. They emphasise the value of small producers, local knowledge, skill and control and the importance of working with nature.

Consumption and waste

Our purchases have a big impact on our carbon emissions. There is carbon embodied in everything you buy, from the shoes on your feet to a holiday trip. Somewhere, energy has been used - in extracting raw materials, turning them into goods, transporting these goods and selling them. Your house, your car, your clothes and your computer have all taken energy to make. Even services, like household insurance, a ticket to a football match and internet use have a carbon cost. The insurance company has offices to run. The football club has a stadium to maintain and its team may fly all over the world. The internet requires a vast array of servers to store its data. All of these use energy. At every step, CO_2 is emitted.

When you throw something away, more greenhouse gases are emitted. First there are the energy costs of removing waste, whether it's a skip full of builder's rubble, a black bag or a box of recycling. Then come the energy costs of recycling or burying rubbish in landfill. Finally, the stuff that is left to rot slowly emits methane, one of the most powerful greenhouse gases.

In general, the more you spend and the more you throw away, the more greenhouse gases you are responsible for. Some purchases are more carbon-intensive than others but, in general, consumption equals CO_2.

Rich countries consume far more than poorer countries and within those rich countries, wealthy people consume much more than poorer people. These high levels of consumption are made possible by:

- cheap energy from fossil fuels – coal, oil and gas – all of which produce CO_2;
- free use of the natural world's resources - water, air, forests, the land, the sea and all their biosystems - sometimes called 'Global Commons' because their benefits can't easily be divided up between individuals or nations;[97]
- cheap labour from people in less-developed nations;
- continued economic growth; as production expands the price of goods falls, making them available to more people.

The economic system behaves as if nature is endlessly able to support whatever is done to it. Its use of these 'Global Commons' and the damage done to nature isn't reflected in the price we pay for goods. Most people are unaware of the harm that is caused.

Environment and economics

A country's prosperity is often judged by the figures for its Gross Domestic Product (GDP) - the cost of producing everything in the economy during one year. Economists see growth in GDP as positive – a sign that the country is getting wealthier and that its citizens are enjoying a better standard of living.

Others argue that GDP is a poor measure of a country's wellbeing and ecological health. Some are concerned that continued economic growth may be unsustainable.[98]

- Economic activity depletes and damages natural resources (air and water quality, forests, seas and ecosystems) without accounting for this damage in its costings. No price is paid.

- GDP says nothing about whether the growth brings positive benefits (better housing for example) or is simply clearing up after negative events. For example, the costs of dealing with flood damage and road accidents are included in GDP and are seen as contributing to economic growth. Similarly, GDP can't tell you whether activity is happening in industries that solve environmental problems or in industries that create them.

- GDP doesn't tell you whether everyone is benefiting from growth or just a few. In many countries, increased GDP has left many people in poverty as the benefits are not equally shared.

- Economic growth doesn't necessarily bring a better quality of life. Congestion, pollution and degradation of ecosystems all accompany growth beyond a certain point.

- Advocates of unlimited economic growth ignore the finite limits of the earth. If everyone in the world lived like people in Europe, we would need three planet's worth of natural resources. [99]

Conventional economics

Conventional economists think that climate change can be solved by 'de-coupling' economic growth and our use of resources: greater efficiency, more renewables, cradle to cradle recycling and careful use mean that we can do more with less energy. In essence, the economy is 'de-carbonised'. Often creating the right kinds of markets, in particular a market for carbon, is seen as key. The Stern report,[100] produced for the UK government in 2006, took this approach. Similar arguments are presented on an international scale in the follow-up 2014 report *Better Growth, Better Climate*. Here, Stern and a team of fellow economists argue that continued economic growth is compatible with dealing with climate change. Much of what they propose is sensible and necessary, such as major investments in public transport and renewables, and a focus on the development of cities. The big

question however is whether their proposals will deliver the scale of carbon reduction that is necessary. Unfortunately, the answer seems to be 'no'. Their ten-point plan is only designed to show actions that are compatible with maintaining economic growth. As they themselves admit, these "would not be sufficient to achieve the full range of emissions reductions likely to be needed by 2030 to prevent dangerous climate change."[101]

Stern's first report received widespread approval but it has not been implemented by the UK government. At the time of writing we do not know whether *Better Growth, Better Climate* will lead to practical action either.

Challenges to growth

Not all economists accept that growth can continue however. Herman Daly, once an economist at the World Bank, was one of the first to argue that it can't, in his 1977 book *Steady-State Economics*.[102] He argued for a steady-state economy – one that doesn't keep growing, is stable in size and stable in its throughput of resources. Crucially it has room for both nature and human well-being. Daly and his colleagues suggest that a steady-state economy would be governed by four principles.

1. Maintain the health of ecosystems and the life support services they provide.
2. Extract renewable resources (like fish and timber) at a rate no faster than they can be regenerated.
3. Consume non-renewable resources (like fossil fuels and minerals) at a rate no faster than they can be replaced by the discovery of renewable substitutes.
4. Deposit wastes in the environment at a rate no faster than they can be safely assimilated.

More recently the well-respected economist Tim Jackson has revived interest in these ideas. In *Prosperity Without Growth*[103], Jackson explains that it just isn't possible to decouple growth and the impact of our resource use enough. As incomes increase and the population grows, carbon emissions continue to rise, albeit more slowly. We certainly need energy efficiency. We certainly need investment in renewables. But we also need to leave most of the reserves of fossil fuels in the ground and run the world economy without continuous growth. We need to learn to live comfortably whilst consuming less.

Most people associate a shrinking economy with instability and poverty. This is the usual experience during a serious recession. Unemployment rises, inequality increases, essential services disappear and people suffer. Gradually attention is beginning to focus on how to shrink the economy without causing these problems. The work of Tim Jackson and fellow economist Peter Victor has been at the forefront of this[104]. Not surprisingly, there are many opposing voices as most business leaders find it impossible to imagine a world without economic growth.

Looking at the future

It's clear that if we are to reduce carbon emissions, some reduction in the level of consumption in developed countries will have to be made. It's also clear that we could still lead comfortable lives.

- Some items would become more expensive, as environmental costs are factored into their price.
- Our levels of consumption would fall but quality might increase: goods would have to last longer and be repairable. We would buy fewer items less frequently, so overall costs would not necessarily rise.
- We might have less 'stuff' but more leisure time.
- 'Green-collar' jobs would be created in new industries like renewable energy.
- More goods would need to be produced locally, boosting local economies.
- Once basic needs were met, economies would need to concentrate on activities that were sustainable and neither resource-intensive nor carbon-intensive.
- Inequality would need to be addressed, so that resources were fairly shared.

Why do we buy?

Reducing consumption in a growth economy is not easy. It's hard to participate fully in modern society if you don't buy the objects and services offered. People's sense of themselves - their identity - is also tied up with their purchases. There is constant pressure to consume. Advertising cleverly implies that you will be happier if you buy, and left behind if you don't.

Most people try to make wise purchases but many say that they buy things which they later feel they don't really need or which don't bring them much satisfaction. Some people use shopping as a social outing. Others say they feel compelled to buy in order to remain involved in ordinary life. Meanwhile, research suggests that our high levels of consumption don't make us happy. Our reasons for spending money are complex.

Meeting basic needs

We live in a society where many of our basic needs - for food, clothing, shelter and safety - are met in ways that carry a high carbon price.

Need is the obvious reason for any purchase, but it can be deceptive. Once basic needs for food, shelter and clothing are satisfied, more complex social needs are constructed. A child 'needs' a pair of designer trainers, not because he would otherwise go barefoot to school but because his life will be miserable if he doesn't fit in. A commuter 'needs' a car, not because it's the best way to get to work but because the bus service is unreliable. My computer 'needs' to be upgraded,

not because it is worn out but because new software is not compatible.

Similarly **our need to be safe** has been transformed. Earlier generations feared industrial accidents, poverty and illness. They expected the welfare state to provide a safety net in times of need. Today our fears are more diffuse. Some people fear the random attacks of terrorism or muggings. Nuclear accidents, climate change or fracking feature on some people's lists. For others it's the unpredictable nature of modern employment and the loss of reliable jobs. Still others are made anxious by nanotechnology or genetic modification. The sense of being at the mercy of global events can lead people to try to buy safety. Owning a bigger car with more safety features, a house in a quiet neighbourhood or lots of life insurance might all fit into this category. Sociologist Ulrich Beck refers to this pressure on people to find individual solutions to unmanageable global risks as 'tragic individualisation'.[105] It's not surprising that many of us are caught up in it.

Our feelings of **love and care** lie behind many purchases. There is nothing wrong in wanting the best for your family or in expressing love through providing as well as you can. The difficulty is that many of the obvious ways of fulfilling these basic human impulses are also high-carbon: lavish presents, overseas holidays, the biggest house we can afford. Our desires feel like they are our own but society forms the ways we express them. Finding low-carbon ways to express our deepest feelings is an important task.

Identity, social acceptance and status

Everyone wants to **belong**. In previous generations you might have been defined by the job you did, the church or faith group you were born into, the area of town you lived in or your parents' class and job. In modern society the items we buy help define the groups we belong to. We signal membership of a particular subset by our style of clothes and accessories, the music we listen to and our choice of phone, car and activities. Not having things, or not being able to share activities with friends and colleagues can be a source of misery. Children often use clothes and toys to identify their group. For some adults, having the right phone (or computer, or car) is key to taking part in conversations about upgrades or engine efficiencies. Many people would rather fall into debt than admit that they can't afford something that many of their friends own or do. Sometimes the social pressure or the desire for approval is obvious. You might buy a new suit to impress a job interviewer. More often the pressure is more subtle.

Self-esteem and self-image are often in play. Purchases can make people feel good about themselves, however temporary the feeling turns out to be. Having the right clothes, phone, car or postal address helps people feel they will be acceptable to others. Think about how you feel if you find yourself dressed wrongly for an occasion. If you're a strong character you may shrug it off, but many people will feel a deep sense of shame.

The phrase 'retail therapy' suggests that shopping has also become a common solution to **coping with bad feelings**. People shop in the hope of feeling better - usually in the hope of feeling less depressed. The lift is always temporary, sometimes lasting no longer than the trip home. It quickly becomes clear that the new T-shirt or CD is not the gateway to a happier life.

Material possessions often mark our **status** as well. They show where we stand in society. More, bigger, faster or newer usually means better, more successful, more popular or more admired. Not having material possessions is usually seen as a mark of poverty or failure. Nobody likes to appear poor or unsuccessful and it can be hard to find a way of resisting this pressure. People who have few possessions frequently aspire to have more. Parents often work hard to provide their children with a better life than the one they knew. The idea that we might need to make do with fewer consumer items and spend more of our income on cleaning up the mess of the world, is tough on people who started out with very little.

Fulfilment

In modern society, most new or exciting experiences - whether it is white water rafting, an unusual food or a surprising gadget - come with a price ticket. Novelty is a huge attraction. So is the possibility of enrichment through travel, sport, books, music or art. Many people will tell you that their best memories are often of people rather than the expensive meal, hotel or sporting fixture, but money has often been spent somewhere in the process. No-one would want our lives to be robbed of new and fulfilling experiences but finding low-carbon ways of achieving this is essential.

Bargains, lemons and illusions

It can be hard to tell a bargain from a lemon or from an illusion. Marketers are skilled at playing on our desires to be smart shoppers, on our gullibility and on our dreams. They know how to make us believe that our lives will be improved by buying their products. They subtly tell us we'll be happier, sexier and more successful if we have their particular brand. Bargains often persuade us through the shop door. The promise of massive reductions, two for the price of one or second one half-price – persuade us to buy things we don't really want or need. You will be a strong person if you are never seduced by an advertiser's pitch.[106]

Meanwhile, modern goods are often designed for a short life or are difficult to repair. Many shopping trips are caused by the irritating discovery that some previous bargain no longer works.

Affluence and good lives

Most of us have met an irritating person over forty who tells the tale of how they were happiest as a child playing with a cardboard box or messing about in the woods. "We didn't have much but we were happy," goes the refrain. I'm old enough to have said this myself but also to remember my parents (born c1920) and my grandparents (born c1890) saying the same thing. Clearly people have lived good lives in all kinds of different circumstances.

If you talk to people who have lived in less affluent times or who grew up in less affluent countries it becomes clear that the relationship between material goods and a good life is complex. Across the generations, what seems to matter most to people are the following:

- a basic level of security about housing, health and money;
- good, satisfying relationships with family and friends;
- a sense of meaning in life (which might come from work, family, community involvement, politics or religious faith).

Once people have emerged from deep poverty, the pleasures of material goods seem to lie less in the satisfactions that the objects themselves bring, and more in their social meaning, confirming identity or signally success.

Looking back several generations it is clear that we could be happy with much less but that we would need to be part of social groups who were also happy with less. We would need to find ways of feeling respected, valued and included that were not so dependent on material objects.

Some people find it easier than others to stand out against the dominant social trends. What about you?

The positive side of stuff

It's important not to treat all material objects as bad. It doesn't help to despise them. There are many positive aspects to the objects we surround ourselves with.

Almost all the objects we use have been designed with creativity and ingenuity. Many have changed the way we live. Some are marvels of human inventiveness. Objects also tell a bigger story – the story of our history, culture and human creativity. Former Director of the British Museum, Neil McGregor, created a popular radio series called *The History of the World in a Hundred Objects*[107] in which he did precisely that. He used a chopping tool to describe humankind's entry onto the world stage, while a Victorian tea set became the starting point for talking about the British Empire. What would you use to tell the stories of our own times? The bike or the car? The typewriter or the photocopier? The washing machine or the nylon shirt? The television or the mobile phone?

Each item also tells a personal story, embodies a relationship, creates a sense of who you are and who you have been. We are not passive consumers of these objects but use them purposefully - and not always in the ways that their manufacturers intended. Throughout life, we continue to play with our objects, invest them with meaning and mourn their ends. An older person, moving into residential care, will agonise over the objects they are able to take with them and what must be left behind. Sometimes the most mundane objects become invested with meaning: "I felt so sad when we got rid of our old car," a woman told me. "It's a lump of useless metal and plastic. But we'd given it a name, used it and abused it, cared for and hated it over ten years. I felt 'she' was part of the family."

In Carbon Conversations groups we ask people to describe purchases they feel pleased with and purchases they regret. Sometimes people bring pictures of their favourite belongings and sometimes the object itself. What are your cherished objects?

Tracking down the CO_2

Since there is CO_2 embodied in everything you buy, people frequently want to know how much CO_2 each item is responsible for and whether some types of purchase are worse than others.

It's certainly true that some products and activities - an hour's jet-skiing for example - are very CO_2-intensive, while others, like paying someone to baby-sit, are CO_2-light. Getting exact figures for any item is difficult and although research is being done there are no easy answers at present.

Income

Research suggests that there is a strong correlation between income and carbon emissions.[108] As household income rises, so do the carbon emissions of that household. The number of people in the household also has an effect. In larger households some purchases (for example washing machines, cars, household goods) are shared, but others (such as clothes, toiletries, phones, entertainment) are duplicated several times. Nonetheless a high income household of two people will have higher carbon emissions than a low income household of five people.[109]

Products

Not everything has the same carbon intensity however. Some industry sectors are more carbon-intensive than others, so it also matters *where* you spend your money. The low-carbon sectors are education, financial, legal or professional services, recreational, leisure and health services, and telecommunications. The high-carbon sectors are ceramics,

The carbon footprints of some common goods and services	
	Kilograms CO_2
Clothing and household goods	
A year's worth of clothing	225
A year's supply of toilet roll	75
A new carpet 4m x 4m	76-290
A £500 gold necklace	200-400
A £100,000 mortgage at 5%	800
A new small Citroen car	6000
A new Landrover Discovery	35,000
Entertainment	
A paperback book	1
A bunch of 10 red roses, flown from Kenya	3.5
A bunch of 10 red roses, from a heated greenhouse in Holland	21
A trip to the swimming pool	13.5
A night in a hotel	25-60
A year's worth of newspapers	142-270
A new television	220
Communications and IT	
A year's worth of mobile phone use @ 2 mins a day	47
A year's worth of mobile phone use @ 1 hr a day	1250
A year's worth of emails	135
A year's worth of letters (assumes 5 letters a day and 2 catalogues – junk mail for example – a week)	480
A single web-search from an efficient laptop	0.0007
A single web-search from an inefficient desktop	0.0045
A new simple laptop	200
A new IMac	720
Having the builders in	
A new house (85 sq. metres)	80,000
A £20,000 kitchen refit	10,000
2 kw array of photovoltaic panels	3,500
Information derived from How Bad are Bananas? Mike Berners-Lee, Profile Books, 2010	

domestic appliances, furniture, building work, motor vehicles, glass and glass products.[110]

When it comes down to individual products, there are two ways of calculating their emissions. These are sometimes called 'bottom-up' or 'cradle to grave' analysis and 'top-down' or 'input-output' analysis.

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. Accuracy is limited if the emissions of some components are not known and there tend to be underestimates where good data is not available. As more and more products have their emissions calculated, the process becomes easier and more accurate. This method is particularly useful for showing the differences between similar products. The British Standard PAS 2050 provides certification for individual products in the UK but not many products have been certified and the number of individual products makes this a daunting task[111]. In Europe the European Commission is currently conducting a pilot on Environmental Footprinting for a number of industry sectors and products. This is due to report some time in 2016 but it is likely to be some time before much information appears on products.[112]

The alternative is a top down/input-output analysis. This starts from national and industry statistics for the inputs to each industry sector and uses these statistics to work out the total amount of fuel and emissions that belong to their outputs. Estimates have to be made for the emissions from imported goods and added to the totals. It's harder with this method to distinguish between the emissions from similar products but it's less prone to missing emissions. This is the approach taken by Mike Berners-Lee in his book *How Bad*

are Bananas? The table lists the footprints of some common purchases in the UK. The carbon emissions for these products are likely to be similar in other developed countries.

Throwing things away

Many people also have complicated feelings about the objects that come to the end of their useful life. Are you sad to let them go? Pleased you can buy something new? Worried about what to do with them? People's feelings about waste are complex and tangled up with emotions that most people rarely speak about and which are often unconscious.

The love of the old and the lure of the new

Our feelings about acquiring new objects and getting rid of old ones take us surprisingly close to feelings about mortality. We talk about them in terms of life and death. Products have a life-cycle. An old car is deemed dead. As Michael Braungart says in his book *Cradle to Cradle* "In Western society, people have graves, and so do products."[113]

Some people find it hard to throw anything away. As new items are purchased, they fill the loft, the garage and the

garden shed with old ones that might come in useful one day. Throwing stuff out can feel like getting rid of an old friend or a part of ourselves. We may be:

- protecting ourselves against an accusation of being wasteful;
- driven by a fear of shortages that comes from an earlier period of poverty;
- protecting ourselves against the fear of death.

To place something in the ground or send it to landfill can remind us of our own mortality. We too will come to an end and need to be recycled. If we have been attached to an object, placing it in the bin can feel like the death of a part of ourselves.

The other side of the coin is our love of the new. The virgin product speaks of our vitality, our power and our control. It's the old, discarded object that is done for, not us. We can endlessly renew ourselves through our purchases.

The clean and the dirty

Our feelings about waste have a lot to do with how we have learned to think about what is clean and what is dirty. Anthropologist Mary Douglas argued that this is one of the fundamental distinctions that cultures make and we learn to make it in early childhood.[114] Is this object clean and good? Or is it dirty and dangerous?

Waste in our culture, as in many cultures, is seen as dirty and dangerous. It has to be dealt with through prescribed rituals, in specialised ways, according to learned rules. Reflect on the way you feel about something before and after it has been designated waste. The newly sliced piece of bread on your plate is designated clean. 10 minutes later the unwanted portion of it is designated dirty. There is no material change in the bread. It is no more damaged or unhygienic. It has simply been reclassified. The same might be said for an empty tin of beans or a discarded jumper. Once something is designated as waste, it seems to change its characteristics. It feels unattractive, shameful and dirty, and must be dealt with in the proper way.

Most people fear getting it wrong with regard to waste, whether it is faeces or any other kind of rubbish. The possibility of shame and humiliation are never far away, so situations where it isn't clear which category something belongs in can be a source of anxiety.

The introduction of domestic waste recycling produced just such an anxiety. The rules were changed and people were asked to adjust their understanding of what was clean, what was dirty, what was pure, what was dangerous. The complaints that people made were often that they didn't know what went where, that the rules were incomprehensible, inconsistent or kept changing, or that recycling itself was dangerous. People were being asked to move from a simple classification - everything that is waste

goes in the black bin - to a complex one where some waste was valuable and some waste was not, and where different rules applied to each different type.

Problems were compounded when those who administered recycling schemes placed themselves in the position of punitive enforcers, for example, refusing to take waste that was not in the right place (beside the bin and not in it or classified in the wrong way), leaving a humiliating mess outside the owner's front door.

Take a few moments to think about your own attitudes to waste. You will get an opportunity to talk about this in your Carbon Conversations group.

A circular economy?

The items we throw out all used energy in their creation but once they are no longer wanted, getting rid of them also creates CO_2, although this is a small proportion of your overall carbon footprint. The big problem is that many modern products are composites that can't easily be recycled. Others can only be recycled a limited number of times because it is hard to separate them properly. For example the steel from cars is melted down with other car parts, including copper, paint and plastic coatings. This lowers the quality of the recycled steel so that it cannot be used to make a new car. Although the original product is saved from landfill, the recycled one often ends up there. Many products contain toxins that continue to cause damage whatever is done with them. A modern television for example contains 4,360 different chemicals, some of which are toxic.[115] Others could be reused if the TV was designed with that in mind.

More recently some people have begun talking about the idea of a circular economy where waste is seen as a resource, rather than something that just needs to be got rid of.[116] Conventional economies are linear. Raw materials are taken from the environment, used and then thrown away. A circular economy takes its inspiration from living systems. Waste is designed out. Technical 'nutrients' flow just like biological ones do. There's a constant cycle of renewal.

In a circular economy, products would be designed so that each element could be extracted and reused. Instead of thinking of products as objects that come to an end of their useful life we would think of them as providing services which people want to enjoy. When the materials had finished providing one service they would be disassembled and used to provide another. A circular economy would:

- design out waste;
- think in terms of systems and services rather than individual products;
- eliminate the use of toxic chemicals;
- emphasise resilience and effectiveness rather than efficiency;

- shift towards the use of renewable energy.

This is a challenging view for industry but it has been embraced by a number of big companies who see it as the future.
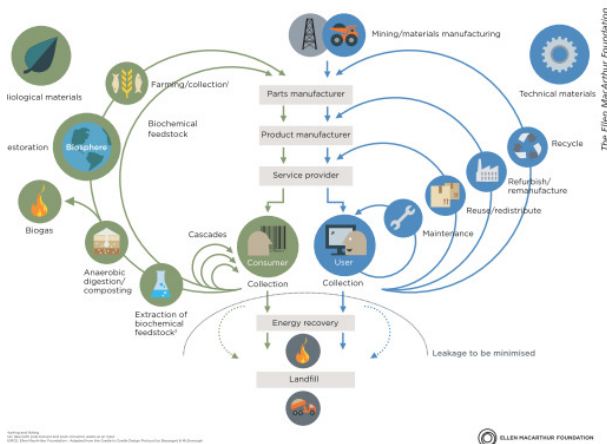
The circular economy – an industrial system that is restorative by design. The Ellen MacArthur Foundation

Critics of the circular economy worry because:

- it assumes that economies can continue to grow;
- substituting technical nutrients with biological nutrients will put additional stress on ecosystems;
- endless recycling isn't possible because materials degrade over time;
- it assumes that all industry's energy needs can be met by renewables, even if economic growth continues;
- it doesn't take account of the energy which products use in their life time.

They argue that a circular economy might encourage us to think that we can still have everything we want. Although the circular economy is an interesting idea we still have to be careful with what we have and make do with less.

The wider impact

CO_2 is not the only issue with many of the goods we buy however. In Chapter One we talked briefly about Johan Rockstrom's idea of the nine planetary boundaries. Mining for minerals and precious metals, and disposing of plastics and other waste has had devastating effects on biodiversity in some parts of the planet.

Many goods are made with 'conflict resources' – raw materials sourced from countries where their extraction is tied up with corruption, armed conflict, human rights abuses and complete disregard for the environment.[117] The electronics industry is a particular concern. Gold, tin, tantalum and tungsten from the Eastern Congo are used in our mobile phones and in many other consumer electronics.

Many goods are also made in countries with low standards of worker protection and where child labour is used. Somewhere, someone's health and well-being is likely to have suffered in bringing us the luxury goods we now treat as everyday items.

There are a number of good campaigns working to stop the use of conflict minerals and improve the conditions of workers in overseas factories. You can support these by joining the campaigns, writing to manufacturers and donating money but also through your choice of products and your careful use of the world's precious resources.

If you are concerned about these wider impacts you may also want to think about acting collectively. You might like to give time to one of the many organisations working to change the global picture. For example, there are organisations focused on the working conditions in overseas factories that supply us and organisations working to stop the use of conflict minerals. You could support an organisation persuading your pension fund to divest from fossil fuel companies, an organisation providing micro-finance to people in third world economies so they can start their own businesses, or an organisation persuading multinationals to pay a fair share of tax. The choice is yours.

What can you do personally?

There are a number of practical things you can do personally to reduce the impact of your consumption. It's important to become a canny shopper. Always ask yourself why you are buying something. Shop for items that will last. Look for items that are repairable and then use them until they are worn out. Avoid disposable items and of course make sure that your recycle everything that can be recycled.

It's important to remember that all the products and services you buy have a carbon impact. It will help to spend your surplus income in the lower-carbon sectors of the economy, but to reduce your carbon footprint significantly, you may also need to reduce your overall consumption and live on less. It is people with above average incomes who face the difficult choices. People on low incomes make less impact. Some people may also be able to think about working less and having more free time, investing their money in renewable projects or donating money to charities that are alleviating the effects of climate change.

High and low-carbon items

High-carbon items use a lot of fossil fuels to make, and include cars, building work, machinery and many household goods. Examples of carbon-heavy purchases would be:

- new carpets or a kitchen refit;
- a meaty meal in a restaurant that is refitted each year;
- flying lessons.

Items likely to be low-carbon are: second-hand goods; labour-intensive services; and labour-intensive products. Carbon-light consumption might include:

- antiques, collectables and new works of art;
- baby-sitting, massage or gardening services;
- hand-crafted furniture or hand-made clothes.

A few long-lasting, hand-made garments will be responsible for less CO_2 than a cupboard full of throwaway items from a sweatshop. You will sometimes find that there are high-carbon and low-carbon routes to the same goal. If you want to get fit, a jog in the park uses less carbon than a trip to the gym. If you want to socialise with friends, a home-cooked meal has a lower impact than a trip to a restaurant. Buying second-hand and getting things repaired are also good routes to a lower-impact life. It is also important to think about the wider impact of what you buy. Try asking yourself:

- How was the natural world valued as this product was made?
- How long will this product 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?

Rules of thumb

A high income usually equals high emissions

Try to spend in the low-carbon sectors of the economy

Beware of rebound

Be careful what you do with any money you save

Try to live on less

Think about what really makes you happy

Think before you buy

Shop for items with a long and flexible life

Remember your 'R's

Reduce, Repair, Reuse, Recycle

Frequently asked questions: consumption & waste

If building work involves all that CO_2 isn't eco-renovation a bad idea? Shouldn't I spend my money in a lower-emitting sector of the economy?

Like any building work, eco-renovation is responsible for emitting a lot of CO_2, but with eco-renovation carbon will be saved 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 carbon begins to be saved. Some building methods and materials have less embodied carbon than others. Timber-framed houses, lime mortars and organic insulating materials are all winners.

My aromatherapist holidays in Thailand. Does that make it a high carbon industry?

The aromatherapy is still low-carbon! What people do with the money they earn counts as their carbon footprint, not yours.

What about my savings? When I lend money surely it's busy producing CO_2?

Again, it's a question of whose footprint it is. The goods that companies make, using your savings, will be bought by others and will count towards their footprints. When you cash in your savings or spend the interest, whatever you buy counts towards your footprint.

Should we be worried about the impact of IT?

The data centres that store the information we access online all run on electricity. When you plug in your laptop and connect to the internet, you're not just using electricity at home, you're also using electricity across the world. The infrastructure supporting the internet and telecommunications accounts for less than 1% of global emissions and some companies are taking steps to move data centres to cooler locations (where they require less cooling) and to move towards using renewable electricity.[118] These infrastructure emissions make up a small part of the average European citizen's consumption footprint. Nonetheless, try to keep a check on your use.

Doesn't it cost more to recycle things than to make new ones?

No. Recycling saves energy and water, reduces pollution and saves on raw materials.

I enjoy my job but it earns me a lot of money. What should I do?

A generous amount of high-quality, local, energy-efficient goods and services are yours for the asking! Think about creating an energy-efficient home, buying wonderful art and employing people on fair terms to help you with jobs you don't want to do yourself. Next, invest in ethical, low-carbon funds and pensions. If you run your own business, make sure

it is a leader in low-carbon activity. Finally, give generously to environmental and development charities that help countries suffering from the effects of climate change.

I'm on a low income and can't afford high-quality green services and products. What should I do?

People on low incomes usually have low carbon footprints so you shouldn'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 government, demanding more sustainable products at fair prices.

If everyone stops buying stuff won't the economy go into recession?

The economy as a whole needs to change direction and provide the goods and services that a low-carbon society needs. Our actions are a small part of showing what we want and living according to our principles.

Isn't the real problem population growth?

No. 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 10 billion. The problem is the resources used by each person. If that can be reduced, population itself is not the issue. Statistician Hans Rosling has an engaging explanations in his TED talk.[119]

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What about at work?

Although our main focus in this book is on people's personal carbon footprints, many of us also work and can be involved in helping to reduce carbon emissions at work. This can be both rewarding and frustrating. As one Carbon Conversations participant put it:

"How to convince my bosses that I shouldn't fly so much? This year alone I've been sent to New Zealand, Israel, Cyprus, France, Germany, Ireland, and Holland - despite me protesting that teleconferencing is almost as good!"

The core activities of some organisations, such as those involved in coal mining, oil and gas extraction or electricity generation, contribute directly to climate change. Others, such as steel production or the production of nitrogen fertiliser emit a lot of CO_2 through their operations. All organisations have buildings and delivery costs. Global networks mean that many companies frequently fly staff to conferences and meetings abroad. Some workplaces (such as hotels, restaurants and hospitals) have significant emissions from the food they serve. In others, such as the health service, it's the supply chain that is responsible for the biggest emissions.

People working in some organisations may struggle to find alternative ways of working. Sometimes it's hard to envisage

how products or services could be delivered in low-carbon ways. Similarly if your sense of professional identity is bound up in the organisation you work for, being asked to consider that organisation in a completely different shape may make you feel quite uncomfortable.

At the day-to-day level too, power, division of responsibility and rules at work can create frameworks in which people struggle to make a difference. Even working out how to turn the thermostat down in some workplaces can be a baffling experience and leave you feeling powerless and cynical.

However most large organisations do have plans for reducing their emissions, particularly in Europe where there are agreed standards to be met. It's worth thinking about:

- What might your job look like in a low-carbon future? Will it exist? How might it have changed?
- What commitments has your workplace made to carbon reduction? Can you find out? What progress is being made?
- What changes would you most like to see in your workplace? Can you talk with colleagues about what you want?

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Getting stuck

There are many reasons why a wish to reduce emissions doesn't turn into reality. In the final section of this chapter we discuss the common experience of feeling stuck and discouraged. Do any of the following feel familiar?

- "I feel so ashamed and guilty I don't know what to do."
- "Everything seems organised to make it difficult for me."

- "I'm trapped between a rock and a hard place."
- "It's unfair – the older generation didn't have to worry about how they lived."
- "I don't see why I should struggle to do these things when other people can't be bothered."
- "I get into an all or nothing frame of mind, and then I give up."

- "It all seems so complicated, I don't know how to take a decision."
- "It's hard to do anything which feels proportionate to the problem – I feel so powerless and insignificant."

People who have benefited from prosperity may feel shame and guilt as they become aware of the costs of their good fortune. The links between cheap consumer goods, the devastation of the natural world, and the exploitation of factory workers in China or Bangladesh are not obvious for example. It is common to feel shocked and then ashamed or guilty when you realise the connections. These are not comfortable emotions and they can sometimes be quite overwhelming. Although they can prompt you towards change they can also be paralysing.

People can also feel trapped by the systems we are all part of. Sometimes it's the power of the big systems – the way that work and transport are organised, the way food is grown and sold or the way housing is provided – that stop us from acting as we wish. Sometimes it's the assumptions of those around us and the norms of our culture that make it hard. Some people find it hard to push against the social norms of material prosperity that surround them. Others feel resentful that they are being asked to give up pleasures and satisfactions – such as foreign travel – that earlier generations took for granted and which their neighbours may continue to enjoy. Research suggests that people are much more likely to agree to reduce their own emissions when this feels fair, so it can be hard to be part of the vanguard.[120]

Another trap that it is easy to fall into is the 'all or nothing' mindset. Here, believing that something is only worth doing if it's done perfectly becomes the justification for doing nothing at all. "I can't cycle every day", quickly becomes "It's not worth cycling at all". A related problem is to be overwhelmed by conflicted or confusing information and throw up your hands in despair. Both of these experiences can feed into the feeling that climate change is an overwhelming problem and that one's efforts cannot really make a difference.

Loss and the process of change

The solution to these difficult feelings is to realise that you are in the middle of a process of change that is social as well as personal, and political as well as individual. The solutions you seek may need other people in order to be effective. The choices you want may require campaigning and political change. It takes time to decide what you want to do and how to make your personal life line up with wider goals and it can involve coping with strong feelings.

You may find that you are mourning for a life that is gone or for a future that cannot happen. The need to mourn is often misunderstood. People think of it as something that only

happens when someone dies. But in reality we mourn, in a smaller way, every time we take a difficult choice, give up on an unrealistic dream or come to terms with a disappointment. Shock at the need for change is often followed by anger, which in turn gives way to attempts to talk your way out of the situation, to blame others or fall into depression. The process of finding your way through such conflicting feelings rarely happens quickly but as you begin to come through them, there is usually a burgeoning of creativity. New ways of coping with the issues appear. New relationships may be formed which facilitate this. Sometimes people reassess what matters in life.

A low-carbon life can be hard work and you may need time, support and good planning to work through your complex feelings about it.

Exploring the process of change

We've worked with hundreds of people over the last 12 years, encouraging them to reduce their impact on climate change, listening to the reasons they give for their successes and difficulties and exploring how to overcome the obstacles. Four things stand out as particularly important:

- talking about what you feel;
- taking account of relationships and systems;
- understanding how you've achieved change in the past;
- planning ahead, assessing what is realistic and allowing yourself time.

Talking about what you feel is an essential part of the process. Finding people to talk with is the first step. Your Carbon Conversations group should offer you opportunities to discuss these ideas and conflicts. Talking with family, friends or colleagues can be equally important. The essential thing is to feel safe with the people you choose to talk with. Are you free to explore what you feel without someone telling you that you are wrong? Can you listen to others without wanting to convert them to your way of thinking? Can you tolerate the uncertainty of not being sure what to do but still continuing to think about it together? These are the building blocks of working through to a better solution and we talk about them in detail in the next chapter.

Taking account of relationships and systems is also important. Unless you run your home like a dictator, you can't impose change on those you share your life with: you need them to work with you. One young woman ruefully explained how her attempts to get her house-mates to be more careful with hot water and turn off the lights had misfired: "It just seemed to encourage them to do the opposite. They liked winding me up and I was made to feel like a school prefect in my own home." Another person described how she found herself cooking three separate meals in order to cope with her own concerns, her gluten-

intolerant daughter and her meat-loving husband. The experiment didn't last long.

Bigger systems can also trip us up: sometimes it just isn't possible to make all the changes we wish to. For example the infrastructure of bus and cycle routes isn't there, the bus timetable is inconvenient or the journey takes too long. However people can also be far too ready to assume, without knowing much about it, that public transport takes longer than going by car, is inconvenient and costly. This means that it is important to approach these problems with an open mind and get good information before declaring that something is impossible.

Planning ahead

Try looking at how change has happened at other points in your life. In Chapter One we discussed three different types of change: changes that happen at transition points such as leaving home; changes that happen at crisis points such as divorce; and changes that come through good resolutions such as a decision to work harder at school or a decision to take more exercise. You may find that certain kinds of changes have stuck more easily with you than others and you may be able to take advantage of this in planning what you are going to do.

Try choosing a range of easy and difficult changes and planning how you will achieve them. You will almost certainly need to acquire information in order to make progress. Without advance planning you will find that decisions overtake you. For example if you are under pressure to sort out a holiday you will book a flight, or if your freezer breaks down you will buy what is easily available rather than looking for the most efficient one you can find.

You may also need to acquire some new skills: vegetarian meals may use ingredients you are unfamiliar with or cooking techniques you've not come across before. Walking, cycling and travelling by public transport use a different set of skills from driving: you may need to listen to the weather forecast, buy suitable walking shoes or keep abreast of timetable changes.

Remember too that change takes time. Research suggests that it takes about two months for a simple change in habit, such as turning out the lights or reducing the speed you drive at, to become automatic. Keep climate change 'front of mind' so that you challenge your routine habits but think about the long-term as well. Where would you like to be in five or ten years' time? How might you get there? How could you gradually make the changes that would halve your footprint?

You may also find that involving yourself in collective or political action gives you strength and helps you feel you are making a bigger difference. You might like to become a Carbon Conversations facilitator, join or start a local community group, engage with a political party, a national environmental group, or take part in demonstrations or direct action.

Your Carbon Conversations facilitators will facilitate discussions about the changes you want to make, support you in making them and suggest ways of going about them.

Chapter Three: talking with friends, family and colleagues

When I was a young woman I was told that there were certain subjects I shouldn't discuss in polite company. Sex, death, politics, religion and money were top of my aunt's list. Today we might add climate change to the list of taboo dinner-party topics. All too often its mention leads to embarrassed silence or angry debate.

What is more distressing is when people close to you - your friends and family - are also unhappy to talk about the subject. Although many say that family and friends are their strongest source of support in facing climate change, it is also common to find that the subject leads to friction. In this chapter we discuss the need for support from those close to you and suggest some strategies for coping with difficult conversations.

The nature of the problem

Most people are concerned about climate change. A 2015 study by the Pew Centre found that worldwide most people agree that it is a serious problem and fear that they will personally be harmed by it.[121] These attitudes do not always translate into action however. Another study by the Royal Society for Arts in the UK[122] asked some deeper questions about what people's concern meant to them. This report concluded that most of those who said they were concerned were better described as 'unmoved'. They rarely spoke about climate change to anyone else and if they did the conversations were short, mostly less than ten minutes. These people accept that climate change is real but they do not match this with much sense of connection to the issue. The feelings, the sense of urgency or the actions that you might expect are missing.

As we discussed in Chapter One, these responses are familiar to therapists working with people who are faced with distressing knowledge. People don't usually deny the facts of a painful situation. Instead, they protect themselves by denying the meaning, the importance or the permanence of those facts. Therapists refer to this form of denial as disavowal.[123] People acknowledge the facts as true but behave as though they are not. You can probably think of examples from your own life. A young person faced with yet another job rejection will tell you that it doesn't matter or that she doesn't care. A woman faced with evidence of her husband's affair convinces herself that she is mistaken. Someone faced with spiralling debts may retreat to dreams of winning the lottery or simply carry on as if nothing has happened, failing to tell their family the bad news.

Disavowal creates splits in the mind that allow us to carry on as usual. We can both know and not know something at the same time. Fact is split off from feeling. Actions are split off from their significance. We don't actively deny the truth. We simply park it in a separate box in the mind and behave as if it doesn't matter. This is what allows a conversation to slip seamlessly from wondering if recent floods are connected to climate change to chat about cheap flights and holidays. If someone challenges this, re-making the connection and reminding everyone of the painful reality, people are likely to react angrily. Our defences are both necessary and convenient – necessary in that they stop us from being overwhelmed and convenient in that they allow us to avoid facing difficult truths. You may be familiar with some of the following responses.

- It's not my responsibility, it's up to government/industry/China/the US.
- I don't see what I can do about it.
- I don't think it's that pressing.
- I can't make a difference - the plane will go anyway, whether I'm on it or not.
- I won't be here, so I'm not bothered.
- There'll be time to sort this out once we've dealt with the economy.
- Don't point the finger at me - I care - I just don't choose to show it by growing a beard and wearing sandals.

There is of course some truth in some of these statements. Bigger systems influence everything from how we travel to work to how we raise our children. On our own, we are just a small part of the picture. There are plenty of big players who are also responsible. There are also other pressing political problems and many ways of approaching this one.

The question we address in this chapter is how to hold conversations that will help people become engaged, rather than stay in an unmoved state. A lot of advice in this field focuses on how to persuade the general public to become politically engaged or take small steps that might help. We draw on some of this work in this chapter but our focus is different. We are not talking about campaigning or about promoting behaviour change but about conversations with the people we meet day to day – our families, friends and colleagues. Here, it's relationships and feelings that matter, and small moments as well as big ones. What's the best way to:

- Hold a conversation about climate change that doesn't end in upset or embarrassment?

- Help others feel that the subject is important to them and that they can do something about it?
- Manage conflicts about the subject with people we love and like?
- Cope with our own feelings when the topic comes up?

This chapter suggests some strategies that may help.

How it feels in practice

If you have become more active and talkative about climate change you have probably noticed shifts in your relationships with other people. It's usually the negative changes that stay in people's minds. For example:

- people are awkward or embarrassed if I raise the subject;
- people avoid me;
- people see me as smug;
- people see me as a puritan, trying to impose my views on them;
- people like to wind me up about it;
- I've stopped talking about it to friends and family;
- I've withdrawn from some social groups because of it.

There are a number of issues in play here.

The information trap

Many of us imagine that information is the answer. We see our task as 'to get the message across' or 'raise awareness'. We hope that telling others the facts that have shocked us will be enough to change their minds. Sometimes we can't stop ourselves from spilling them out: "Did you know…?/The fact is…/Research says…"

Unfortunately facts on their own don't change minds. If they did, the world would be a very different place. Most people are very good at:

- screening out information they think doesn't apply to them;
- splitting off information that makes them feel uncomfortable;
- splitting off information that challenges their sense of identity and expectations of life;
- listening with 'confirmation bias' – making the facts they do hear, fit the world view they already hold.[124]

Facts only make sense when we are ready to hear them. We need to be in an open, receptive frame of mind, free of distractions and other worries. If you want someone to listen to you talk about climate change you need to create a situation where they can be receptive to challenging news.

This is not what most people want to hear when they have the urgency of climate change pounding in their own heart. Once you have acknowledged the reality of climate change yourself it is hard not to feel strongly about the silence of others. You feel desperate to convince them. Their lack of action can seem

inexplicable. A woman described walking through the shopping centre in a daze, staring at other people, wondering how they could still pick items off the shelves. A man described how he devoured every scrap of information he could lay his hands on and then manically regurgitated it to anyone who would – or wouldn't –listen.[125] Our sense of urgency, our despair and our underlying anxiety can overwhelm others and make us poor communicators.

Anxiety leads to poor communication

In these states of mind we appear to be focused on the subject but we are actually focused on ourselves and our own distress. Sometimes we are trying to get rid of that distress. Sometimes we are looking for someone to be angry with. Sometimes we are pleading for someone else to take responsibility. What we actually communicate is the need for someone to deal with our feelings and so people respond accordingly. Sometimes they try to reassure us, telling us it can't be as bad as we imagine. Sometimes they retaliate. Sometimes they try to comfort us with stories of how government will deal with it. If we then react with frustration, the conversation is likely to break down.

If you recognise yourself in this description, the first step is to find another way to deal with your own distress. You need to talk through your own feelings about the issue before you try to convince, help or educate anyone else.

Projection and scapegoating

It would be a mistake to think that the problem lies simply with our own feelings however. Once you have declared your interest in climate change you can easily become a scapegoat for others. This is the process that therapists call projection, where people attribute their own feelings to someone else.

If someone does feel anxious about climate change they may see the cause of their anxiety in you, rather than in the situation. 'Don't wind me up,' 'Stop going on about it' or 'Let's talk about something nicer' are common responses. If someone feels ashamed of their own inaction they may project their self-critical conscience into you. If they see you as a nagging parent who is trying to tell everyone else what to do they can feel absolved from responsibility. They no longer have to experience the nagging inner voice and they can blame you for getting on their back. One friend begins every conversation about holidays with the phrase, "I know you'll disapprove but…" By making me responsible for her own disapproval she takes her flights with a clear conscience.

Achieving the right state of mind

It's easy to forget the times when communication has gone well. They seem less remarkable than the times which end in hurt or embarrassment. You can learn a lot from reflecting on them. You will probably find that:

- you were calm;

- you weren't desperate about the outcome;
- you were feeling confident and positive about yourself;
- you were interested in the other person;
- you connected to the other person's feelings and experience;
- you listened more than you spoke.

These are all aspects of creating what we call a 'safe space' for conversation. This is much easier to do if you are feeling good yourself. If you start out anxious, upset, angry, judgemental or defensive the conversation is unlikely to go well. If any of these negative feelings are dominant for you, find support for yourself before trying to engage with others.

Creating the safe space

A 'safe space' is one in which people feel safe to share experiences, express feelings and explore ideas. It is a milieu where people can expect to be listened to without being judged. Its atmosphere is one where people feel that their point of view will be understood and that they can dare to take risks, experiment and try out new ideas. This might mean admitting to weakness, being able to laugh at yourself or agreeing to try something new. The 'safe space' isn't cosy or self-congratulatory. It has kindness and empathy at its core but it can also be challenging. This is the kind of space your Carbon Conversations facilitators are trying to create in your group. If you can create it in your interactions with others you may find your conversations about climate change go better.

Existing relationships

When you are talking with family, friends or colleagues, existing relationships always come into play. With family and friends most people assume that there is a basic level of trust that will see them through and can be surprised to discover that it doesn't always do so. The people we are closest to are often the people we also argue with the most. When someone knows you well, they also know how to wind you up or hurt you. Like any other contentious subject, climate change can be pulled into the dynamics of a marital dispute or sibling rivalry. It can provide fodder for the politics of housework or the workplace.

Traditional gender roles provide a common trap. If the woman of the house feels responsible for reminding everyone else of their domestic duties (tidy your room/wash up/put your clothes in the laundry) then the small actions that help to reduce a family footprint (turn off the lights/close the fridge door/take a short shower) can get pulled into this dynamic. She feels additionally burdened. Others feel absolved of responsibility and see her as a nag. The mirror image of this is the man who takes responsibility for anything seen as practical or technical. If Dad reads the meters, puts up the draught stripping and drools over the photovoltaic

catalogues, then carbon reduction can be seen as just another of his hobbies.

In most families there are other dynamics too, some crude, some subtle. My brothers love to wind me up and climate change provides the perfect topic. In another family the teenage children felt that their parents' refusal to provide them with endless fashion items and electronic gadgets was further evidence of their parents' meanness. In a third family, a father saw his son's refusal to fly overseas for a family gathering as an act of deliberate disrespect.

Close friends can be a great source of support but amongst groups there are often powerful norms about the way to behave. Norms such as flying thousands of miles for a hen weekend, buying a new outfit every weekend or upgrading your car every three years are hard to challenge. Groups like conformity and if you stand out you may find yourself under pressure. Banter, mockery and gossip are some of the common ways in which groups put pressure on their members to conform.

Similarly att work there are often strong cultural norms about the kind of chat that takes place in coffee breaks or in after-work socialising. It's common to enquire about holidays, home improvements or recent outings. These conversations tend to follow predictable patterns. You're expected to be enthusiastic about exotic holiday destinations or a new conservatory, and commiserate about bad weather, missed flights and substandard builders. Announcing that you're not flying anywhere this year, that your building work is an eco-upgrade or that you've given up eating meat disrupts the predictable flow of chat. Awkwardness descends. In formal work relationships, power and responsibility play a big part. As with anything else she does, a respected manager will be able to bring her team with her on climate change. If there is already friction, her climate change initiative is likely to be treated in the same way as anything else she tries. There may be grumbling, a half-hearted response or subtle sabotage.

In all these relationships we are sometimes naive in the way we introduce climate change. We expect support and are surprised to discover that another aspect of the relationship has come into play. The power balance between friends, the history of domestic arguments or the resentment of junior colleagues can take us by surprise. We expect agreement and are surprised to discover friction. Recognising that a conversation goes on at more than one level can help.

Levels in a conversation

Most conversations take place at several levels. We often focus on the content, such as planning a holiday, arranging a meeting or talking about climate change. This is the surface level and what goes on underneath can be just as important. You can think of a conversation as having four levels: the content, the mood or emotions felt by the people involved,

the agenda each person has and their perceptions of each other.

Content is the subject matter – what's on the news, how's the family, what is it urgent to do this week?

Mood and emotion refer to how people feel. A conversation can have a dominant mood, for example, light-hearted, serious, depressed, awkward or excitable, which may change during the course of the conversation. Each person will also have their particular feelings. For example, one person might feel comfortable, excited and curious. The other person might feel the same way but they could equally well feel edgy, anxious, suspicious or cross.

The agenda refers to what people hope to get out of the conversation. Most people are hoping to get something out of a conversation, if only to pass the time of day or show that they feel well-disposed towards another person. These agendas are often covert or semi-conscious and can shift during the course of a conversation. For example you might be trying to persuade the other person, prove them wrong, show superiority or flirt. Sometimes your agenda will coincide with someone else's. Sometimes your agendas will clash. The other person may be happy to share your agenda but equally they might be trying to change the subject, persuade you of an opposite point of view or end the conversation.

Perception refers to how we see others. We often start with unfounded assumptions about others. We perceive them in particular ways, which can have little to do with how they feel about themselves, or with what they are saying to us. For example you might see someone as overbearing or timid, as behaving like a parent or like a child. In turn, they might be seeing you as a role model and wanting your approval, or seeing you as an inferior and someone to be pushed around. Even with people we know well, we can slot them into our existing expectations: Dad's a joker, Tom's lazy, Saffron's an airhead.

Some examples

Here are three examples, one from a domestic situation and two which are climate change related.

1) A woman says to her husband: "Have you thought about supper?" The content is a factual question. Her mood is edgy and irritable though she's attempting to conceal this because she doesn't want a row. Her perception is that her partner is lazy and thoughtless because it's already late and he's checking his email again. Her agenda is to get him to make supper. He replies: "Not really", which is factual and true (the content). His mood is irritable in return because he feels wrong-footed. His perception of his wife is a parental one - mother telling him off. His agenda is not to lose face.

2) A group of flatmates have agreed to turn lights off when they leave the room but Jack comes into the empty kitchen to find every light blazing. He goes into the living room to speak to the others and says "Hey, guys, I thought we agreed we'd turn lights off when we're not using them?" The content is the agreement about lights, but Jack's mood is hurt and his tone is reproachful, his perception of his friends is that they don't care and his agenda is to shame them into action. Dan replies "Cool it mate, a few minutes won't hurt." Dan's mood is resistant and irritable, his perception of Jack is that he's behaving like a little dictator and Dan's agenda is to show that he can't be pushed around.

3) In a workplace chat over coffee Denzil has connected recent floods with climate change. Karen challenges him: "Do you really think it's worth doing anything?" The content is a factual question but Karen's mood is hurried, critical and impatient, her perception is that Denzil is a misguided do-gooder and her agenda is to reinforce her belief that there's nothing more she should do about the problem.

In all these examples you can see that focusing on the content will get you deeper into trouble. A battle is likely to ensue, feelings will get hurt, each person will retire wounded with their original position entrenched. Reflect back on some of your own climate-change conversations and see if you can identify what was happening at each of the four levels.

Content

- What was the other person talking about?
- What were you talking about?
- Were you talking about the same thing?

Mood/emotion

- Were your feelings and those of the other person similar or different?
- Did your feelings change as the conversation went on?
- Did the mood of the conversation shift as it went on?

Agenda

- What were you trying to do?
- What was the other person trying to do?
- Were your agendas compatible?
- Did they shift during the conversation?

Perception

- How did you perceive the other person?
- What did you imagine they were thinking of you?
- How did the other person perceive you?
- What did they imagine you were thinking of them?
- Did anyone's perceptions change during the course of the conversation?

You may have remembered a conversation that went better than those in our examples but many people recall

conversations that came unstuck in similar ways. How can you get past this? Start by focusing on the emotion and mood of the conversation.

Achieving empathy

Empathy means:

- imagining what it is like to be someone else;
- listening, accepting and respecting their point of view;
- showing warmth and understanding;
- avoiding blame, criticism and judgment.

The paradox of empathy is that the more people feel understood and respected, the more open they are to reflecting for themselves and the more likely they are to shift their opinion or alter their behaviour. Identifying someone else's mood is the first step towards empathy. Try observing the shifting moods in some of the conversations you take part in. You may be surprised at how rapidly they can change. What seems to make someone open up or close down? How do different people show enthusiasm or irritation? How do they show approval or disapproval? Sometimes it is worth checking out what the other person is feeling and giving time for them to respond. Try asking: "You seem irritated – is that right?" or "I get the sense that you're feeling quite put upon by this." You may be surprised at how this can open up the conversation, as in this example between a manager and a member of her team:

> Manager: "Have you made any progress with the travel-to-work survey?"
>
> Team member: "It's on my list."
>
> Manager: "You seem irritated by my raising this again…"
>
> Team member: "No, no, not at all…"
>
> Manager: "I wouldn't be surprised if you were irritated. It's difficult being asked to add something else to your job role."
>
> Team member: "Well, I am a bit pissed off I suppose. I just get flack from the rest of the team."

The manager could have closed this conversation down by responding to the irritation with a demand of her own such as "I want your report on my desk by Friday'". By taking a more empathic route, she opens up the possibility of solving the problem. Here's an example between two friends. Kate has always taken the lead in the friendship.

> Kate: "I think you feel I'm always banging on about this."
>
> Ruby: "Well it does seem like every time I suggest we do something fun together you come up with a reason for why it's going to wreck the planet."
>
> Kate: "Sounds like you feel I'm a bit of a kill-joy."
>
> Ruby: "Yeah - it depresses me. I feel I can never do anything right. It's as if all my enthusiasm for life is being trampled on."

In this example, Kate manages not to retaliate. By identifying with Ruby's annoyance, she allows Ruby to express what she feels. This creates space for more understanding between the two of them. Empathic conversations usually check what the other person is feeling by reflecting back the mood or feeling you are picking up from them. They also use more open questions than closed ones. Closed questions invite yes/no answers. Open questions invite the other person to carry on talking and express what they feel or think. Try questions like:

- It sounds like you feel…
- Are you feeling that…?
- What do you think about…?
- How does that make you feel?
- What happened next?
- How did that work out?

If you can stop trying to convince someone else and instead become interested in what they feel and think you are likely to have better conversations.

Appreciating the real dilemmas

Another important aspect of empathy is appreciating the real dilemmas that people face. With regard to climate change you have encountered many of these earlier in this book and will have struggled with them yourself. For example:

- The dilemmas of being part of an international family.
- The feeling that you are being asked to curtail your aspirations.
- The conflict between doing what feels best for your family and what feels right for our collective future.
- The sense of unfairness - that those who cause the most emissions are not doing much to check them.
- The shock of realising that a high income makes you a high emitter.
- The traps created by the way society is organised, such as the systems of transport, settlement, provision of goods and services, which lock us into high emissions.

Each of these dilemmas plays out differently in people's lives. Sometimes they create genuine and painful obstacles. Sometimes people reach for them as reasons to do nothing. Again, if you explore these issues through open questions, paying close attention to the feelings they bring up, you are likely to have a more fruitful conversation. At certain points you will almost certainly find that you are hitting ambivalence and resistance - your own as well as that of other people.

Ambivalence and resistance

Don't be surprised when you encounter ambivalence. Faced with the need for major social and personal change, most people have mixed feelings. People simultaneously want to know and don't want to know about the impact their lives have on our climate. One day they feel inspired to change, the next they long to stay the same. One moment they feel it's a

really important issue, the next that they don't really care. You've probably noticed this ambivalence in yourself. One day you're really concerned. The next it all feels too much. You find yourself involved in "Yes, but…" conversations, sometimes with someone who is trying to help you but just as often with yourself.

"I could take the bus but…"
"I agree it's important but…"
"I'd like to do more but…"

You become a master at showing just why any suggestion is impractical, dangerous, irrelevant or just plain unhelpful. Often, you feel someone else's resistance before it is put into words. They fidget, their glance travels away, they move uncomfortably in their chair. They nod, as if they're agreeing with you, but actually they're collecting their thoughts in order to block what you are saying. William Miller and Stephen Rollnick suggest that the most important thing in these situations is to 'roll with the resistance'.[126] The metaphor comes from judo where instead of hitting back you use the other person's momentum to your advantage. Conversations about climate change shouldn't be battles but resistance *is* a signal to respond differently. Don't argue. Don't retaliate. Don't oppose the resistance directly. Instead, try to approach from a different angle. Ask more questions. Suggest another perspective but don't impose it. Acknowledge that we all have mixed feelings. Elicit what the other person feels. See him or her as a resource in finding a solution.

Imagine that in a conversation about public transport, someone says to you: "I'd like to use the bus but it takes so long and the times are so inconvenient". Listed below are seven possible responses you could make. The first three are likely to lead to an entrenched argument or an awkward silence. The last four 'roll with the resistance'.

1) If you look through these timetables you'll see that they've really improved lately.
2) I get the bus most days and I've found it works out really well for me.
3) I think we have to put our own convenience to one side when we're thinking about climate change.
4) It sounds like you don't really like the idea of buses.
5) It sounds like you've had bad experiences trying to use buses in the past.
6) What would your dream public transport system be like?
7) Time is such a pressure isn't it? Maybe that's the first thing to think about, rather than the nitty-gritty of bus timetables.

In the heat of the moment it can be hard to follow good advice, but if you practise listening for the resistance you will quickly find that your tactics in conversation change. There are some common forms in which resistance to acting on climate change is expressed. You may recognise some of these in yourself as well as in others. For each one we've suggested some moves that could 'roll with the resistance'.

"I'd love to but…"

There is a common longing to be an exception. We all hope that others will take the brunt of change and that we can be excused. Academics feel that their work is so important they must be allowed to fly. Country dwellers argue that their off-road vehicle is a necessity. Parents justify their long commute with the need to live near a good school. Young people feel they have as much right to explore the world as previous generations. Older people claim a right to some rewards after a lifetime of hard work. Other phrases of this kind you will hear are "I just don't have the time…", "I don't think I'm extravagant…" "I make up for it by…" Try asking:

- How would society need to change for you to be able to change?
- Is there anything you could do that would contribute to that change?
- How would you feel if that change had taken place?

If you're lucky the conversation may move into a discussion of what people are afraid they will lose if they take climate change seriously. It may help to talk about your own desire to be an exception or your own ambivalence. It may also help to focus on the losses people fear. Once loss is spoken about it often seems less significant. Try statements and questions like:

- It sounds like you've got really mixed feelings about the actions we all might need to take.
- I found the idea that I might have to give stuff up really difficult at first. It was only when I realised that I was also gaining something that I stopped feeling resentful.
- In my daydreams everyone else has to do stuff and I'm allowed to carry on regardless. It's been tough acknowledging that my reasons for thinking I'm an exception don't really stack up.

"It's all so complicated…"

Some people use their confusion as a reason for retreat. Sometimes their focus is on small technical distinctions. They fret over dilemmas such as whether it is better to buy out-of-season locally grown hothouse flowers or air-freighted ones from Africa and whether washing up by hand is better than using the dishwasher. (The truth about the flowers is that both options are unsustainable and the truth about the washing up is that both options can be carried out with very little hot water.) The questions do need a proper answer but you may find that your helpful information is met with disinterest or a change of subject. Focusing on small issues like these can be a way of diverting yourself from the big ones and convincing yourself that it is all too complicated to tackle.

Similarly, conversations that appear to be about technical disputes can have more to do with feelings of despair or irritation. It's easier to feel exasperated that the experts can't make up their minds than to feel angry about the scale of the changes that are asked of you. Remarks that begin...

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- "I read in the paper…"
- "My builder says…"
- "Someone told me…'"

…often relate back to an urban myth such as the idea that wind turbines are hopelessly inefficient or that it uses less energy to leave the heating on all day than to turn it off. Technical conversations can also be about hopeful but unrealistic solutions which will avoid some of the pain or difficulty of major changes. These are often referred to as greenwash. The idea that biofuels can supply our energy needs or that geo-engineering will provide a fix are good examples.

Your approach here needs to be two-fold. You need to use your intuition to feel what might lie behind the question and your knowledge to reply to its technical aspect. Don't answer the technical side on the basis of your gut feeling! And don't respond to a feeling with a technical lecture! On the feeling side, try interventions like:

- It sounds like you could just give up in despair.
- Some of the technical detail is tough, isn't it?
- I can understand why you're irritated/confused/annoyed.
- It would be great if there were some magic answers, wouldn't it?

On the technical side, recognise your own limitations, be supportive of people's curiosity and encourage their questioning. If you genuinely have the technical answer at your fingertips it can help to offer it with confidence if this is really what is being sought. If you are not a technical expert, ask the person for the sources of their information. This often makes it clear that there is no real foundation for the 'facts' being offered or casts doubt on them. If there is a trail leading back to a source, follow it up. Look out for vested interests and question unlikely new technologies that are going to save the world.

"I'm too small to make a difference"

Variants of this are, "It's not my responsibility", "It's probably too late" and "I've got other things to worry about". These statements often signal a retreat into hopelessness. People find climate change overwhelming and can't see the point in doing anything. It can help to reflect back to someone that they may be feeling hopeless or powerless. It can also help to ask questions that put them back in touch with their deeper motivations for acting. Try reflecting back the feelings that might be behind the statement, for example:

- It sounds like you're feeling rather hopeless/powerless/overwhelmed/insignificant.
- It sounds like you feel that nobody takes account of you.
- It sounds like you long for someone else to clear up this mess.

Asking questions that connect someone to their own strengths can also help, for example: "What has given you strength in the past?" or "What usually makes you stick at difficult tasks?"

'It's all right you for …'

Variants of this are, "'You want everyone to be like you…" and "You've been conned, now you're trying to convince everyone else…" The dominant emotion is resentment. The person is probably feeling hedged in or pushed around. They project onto you that you have life easy, that you're a bit of a dictator or that you're stupid. This makes it much easier to disagree with you. It's tempting to retaliate with stories of your struggles, a denial that you've ever tried to influence anyone or a vivid account of the catastrophes that climate change will bring. Take a deep breath and try to stay calm. Sometimes it can help to reflect back the feeling. Try:

- It sounds like you're feeling hedged in/pushed around/exasperated with the subject.
- Do you resent all this talk about climate change?

This may open up a discussion of the person's feelings that is fruitful but sometimes this kind of projection is the signal to back off and close the conversation for the time being. Try something like:

- I think I've really annoyed you. I'm sorry.
- Let's leave this for now and go for lunch.

Sometimes this is enough to let the person reassess their view of you. You may get an apology in return or at least the possibility of returning to the subject another time.

Promoting self-efficacy

If you want someone to join you in making changes or to make changes on their own account, you have to believe in them. They need your respect. You have to support their sense of self-efficacy. Think about times when you have tried to make changes or tackled a difficult project yourself. How did you overcome self-doubt? How did you deal with setbacks? How did you stay hopeful? It was probably easier when you had someone backing you. Realistic encouragement matters. It will help if you can:

- believe in other people's willingness to act;
- nurture people's potential;
- credit people with what they achieve;
- praise what is done well.

Climate change can be a difficult topic in this respect. Our own disappointment at political failures or at the complacency of the majority can lead us to denigrate the first 'baby steps' that other people take. Look at the difference between three possible responses in a tea-break conversation at work. Maria says: "I'm concerned about climate change too – I always do

the recycling properly." Which of Tod's replies is most likely to encourage Maria to do something more?

1) "Well that's not exactly going to save the planet, is it?"
2) "That's a great first step – what else are you planning on?"
3) "That's good – how did you get the family on board?"

In the first response, Tod speaks from his irritation at Maria's complacent belief that doing her recycling is enough. In the second, he praises her but immediately makes it clear that he thinks what she's done is inadequate. In the third, he praises her and asks her to tell him more, an approach that is likely to open up the conversation, put her in touch with her abilities to organise her family and give him some clues about what else he could suggest to her.

Supporting other people in this way comes from a state of mind that is not always easy to achieve. It's dependent on a degree of hope and faith in other people's good will and on being able to keep your own anxiety and anger in check. Don't be surprised if you don't always manage this. Do think about the circumstances that make it easier to achieve. Choosing when and where you talk about climate change can help.

Pick your time and place

Climate change and carbon reduction often come up at times and in places that make the conversation hard. People often report feeling that they are on the back foot as the norms of the conversation restrict what it is acceptable to say. Socially, many issues are framed in ways that assume that climate change has no connection to them. For example, it's common to see tax as a burden rather than as a necessary policy to help deal with climate change. Similarly, driving a car is assumed to be a right rather than an environmental problem. Look at the examples below. The dominant assumption or framing is in brackets at the end of each one.

1) The meeting room was hot and my boss told me to open the windows; I didn't feel I could scrabble around looking for the heating controls. (The most important thing is to get on with the meeting.)
2) Everyone else in the pub was happy that green taxes are being removed from fuel bills. I wanted to disagree but I knew I was on a hiding to nothing. (Tax is a burden, you're a mug if you want to pay it.)
3) My dad announced over Christmas dinner that he was inviting (and paying for) the whole family to join him in Goa to celebrate his sixtieth. (The most important thing is family: you're disloyal and ungrateful if you don't come.)
4) My friend asked me to sign a petition against congestion charging. (Driving a car wherever you want to is a right, tax is a burden.)
5) My cousins showed me the bargain clothes they'd bought from a discount shop and expected me to congratulate them on their smart shopping. (Price is the most important aspect of any purchase.)

In situations like these you need to decide if this is a moment to stay quiet, assert yourself mildly or assert yourself strongly. Asserting yourself can be hard as you're driving against the flow of the conversation. If you think back to the levels of a conversation that we talked about earlier, you need to pay attention to both the agenda and the perceptions of the people taking part. Is your agenda of talking about climate change compatible with other people's agendas of (say) running an efficient meeting or getting uproariously drunk? If you assert your agenda, how will you be perceived? Will you be seen as a welcome messenger, as the meeting's time waster or the party's killjoy? Strategy matters. Are you likely to get a good outcome by raising the subject? If not, you may do better to stay quiet for the time being.

Often you will do better if you can pick your own time and place for a conversation. Frame what you want to say positively, in a way that you think will appeal to the other person. Think about:

- Who do you want to talk to - everyone in the family/work-team/group of friends, or just one or two people?
- What kind of outcome are you looking for? Do you want your viewpoint acknowledged? For the other person to show interest? Or are you looking for a promise of change on their part? Weigh up what is realistic.
- When is likely to be a good time? Avoid rushed situations when people are tired or distracted. Try to make it a pleasant occasion. Make sure you listen.

In the first example above, the person did as her boss instructed. She didn't want to run the risk of annoying him or shaming him in a tense meeting. Later, she contacted the Facilities Manager to find out where the heating controls were and then had a quiet word with her boss about how to turn the heating down if the situation recurred. In the last example, the person admired the clothes her cousins had bought but then, in a lull in the conversation, explained how she had been thinking recently about the impact of the clothes she herself bought and had decided to change her shopping habits. One cousin shrugged and said "Whatever…" but the other one was more interested and they managed a short conversation about it.

In both these examples the person managed to take control of the agenda of the conversation and manage the perceptions the other person was likely to have of them. Keep your expectations realistic as well. Most people hate to lose face and prefer to make up their own minds. They may not shift their position through one conversation but if you have listened as well as spoken, treated them with empathy and respect and supported them in their good intentions, you will probably have made a difference.

Your own needs

People vary in how much they like to talk about issues that are troubling them. We all have our own ways of dealing with upset and anxiety. These often have their roots in childhood. Were you a child who actively sought comfort from others? Or one who retreated to their room and cried alone? Do you come from the tradition of the stiff upper lip? Or did your family prefer to talk through difficulties? Do you like to get on and solve a problem by yourself or are you someone who can't get started till you're sure of the support of others?

Climate change produces strong feelings. You may be anxious about what the future holds for you or your children. You may be ashamed of living in a culture that pays so little attention to such an important issue. You may feel guilty about everyday actions that you haven't managed to change. You may be angry at politicians for their inaction. You may despair of humanity ever getting its act together. The process of trying to live a low-carbon life produces another set of strong feelings. People often feel grief, anger, frustration and sadness as they struggle to make changes that are difficult for them. Some people are eager to talk about these feelings and feel better for doing so but we don't all seek support in the same way. Which of these examples is most like you?

Emma comes from a family where talking was the norm. She finds it easy to share her feelings with her partner Jenny. When they meet up in the evening they tend to ask how the other's day has gone and it feels quite natural if climate change comes into the conversation, along with their feelings about it.

John is a rather bluff, practical man who looks for his wife **Carol**'s support in the form of praise for his achievements and quiet agreement when he's in a mood of anger or despair. He needs her to admire his eco-renovations and if he rails at the TV when a climate change denier comes on, this is not an invitation to a political discussion but a request for simple agreement. Carol is not a great talker either. She gains comfort from her connectedness to the natural world and finds that spending time quietly in her garden is the best form of support she knows. She has one friend who she turns to if something is really troubling her but she finds it difficult to express herself in words and is anxious about wasting someone else's time.

Matt's political activity is his main forum for discussing climate change. The conversations tend to be about campaigning and strategy and ignore people's reasons for being part of the group. He has introduced the idea of spending a short part of each meeting checking in on how people are feeling about the issues they are facing. This has increased the group's willingness to offer more personal support to each other.

Dan's religious beliefs are the touchstone for what he does in all aspects of life. Connecting climate change to his other spiritual and ethical concerns grounds him. His main source of support is regular discussions with other church members.

The need for hope

The question of hope often comes up amongst people who are deeply involved in climate change. How can we keep hope alive? How can we protect ourselves from despair? Hope needs to be realistic. False optimism helps no-one. During the struggle against fascism in 1920s Italy, the Italian socialist Antonio Gramsci coined the famous phrase 'Pessimism of the intellect, optimism of the will'[127] which appeared on the masthead of his newspaper, *L'Ordine Nuovo*. He meant that one should always look at the difficult truth, refuse illusion and yet still find the determination to fight for what one believes to be right and just.

Contemporary activist Shaun Chamberlin coined the phrase 'dark optimism' for the way he feels, describing it as:

> "…a way of seeing life which is not afraid of seeking the truth - even when that truth is unpalatable or feels overwhelming. By exploring the unknown we can see it for what it is, rather than what we might fear it to be. Where there is darkness present we face it with an indomitable belief in the potential of humankind."[128]

Buddhist writers Joanna Macy and Chris Johnstone titled their book *Active Hope,*[129] expressing their view that hope is a practice or an act of doing rather than a belief or a state of mind. However you think of it, it is important to find some way of acknowledging the real difficulties we face and keeping realistic hope alive. These are some of the things people have told us about how they manage this:

- "I accept that this isn't something to think about all the time, I allow myself to compartmentalise it, put it somewhere manageable."

- "Spending time in nature helps me. It gives me a quite different perspective."

- "I surround myself with people who feel the same way as I do, so I have a sense of companionship and solidarity."

- "Seeing the creativity that goes into low-carbon technologies cheers and encourages me."

- "Humour helps – being able to laugh, not necessarily about climate change but about anything."

- "I treasure all the ordinary things of life, like a meal with friends, a family birthday or a sunny day."

Managing despair

Sometimes talking seems to bring you down. Sometimes you find yourself blaming good friends or winding up your family

in the ways that only close relatives can. Sometimes you catch yourself in a punitive mood. You stamp on someone's naïve optimism. You're grudging about the good work someone has done. You demand the impossible from the people you love. Feelings of despair and impotence often lie behind such experiences. They can also indicate burn-out or at any rate the need for a break from campaigning and organising. It's essential to keep a sense of proportion. In a world where many do little and the few do a lot, it is easy to feel the weight of the future bearing heavily on you.

Try not to punish yourself or others. Look for the real sources of pleasure in life. This might be time spent with family, time spent outdoors or time spent on an old hobby or much loved pursuit. Remember that one reason for acting on climate change is to preserve what matters in life to you. If you are able to balance your commitment with a life that is fruitful in other ways you will not only have a better time yourself but be a better role model for others.

Sources of support

Think about how you find support and whom you usually turn to. Think about whether your concerns about climate change can be shared as openly as you wish with the people you usually share your problems with. If no-one ever listens to you, appreciates you or gives you support in your attempts to live appropriately with climate change you will find life difficult. If support doesn't exist amongst your immediate circle, then start looking more widely. Think of joining a group who are actively working on some aspect of climate change. Try attending meetings or lectures on the subject. Look for online discussion groups. There's someone out there who will appreciate your support and can offer the same to you!

Lessons from cognitive approaches

So far we have concentrated on the emotional experience of talking about climate change and the way it affects our relationships with people we care about or work with. A lot of research has been done on the more cognitive and behavioural aspects of people's responses to climate change. These approaches concentrate on people's ideas, attitudes and behaviour, rather than on their emotions, relationships and social connections. Most of this work is aimed at understanding how big communication campaigns should approach the issue, but you may find some of it useful at the smaller scale of family, friends and colleagues as well. Which appeals make people sit up and think? What approaches make them change their behaviour? Does the language we use make a difference? Should we appeal to people's self-interest or to their deeper values? Do different sections of the population respond in different ways? Here we summarise the conclusions we have drawn from our readings of it.

Information is not enough

As we mentioned earlier, people screen out information they think doesn't apply to them. Don't lecture people or thrust leaflets in their hands. Try to create a setting where people can be interested and are willing to listen. Beware also of the paradox where some people confuse having accepted a fact as true with doing something about it. It is easy to feel that if you are concerned about something you have also done something.[130]

People make snap judgments

Most people try to fit new facts to their existing views rather than altering their views because of new information. We use rules of thumb and gut feelings to help us make up our minds. This means that it will help to think about how the facts of climate change fit with someone's existing attitudes. If you're talking to a business audience you are more likely to get a hearing if you dress in a way that accords with their expectations of a serious speaker and present your arguments in frameworks they are used to. The same goes for any other audience too. Craft your presentation so that it appeals to the particular people you are talking to.[131]

Trusted messengers

'Trusted messengers' are more likely to get a hearing. People are more likely to listen to people who are already trusted leaders in their communities. Trade unionists are more likely to pay attention to a trade union leader, church members to their priest, university students to a fellow student and so on.[132]

Adapt to your audience

Tailoring what you say to your audience helps. Not everyone responds to the same type of message. Speaking the language of your audience and framing what you say in terms that interest them will help. There are a lot of different ways of dividing up the population from theories that focus on class or cultural identity to approaches such as social marketing, that work out how to sell carbon reduction to different audience segments.[133]

Climate change feels distant

It's easy for climate change to feel distant and unconnected to ordinary life. Most people's time horizons don't extend much beyond the next few years and they find it hard to be concerned about events that may be 30 years in the future. It can be just as hard to feel concerned for long about people you will never meet in places you have never seen.[134] Try to make connections to people's actual experiences. Gardeners and outdoor types may be aware of weather patterns changing. People with relatives overseas may know a lot about droughts, floods and storms in other countries. Parents may be thoughtful about their children's future.

The value-action gap

There are always gaps between people's values and their actions or between their attitudes and their behaviour[135]. We are all creatures of conflict and our best intentions often come to naught in the face of our own desires and social systems that make it hard for individuals to change on their own. You'll do yourself no favours by gleefully pointing out someone else's inconsistencies. Try to explore the conflicts people experience. Open up a conversation about the difficulties.

Money-saving appeals are counter-productive

Money-saving appeals and appeals to self-interest don't work in the long-term. You may get some short-term gains by telling people that carbon reduction saves money. The trouble is that many of the actions people need to take will cost money or demand a serious change in their lifestyle. If people are encouraged to act solely from self-interest, many people will not consider the deeper changes that are needed.[136]

Values matter

Strengthening people's intrinsic values such as their concern for others and for 'bigger than self' issues, their care for nature and their desires for fairness will help create the climate for social action and political change that is needed.[137]

Small steps don't automatically lead to big ones

People hope that there is a virtuous escalator that will carry you from small steps to big ones. There isn't.[138] If all you ask of someone is a small step they will often do as requested but feel virtuous and stop right there. You need to frame the small step as the first on a big journey.

Framing matters

Frames are unconscious structures in our minds - bundles of words, thoughts and feelings - that shape how we see the world. The way an issue is framed will dictate how we see it. If climate change is framed as an environmental issue it will be seen as a minority concern. If wind turbines can be framed as eyesores the public will easily reject them. If action on climate change is seen as 'helping the environment' it will be seen as optional. Changing the way an issue is framed can be difficult but it is worth thinking carefully about how language can make you fall into unexpected traps.[139]

Speaking personally helps

The story of your journey may inspire others. Understanding your motivation may help others share your concerns. Speaking from the heart is more appealing than a list of numbers or a screen full of graphs.[140]

Frightening people doesn't help

Stories of disaster make people shut down. Although their interest is raised in the short term, so is their anxiety and they quickly put their defences back in place. Sometimes the response to fear is to ignore the subject altogether but fear can also lead people to pursue illusory solutions.[141]

Use stories

Stories, practical examples and a positive message all help.[142] People like to be entertained. We learn through stories and examples as much as through facts and figures. Stories make the dry facts personal and help people identify with an issue. A story doesn't have to be long - some of the best stories are over in a couple of sentences. Practical examples can inspire, make the issue concrete and graspable, and help people see that there is something positive that they can do. Although your overall message may be serious, people also need to feel a sense of realistic hope.

Rules of thumb

Listen

Empathise, accept, offer support, don't judge.

Speak from the heart

Express what you feel, notice your own responses, reflect.

Understand ambivalence

Accept that we all have mixed feelings and struggle with our inner conflicts.

Roll with the resistance

Focus on feelings and find a new angle if you hit a brick wall.

Don't expect instant change

Work through the complex feelings so that change becomes permanent.

Nourish your creativity

Take care of yourself and seek support.

🔖 Frequently asked questions: talking with friends, family and colleagues

Other people aren't empathic towards me, why should I empathise with them?

It's tough if others are always cold or critical. It's possible that they are being defensive. They may be protecting themselves from feeling exposed. They may be scapegoating you. Recognise the resistance and back off for a time. Remember that you don't have to like everyone and that not everyone will deserve your best empathic response!

When I try to understand other people's points of view, they assume I'm agreeing with them. Surely we need to argue our case?

There's a difference between being a doormat, having a pointless, angry argument and enjoying an assertive exchange of views. Sometimes when people are struggling to avoid an unpleasant row they back down and end up feeling like the doormat. There will be times when you want to make it clear that although you've been interested to hear what someone else thinks, you wish to disagree. Before reaching that point it can be helpful to explore with the other person why they think what they do, what has influenced them and how they have arrived at their point of view.

Surely people need to know that we're facing catastrophe?

It's true that there are many worrying and depressing aspects of the future we face. However a morbid fascination with disaster doesn't help if you are trying to get persuade others. Sometimes people are attracted to ideas of catastrophe because they are frightened themselves: passing that fear onto others is a way of trying to deal with the fear. Sometimes people are so angry at what is happening to the world that catastrophe feels like a just punishment: frightening others with the possibility of disaster becomes a form of revenge. Ask yourself why you are attracted to the idea of disaster. Research tells us that these stories don't lead to engagement and that there are better ways of trying to involve people.[143]

Information changed my mind. Why do you say it doesn't change other people's?

All of us forget the times when information passed us by or we dismissed it as irrelevant. We don't remember the occasions when we got up to make the tea when climate change came on the news or picked up a leaflet and put it straight in the bin. The information only made sense to you at a point when you were ready to absorb it. Think about what created that moment for you. Information is important only when people are ready for it.

Most of my difficult conversations just arrive. I feel I don't have much control over them. What do you suggest?

Try to balance these occasions with ones that you create yourself. If you'd like to talk to someone about climate change, think about making the time and space to do so on your own terms. Decide what would be a realistic outcome for you. Prepare what you want to say. Think what you would like to hear about from the other person. Listen well. Keep the first conversation short unless they clearly want to continue. Meanwhile, have some prepared responses for those difficult times when you've been ambushed. Some people find they can use humour to deflect the conversation. Some turn attention to the tactics of the other person, for example, "You love to wind me up, don't you?" This sometimes has the effect of disarming the other person and allowing a change of subject. Some people risk a direct challenge such as, "I think you're using this to get at me about other things you're cross about." Work out how to withdraw from conversations that don't seem to be going anywhere.

Don't we just need to get on with things instead of talking all the time?

We need to do both. Not enough people - only 14.5% - are 'getting on with things'.[144] Most are avoiding any real engagement. You may be surprised to find how many people share your concerns but feel too powerless, hopeless or disillusioned to do anything. Talking with them about how they feel is often the first step towards action.

People ignore me to my face, then three months later I find them lecturing me on the urgency of climate change or the benefits of personal action. What's going on?

Most people don't change overnight. You have probably been part of a gradual process in which your friends shifted their attitudes. Many people find it humiliating to admit that someone else helped to change their mind. Most people like to think that they have arrived at their point of view independently. Be flattered. Treat their change of view with good nature and humour.

Don't we need more good news stories?

We need to distinguish between realistic, inspiring examples and illusory, utopian daydreams. We certainly need the former. Think critically about the value of the good news stories and projects you hear about. Are they genuinely good examples or greenwash? Real solutions or daydreams? Widely applicable or minority pursuits? Grab the former and talk about them wherever you can.

Shouldn't we be teaching children? It's their future and they're the ones who will have to make the big changes.

Each generation seems to hope that the next one will solve the problems they have failed to address. It's easy to get primary school kids to identify with endangered species and help with the recycling but this rarely lasts into their teenage years. It's also very easy to make children feel anxious about an issue like climate change. Children have very little power or control. They can't dictate where they go on holiday, what they eat, how their homes are heated or what fashions will make them feel acceptable to their friends. Even more than adults, children need to feel safe if you are addressing a difficult subject like climate change. Most talks given to schools take little account of this and children can end up feeling alarmed and fearful. A more positive approach is to develop children's interest in the natural world and offer them plenty of enjoyable experiences that can act as an antidote to our high consumption culture and give them the skills to deal with an uncertain future. Research suggests that people who spent time playing freely outdoors as children tend to have a deeper sense of connection to the natural world and more pro-environmental attitudes.[145]

Don't we need a spiritual re-engagement with the natural world?

Some writers on eco-psychology emphasise the idea of spiritual re-engagement with nature.[146] Spiritual connections are important for some people but not for everyone. The major faiths all have views on the relationship of people to the natural world and people with religious faith frequently find support through their religious practices. For other people spirituality and religion are turn-offs. Do what feels right for you but don't try to impose your spiritual or religious beliefs on others - it's unlikely to help.

Conclusion

Whatever route you take in dealing with climate change we hope this book has helped you feel confident that your voice and your contribution matter, individually, collectively and politically. Psychologically, we all need to find the place that Al Gore once described as lying 'between denial and despair'.[147] We need to cope with the human tendency to split off, repress and ignore painful realities. We also need to avoid the black pit of despair that can come from facing the truth, but which leads to apathy, cynicism and defeat. This is not always easy, but we hope this book and your Carbon Conversations group encourages you to think that it is possible and given you some tools for the task.

Notes

[1] When this individualism took root is a matter of debate. Most recently, many people connect it to globalisation and the economic and political changes initiated in the 1980s by Margaret Thatcher in the UK and Ronald Reagan in the US which swept away the post-war consensus about collective provision and the positive role of the state. Sociologists like Zygmunt Bauman in his book *Liquid Modernity* (Polity Press 2000) or Anthony Giddens in *Modernity and Self-Identity* (Polity Press 1991) relate it to broad trends in the post-war world which removed old certainties about the relationship between individuals and society. Others, for example eco-feminists like Carolyn Merchant in Earthcare: Women and the Environment (Routledge, 1996) go back further and relate it to what they see as the hubris of the scientific revolution, which underpinned industrialisation, and saw the earth as a resource to be exploited for human gain.

[2] There are elements of experiential learning, deliberative dialogue, therapeutic group work and psycho-education in the thinking behind Carbon Conversations groups. See the *Facilitator's Guide to Running Carbon Conversations Groups*, Rosemary Randall, available at www.carbonconversations.co.uk.

[3] See, for example, Stokes, Bruce, Wike, Richard and Carle Jill (2015) *Global Concern about Climate Change.* The Pew Centre, http://www.pewglobal.org/2015/11/05/global-concern-about-climate-change-broad-support-for-limiting-emissions/ which documents world-wide concern.

[4] The facts about climate change in this section are taken from the IPCC's 5th Assessment reports, *Climate Change 2013: the Physical Science Basis: Summary for Policy Makers,* http://bit.ly/IPCC-2013, and from *Real Climate*, http://www.realclimate.org/. A good introduction to the science can be found in *The No-Nonsense Guide to Climate Change*, Danny Chivers, New Internationalist Publications, 2011. *Weather Reports from the Future*, a series of short videos from the World Meteorological Organisation gives a graphic picture of what the weather may be like in 2050, http://public.wmo.int/en/resources/weather-reports-from-future .

[5] In general in this book we refer to CO_2 but use CO_2e when other greenhouse gases are also involved.

[6] Temperature data: HADCRUTv3, http://bit.ly/hadcrut3; 'Uncertainty Estimates in Regional and Global Observed Temperature Changes: a New Dataset from 1850.' P. Brohan et al, Journal of Geophysical Research 111, D12106, 2006. CO2 data: Mauna Loa (1959-2009), http://bit.ly/maunaL; Law Dome Ice Core http://bit.ly/icecore

[7] For details of an 8% target and how it could be achieved, see the *Radical Emissions Reduction Conference Abstracts*, Tyndall Centre for Climate Change Research, 2013, http://bit.ly/tyndallreduct

[8] 'Planetary Boundaries: Exploring the Safe Operating Space for Humanity,' J.W. Rockstrom et al, *Ecology and Society* 14(2): 32, 2009, http://bit.ly/Rockstorm-2009

[9] *A Safe and Just Space for Humanity: Can we Live within the Doughnut?* Kate Raworth, Oxfam, 2012, http://bit.ly/Raworth-2012, and Kate Raworth's website, www.kateraworth.com

10 Stokes, Bruce, Wike, Richard and Carle Jill (2015) *Public Support for Action on Climate Change*. Pew Centre. http://www.pewglobal.org/2015/11/05/2-public-support-for-action-on-climate-change/

[11] World Meteorological Organisation (2015) *Greenhouse Gas Bulletin*. WMO. http://public.wmo.int/en/media/press-release/greenhouse-gas-concentrations-hit-yet-another-record

[12] See *Energy Use in the New Millennium: Trends in IEA Countries*, International Energy Agency, 2007, http://bit.ly/iea-energyuse

[13] Information about conflict minerals: *Raise Hope for Congo,* http://bit.ly/congo-minerals. Information about the cotton industry and the drying of the Aral Sea: *Environmental Justice Foundation,* http://bit.ly/EJF-Cotton-Water.This article from the *Independent* provides a brief account of China's air pollution problems, http://bit.ly/Independent-China.

[14] See A New Climate for Psychotherapy', Rosemary Randall, *Psychotherapy and Politics International,* Issue 3:3, John Wiley 2005, http://bit.ly/randall-2005, and 'The Difficult Problem of Anxiety', Sally Weintrobe in *Engaging with Climate Change: Psychoanalytic and Interdisciplinary Perspectives*, edited by Sally Weintrobe, Routledge, 2013.

[15] The differences depend on how you calculate imports and exports and whether land-use, deforestation and other greenhouse gases are included or not. There is a good discussion of the issues in *How Bad are Bananas? The Carbon Footprint of Everything*, Mike Berners-Lee, Profile books, 2010. Figures for individual countries are published by the US Energy Information Administration: http://bit.ly/eia-energystats, and you will find a brief, readable discussion of the issues about imports in *Carbon Emission Accounting - Balancing the Books for the UK,* UKERC Energy Insight Briefing Paper, 2012, http://bit.ly/ukerc-2012.

[16] These issues are discussed in *Environment: Treading Lightly on the Earth*, a free module from the Open University, 2010, http://bit.ly/open-environment

[17] *Techno-Fixes: a Critical Guide to Climate Change Technologies*, Corporate Watch, 2008, http://bit.ly/corporate-tech, remains a good introduction to the technologies and their political implications. *Earthmasters: the Dawn of the Age of Climate Engineering*, Clive Hamilton, Yale University Press, 2013, focuses specifically on the problems of geo-engineering. For a defence of the 'technology will save us' argument, see *The God Species: How the Planet can Survive the Age of Humans*, Mark Lynas, Fourth Esate, 2011

[18] See pp 157-9 *in Heat: How we can Stop the Planet Burning*, George Monbiot, Penguin Books, 2007 and *Fuelling Hunger,* a 2013 report from Action Aid, http://bit.ly/actionaid-hunger. The problems created by using biofuels in power stations are well explained in a Guardian article *The Campaign Against Drax Aims to Reveal the Perverse Effects of Biofuels,* Charles Eisenstein, The Guardian, April 2014, http://bit.ly/eisenstein-2014

[19] The various policy options are well described and discussed in *Kyoto 2: How to Manage the Global Greenhouse*, Oliver Tickell, Zed Books, 2008

[20] *A Green New Deal*, Andrew Simms et al, New Economics Foundation, 2008

[21] *Climate Change 2013 the Physical Science Basis: Summary for Policy Makers*, IPCC 2013, http://bit.ly/CC2013-summary

[22] Aubrey Meyer's idea of 'Contraction and Convergence' describes how countries could gradually arrive at a fair allocation of carbon emissions: *Contraction and Convergence: the Global Solution to Climate Change*, Aubrey Meyer, Green Books, 2001

[23] See the critical report from Sandbag who are supporters of carbon trading: *Drifting towards Disaster: the ETS Adrift in Europe's Climate Efforts*, Damien Morris, Sandbag 2013, http://bit.ly/sandbag-disaster.

[24] Energy and the Common Purpose: Descending the Energy Staircase with Tradable Energy Quotas, David Fleming, The Lean Economy Connection, 2007, http://www.teqs.net/ and A Persuasive Climate: Personal Trading and Changing Lifestyles, Matt Prescott, RSA, 2008, http://bit.ly/prescott-2008.

[25] This idea is promoted by schemes like TEEB (The Economics of Eco-systems and Biodiversity), http://www.teebweb.org/, and REDD (Reducing Emissions from Deforestation and forest Degradation), the UN's controversial scheme to reward forest owners in the Global South for not cutting their forests down. Closer to home there is a good discussion of the issues in *Placing a Monetary Value on Ecosystem Services*, Chartered Institution of Water and Environment Management, 2012, http://bit.ly/value-ecosystem.

[26] *Mapping Rebound Effects from Sustainable Behaviours: Key Concepts and Literature Review,* Steve Sorrell, Sustainable Lifestyles Research Group Working Paper 01-10, 2012 and *The Burning Question*, Mike Berners-Lee and Duncan Clark, Profile Books, 2013.

[27] The idea that economic growth could continue forever in a world of finite resources was challenged in *Steady State Economics* by Herman Daly, Earthscan, 1977, and has since been developed by many other people, including the New Economics Foundation whose website is a good source of information about the writers and thinkers in this field. *http://www.neweconomics.org/our-work*. See also Naomi Klein's book *This Changes Everything*, Allen Lane, 2014, which offers an impassioned and convincing argument for de-growth and major political change.

[28] A Safe and Just Space for Humanity: Can we Live within the Doughnut? Kate Raworth, op cit.

[29] *The Genuine Progress Indicator 2006: A Tool for Sustainable Development,* John Talberth et al, Redefining Progress, 2006, http://bit.ly/Talberth-2006, See 'Beyond GDP: Measuring and achieving global genuine progress', Ida Kubiszewski et al, *Ecological Economics* 93 57-68, 2013, http://bit.ly/Kubiszewski-2013 for details about a number of different countries.

[30] Graph adapted from 'Beyond GDP: Measuring and achieving global genuine progress', Ida Kubiszewski et al, *Ecological Economics* 93 57-68, 2013.

[31] *The Song of the Earth*, Jonathan Bate, Picador, 2000 for a discussion of our longing to live in harmony with nature, explored through poetry and literature

[32] *Climate Futures: Responses to Climate Change in 2030,* Forum for the Future, 2008, http://bit.ly/CC-Futures

[33] *Climate Change 2013 the Physical Science Basis: Summary for Policy Makers*, IPCC 2013, http://bit.ly/CC2013-summary

[34] 'Tropical Cyclones and Climate Change', Thomas R. Knutson et al, *Nature Geoscience,* 3, 157-163, 2010, http://bit.ly/knutson_2010

[35] *Global Warming may have Fuelled Somali Drought,* Jason Straziuso, Phys.Org, 2010, http://bit.ly/Straziuso-2010

[36] *Sharing Nature's Interest: Ecological Footprints as an Indicator of Sustainability*, Nicky Chambers et al, Earthscan, 2000. See http://www.bbc.co.uk/news/magazine-33133712 for a quick summary.

[37] *The Burning Question*, Mike Berners-Lee and Duncan Clark, Profile Books, 2013, p. 32

[38] A Safe and Just Space for Humanity: Can We Live within the Doughnut? op cit.

[39] *Myth Buster,* the UK Climate Change and Migration Coalition, COIN 2013, http://bit.ly/COIN-2013

[40] United Nations Population Fund, http://bit.ly/1p8EVlA, or Hans Rosling's TED Talk, http://bit.ly/TED-Rosling

[41] Web of Power: the UK Government and the Energy-Finance Complex Fuelling Climate Change, World Development Movement, 2013; Dealing in Doubt: The Climate Denial Machine vs Climate Science, Greenpeace, 2013, http://bit.ly/Greenpeace-2013; Merchants of Doubt, Naomi Oreskes and Erik M. Conway, Bloomsbury, 2010.

[42] The UK, for example, appears to have reduced its carbon emissions by closing much of its heavy industry and instead importing steel and other finished goods from overseas, particularly from China. When these imports are taken account of the reductions in UK carbon emissions are seen to be less significant.

[43] 'Turning Lights into Flights Estimating Direct and Indirect Rebound Effects for UK Households', Mona Chitnis et al, *Energy Policy 55 (2013) 234–250.*

[44] 'Missing Carbon Reductions? Exploring Rebound and Backfire Effects in UK Households', Angela Druckman et al 2011, *Energy Policy* 39, 3572–3581. See also *The Burning Question,* Mike Berners-Lee and Duncan Clark, Duncan, Profile Books, 2013.

[45] *Econometric Modelling and Household Food Waste*, Erik Brittton et al, WRAP, 2013, http://bit.ly/Brittton-2013.

[46] See *Comfort, Cleanliness and Convenience*, Elizabeth Shove, Berg, 2003.

[47] For UK figures see *Families and Households 2012*, Office of National Statistics, 2013, http://bit.ly/national-stats. For comparable US figures see http://www.census.gov/hhes/families/files/graphics/HH-6.pdf

[48] *Understanding Home Owners' Renovation Decisions: Findings of the VERD project*, Charlie Wilson et al, UKERC, 2013, http://bit.ly/Wilson-2013.

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[49] PassivHaus buildings provide high levels of comfort with very low energy use. There are different schemes for new-build and retrofitted buildings. The PassivHaus Trust provides training in its exacting standards, http://www.passivhaustrust.org.uk/.

[50] Berners-Lee, 2010, op cit, quoting DEFRA's Market Transformation Project

[51] Figures from Australian Bureau of Statistics http://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/3412.0Media%20Release12014-15, and Brookings Institute http://www.brookings.edu/blogs/brookings-now/posts/2013/09/what-percentage-us-population-foreign-born

[52] 5.5 million British people live permanently overseas and another 500,000 live overseas some of the time, mainly through second home ownership. *Brits Abroad: Mapping the Scale of British Emigration*, Dhananjayn Sriskandarajah, and Catherine Drew, London, IPPR, 2006, http://bit.ly/Drew-2006.

[53] *Commuting and Personal Well-being 2014*, Office of National Statistics, 2014, http://bit.ly/commuting-stats.

[54] Although the EU has guidelines on sustainability and the use of biofuels, many people think that these do not go far enough. *Broken Biofuel Policies Still Driving Rainforest Destruction*, Greenpeace, 2010, http://bit.ly/greenpeace_biofuel.

[55] For more discussion of the pros and cons of electric vehicles, see *Sustainability without the Hot Air*, David Mackay, UIT, 2009, http://www.withouthotair.com/; and *Zero Carbon Britain: Rethinking the Future*, Centre for Alternative Technology, 2013.

[56] *Car Dependency Scorecard 2011,* Campaign for Better Transport, http://bit.ly/bettertrans-2011, and *Car Dependency Scorecard 2012* Campaign for Better Transport, http://bit.ly/bettertrans-2012.

[57] European Environment Agency http://www.eea.europa.eu/articles/reducing-speed-limits-on-motorways

[58] Car Sick: Solutions for Our Car-Addicted Culture, Lynn Sloman, Green Books, 2006.

[59] For a discussion of aviation policy, see *Aviation and Climate Change Policy in the UK*, Peter Lockley, Airport Watch, 2011, http://bit.ly/Lockley-2011.

[60] Our imaginary future owes a lot to the analysis in *Zero Carbon Britain: Rethinking the Future*, Centre for Alternative Technology, 2013. The ideas about coach travel are Alan Storkey's and can be found in his 2005 paper *A Motorway Based National Coach System,* www.alanstorkey.com, and are also described in *Heat: How We Can Stop the Planet Burning,* George Monbiot, Penguin, 2006.

[61] *Busting the 21 Days Habit Formation Myth*, Ben D. Gardner, University College London, 2011, http://bit.ly/Gardner-2011.

[62] For an amusing view of offsetting view the short film *Cheat Neutral,* http://www.cheatneutral.com/.

[63] *The Final Call: Investigating Who Really Pays for Our Holidays*, Leo Hickman, Guardian Books, 2008 and *The No-Nonsense Guide to Tourism,* Pamela Nowick, New Internationalist Publications Ltd, 2007.

[64] *Quick Hits: Limiting Speed*, UKERC, 2006, describes how speed reductions could save significant amounts of carbon emissions, http://bit.ly/quickhit-2006. See also *Controlled Motorways*, The Highways Agency, http://bit.ly/gov-speed, and *Fox Traffic Simulation* http://bit.ly/traffic-sim.

[65] *Crop Production in a Changing Climate*, UNEP, 2006, http://bit.ly/unep-2006.

[66] The IPCC estimates climate change will reduce average crop yields by between zero and two per cent per decade for the rest of the century, at the same time as demand increases by about 14 per cent per decade. *Climate Change 2014: Impacts, Adaptation and Vulnerability. Part A Global and Sectoral Aspects, Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Field et al, Cambridge University Press, 2014, http://bit.ly/Field-2014.

[67] 'Dietary Greenhouse Gas Emissions of Meat-Eaters, Fish-Eaters, Vegetarians and Vegans in the UK', Peter Scarborough et al, *Climatic Change*, 125:179–192, 2014, http://bit.ly/Scarborough-2014.

[68] See http://www.eaternity.org/meals/

[69] *Product Carbon Footprint Summary,* Tesco, 2012, http://bit.ly/tesco-carbonprint.

[70] The role of fast food is clearly explained in Eric Schlosser and Charles Wilson's *Chew on This: Everything You Don't Want to Know about Fast Food*, Puffin 2006. See *Shopped*, Joanna Blythman, Harper Perennial, 2007 and *Tescopoly: How One Shop Came Out on Top and Why it Matters,* Andrew Simms, Constable, 2007 for discussion of how the supermarkets control large parts of the food chain and the wider economy. For an analysis of the environmental burden of UK patterns of food consumption on other areas of the world see, *Environmental Impacts of the UK Food Economy with Particular Reference to WWF Priority Places and the North-East Atlantic,* World Wildlife Fund, 2008, Donal Murphy-Bokern.

[71] The workings of the food system are well outlined in *Eat Your Heart Out: Why the Food Business is Bad for the Planet and Your Health*, Felicity Lawrence, Penguin 2008. For discussion of the global problems see *Stuffed and Starved: Markets, Power and the Hidden Battle for the Worlds' Food System*, Raj Patel, Portobello 2008 and the chapter on food in *The Poverty of Capitalism: Economic Meltdown and the Struggle for what Comes Next*, John Hilary, Pluto Press, 2013. For a discussion of food sovereignty see La Via Campesina, http://viacampesina.org, or *Food is Different: Why We Must Get the WTO Out of Agriculture*, Peter M Rosset, Zed Books, 2006.

[72] Tara Garnett, Cooking up a Storm: Food, Greenhouse Gas Emissions and Our Changing Climate, University of Surrey, Food Climate Research Network, 2008.

[73] *Livestock's Long Shadow: Environmental Issues and Options*, H. Steinfeld et al, FAO, 2006, http://bit.ly/Steinfield-2006.

[74] 'Trends and seasonal cycles in the isotopic composition of nitrous oxide since 1940', S.Park et al, *Nature Geoscience* 5, (2012) 261–265, http://bit.ly/Park-2012.

[75] Over a 100 year period one tonne of methane has the same effect as 25 tonnes of carbon dioxide. The Guardian's *Ultimate Climate Change FAQ* has a good explanation, http://bit.ly/guardian-cc.

[76] Figures on relative proportions of greenhouse gases in agriculture, *Zero Carbon Britain: Rethinking the Future*, Paul Allen et al., CAT Publications, 2013, pp 84-85, quoting DECC figures.

[77] *Wise Moves: Exploring the Relationship between Food, Transport and CO_2*, Tara Garnett, Transport 2000 Trust, 2003, http://bit.ly/Garnett-2003.

[78] Garnett, 2008, op cit p.38. Garnett also suggests that the UK cold chain is responsible for 15% of total food chain emissions but this includes home refrigeration which we include in our calculations for home energy.

[79] *Recycling of Plastics*, Sue Jackson and T. Bertenyi, ImpEE Project, University of Cambridge, 2006, http://bit.ly/Jackson-2006 and *How Bad are Bananas*, Mike Berners-Lee, Profile, 2010, p. 180.

[80] Pyramid based on *Double Pyramid 2012:* Enabling Sustainable Food *Choices*, The Barilla Centre for Food and Nutrition, 2012, http://bit.ly/Pyramid-2013.

[81] Virtual Water: Tackling the Threat to our Planet's Most Precious Resource Tony Allan, I.B. Taurus, 2011.

[82] 783 million people do not have access to clean water and almost 2.5 billion do not have access to adequate sanitation. United Nations International Year of Water Cooperation, http://bit.ly/UN-water.

[83] Figures variously from: *Virtual Water* (Allan op cit); *Global Food: Waste Not, Want Not,* Tim Fox, Institution of Mechanical Engineers, 2013, (food and petrol), http://bit.ly/global-foodreport; *Water: Use Less, Save More,* Jon Clift and Amanda Cuthbert, Green Books Guides, 2006, (bicycle); *Waterfootprint*, www.waterfootprint.org (biodiesel from soy); and *'Water footprint of European cars'* M. Berger et al, *Environ. Sci. Technol.*, 2012, 46 (7), pp 4091–4099 (car), http://bit.ly/Berger-2012.

[84] Eurostat: statistics explained. Water Statistics 2015. The European Commission. http://ec.europa.eu/eurostat/statistics-explained/index.php/Water_statistics

[85] Water Consumption per person 2004-5 Australian Bureau of Statistics http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/1370.0~2010~Chapter~Water%20consumption%20per%20person%20(6.3.3)

[86] US Geological Survey Water Science School. (2016) Water at Home http://water.usgs.gov/edu/qa-home-percapita.html

[87] The concept is Tony Allan's. See *Virtual Water* op cit and *The No-Nonsense Guide to Water,* Maggie Black, Verso 2004. Fred Pearce provides a readable romp through the problems in *When the Rivers Run Dry: What Happens When Our Water Runs Out?* Eden Project Books, 2006. Online see WaterFootprint, www.waterfootprint.org.

[88] The evidence is reviewed in 'Does Organic Farming Reduce Environmental Impacts? A Meta-Analysis of European Research', Hannah Tuomisto et al, *Journal of Environmental Management* 112 (2012) 309-320.

[89] *Agriculture at a Crossroads: Synthesis Report*, GM IAASTD, 2008, http://bit.ly/IAASTD-2008. For discussion of the GM industry's response see *The IAASTD Report and Some of its Fallout – a Personal Note*, Dr. Angelika Hilbeck, ETH Zurich, http://bit.ly/ines-IAASTD.

[90] Read this interview with Will Nicholson for a quick view of the sustainability of the restaurant sector, http://bit.ly/Nicholson-sustain.

[91] Tim Fox, Institution of Mechanical Engineers, 2013, op cit, http://bit.ly/global-foodreport.

[92] The CO2e associated with avoidable food waste in the UK was 17 million tonnes in 2012. There are 26.4 million households in the UK (Families and Households, 2013, Office of National Statistics) which gives the figure of 640 kg per household. *Household Food and Drink Waste in the United Kingdom 2012,* WRAP 2012, http://bit.ly/waste-2012. Food waste is discussed in more detail in *Waste: Uncovering the Global Food Scandal*, Tristram Stuart, Penguin 2009.

[93] See the regulations at http://bit.ly/govuk-shipping.

[94] WHO definition, http://bit.ly/WHO-food.

[95] Description of the G8's New Alliance on Food Security and Nutrition, http://bit.ly/feedthefurture-security. For a critique, War on Want's report, http://bit.ly/waronwant-food.

[96] See https://viacampesina.org/en/ for more information about La Via Campesina and food sovereignty.

[97] 'The Tragedy of the Commons', Garrett Hardin, *Science,* Vol. 162 no. 3859, pp. 1243-1248*,* 1968. 'Revisiting the Commons: Local Lessons, Global Challenges', Elinor Ostrom et al, Science Vol. 284, pp 278-28, 1999, http://bit.ly/ostrom-1999.

[98] Some different critiques of economic growth can be found in *Steady-State Economics*, Herman E. Daly, Earthscan 1977, in *Growth isn't Possible*, Andrew Simms and Victoria Johnson, New Economics Foundation, 2010, http://bit.ly/simms-2010, in *Prosperity without Growth: Economics for a Finite Planet*, Tim Jackson, Routledge, 2011, and on the website of the Centre for the Advancement of a Steady State Economy, http://bit.ly/steady-state.

[99] *One Planet Living*, http://www.oneplanetliving.net/ and *Sharing Nature's Interest: Ecological Footprints as an Indicator of Sustainability*, Nicky Chambers et al, Earthscan, 2000.

[100] *The Economics of Climate Change: the Stern Review,* Nicholas Stern, Cambridge University Press. For a broader discussion of this approach see *A New Blueprint for a Green Economy*, Edward B. Barbier and Anil Markandya, Earthscan, 2012

[101] *Better Growth, Better Climate: the New Climate Economy Report*, The Global Commission on Economy and Climate, 2014, p.24, http://bit.ly/nce-2014.

[102] *Steady State Economics* op cit.

[103] *Prosperity without Growth* op.cit.

[104] For Peter Victor's ideas about how to make the transition to a no-growth economy, *Managing without Growth*, Peter Victor, Edward Elgar, 2008.

[105] 'Living in the World Risk Society', Ulrich Beck, *Economy and Society* Volume 35 Number 3, 329-345, August 2006.

[106] *Advertising Effect: How Do We Get the Balance of Advertising Right?* Zoe Gannon and Neal Lawson, Compass, 2010, discusses how advertising creates unsustainable 'wants', http://bit.ly/Gannon-2011.

[107] *A History of the World in 100 Objects*, Neil MacGregor, 2011, http://bit.ly/MacGregor-2011.

[108] 'The Impact of Social Factors and Consumer Behavior on Carbon Dioxide Emissions in the United Kingdom', Giovanni Baiocchi et al, *Journal of Industrial Ecology,* Vol. 14, Issue 1, pp 50-72, 2010 and 'Who emits most? Associations Between Socio-Economic factors and UK households' Home Energy, Transport, Indirect and Total CO_2 Emissions', Milena Buchs and Sylke V. Schnepf, *Ecological Economics*, 90, (2013), 114-123, http://bit.ly/Buchs-2013.

[109] In the UK, a two person household with an income of over £48,000 is responsible for 16 tonnes of carbon emissions through their purchases of goods and services. A 5 person household with an income of £12-17,000 is responsible for 10 tonnes of carbon emissions through their purchases of goods and services. See *Understanding Changes in CO_2 Emissions from Consumption 1992-2004: A Structural Decomposition Analysis,* J.C. Minx et al, Report to DEFRA, Stockholm Environment Institute, York University and University of Durham, 2009 and *The Distribution of Total Greenhouse Gas Emissions by Households in the UK, and Some Implications for Social Policy*, Centre for the Analysis of Social Exclusion, Paper 152, I. Gough et al, 2012.

[110] See How Bad are Bananas? Mike Berners-Lee, Profile Books, 2010 for more examples.

[111] Description of how bottom-up product analysis works, Carbon Trust, http://bit.ly/Carbontrust-bottomup. Details of PAS 2050, http://bit.ly/PAS-2050.

[112] The Environmental Footprint Pilots The European Commission. http://ec.europa.eu/environment/eussd/smgp/policy_footprint.htm

[113] *Cradle to Cradle*, Michael Braungart and William McDonogh, Vintage, 2008, p. 110.

[114] *Purity and Danger: an Analysis of the Concept of Pollution and Taboo*, Mary Douglas, 1966, Routledge edition 2002

[115] *Cradle to Cradle*, op cit, p.102.

[116] *Towards the Circular Economy*, the Ellen MacArthur Foundation, 2012, http://bit.ly/MacArthur-2012

[117] Global Witness, http://www.globalwitness.org. Enough Project, http://www.enoughproject.org/conflict-minerals.

[118] Internet infrastructure responsible for 1.9% of global emissions: *Smarter 20:20 The Role of ICT in Driving a Sustainable Future*, Boston Consulting Group, 2012, http://bit.ly/boston-2012. 61% of this is accounted for by end-user devices whose emissions are normally counted as part of the household or workplace footprint. The other 39% comes from data centres and telecommunications networks, giving a figure of 0.74% of global emissions. Greenpeace report some improvement in internet companies' commitment to reducing their environmental impact: *Clicking Clean: How Companies are Creating the Green Internet*, Greenpeace, 2014, http://bit.ly/clicking-clean.

[119] Hans Rosling's TED Talk, http://bit.ly/TED-Rosling

[120] Climate Change and Sustainable Consumption: What do the Public Think is Fair? Tim Horton and Natan Doron, Joesph Rowntree Foundation, 2011.

Stokes, Bruce, Wike, Richard and Carle Jill (2015) Global Concern about Climate Change. The Pew Centre, http://www.pewglobal.org/2015/11/05/global-concern-about-climate-change-broad-support-for-limiting-emissions/

[122] *A New Agenda for Climate Change: Facing up to Stealth Denial and Winding Down on Fossil Fuels*, Jonathan Rowson, London: RSA, 2013, http://bit.ly/Rowsoncc-2013.

[123] Disavowal is discussed in relation to climate change in 'A New Climate for Psychotherapy?' Rosemary Randall, *Psychotherapy and Politics International* 3 (3): 165-179, 2005, http://bit.ly/Randall-2005, and in 'The Difficult Problem of Anxiety in Thinking about Climate Change' in Engaging with Climate Change: Psychoanalytic and Interdisciplinary Perspectives, ed. Sally Weintrobe, Routledge, 2013.

[124] Confirmation bias in relation to climate change is explained clearly in *The Psychology of Climate Change Communication: A Guide for Scientists, Journalists, Educators, Political Aides, and the Interested Public*, New York: CRED, 2009, http://bit.ly/Cred-2009.

[125] These processes are described in more detail in 'Great expectations: the psychodynamics of ecological debt', Rosemary Randall, in *Engaging with Climate Change: Psychoanalytic and Interdisciplinary Perspectives,* op cit.

[126] *Motivational Interviewing: Preparing People for Change*, William R. Miller and Stephen Rollnick, Guildford Press, 2002.

[127] *Selections from the Prison Notebooks of Antonio Gramsci*, edited and translated, Quintin Hoare and Geoffrey Nowell Smith, Lawrence and Wishart, 1971.

[128] *Dark Optimism*, http://www.darkoptimism.org/about.html.

[129] *Active Hope: How to Face the Mess We're in Without Going Crazy,* Joanna Macy and Chris Johnstone, New World Library, 2012.

[130] The limitations of the information deficit model are discussed in *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change,* Susanne C. Moser and Lisa Dilling, Cambridge University Press, 2007.

[131] The Cultural Cognition project discusses these issues well. See 'Fixing the communications failure' *Nature* 463, 296-297, Dan Kahan, 2010 and *The Tragedy of the Risk Perception Commons: Culture Conflict, Rationality Conflict, and Climate Change,* Dan Kahan et al*,* Cultural Cognition Project, Working Paper No. 89, 2011, http://www.culturalcognition.net/.

[132] The Cultural Cognition project discusses these issues well. See 'Fixing the communications failure' *Nature* 463, 296-297, Dan Kahan, 2010 and *The Tragedy of the Risk Perception Commons: Culture Conflict, Rationality Conflict, and Climate Change,* Dan Kahan et al*,* Cultural Cognition Project, Working Paper No. 89, 2011, http://www.culturalcognition.net/.

[133] The guru of social marketing is Doug Mackenzie-Mohr. His classic book is *Fostering Sustainable Behavior: an Introduction to Community-Based Social Marketing*, D. McKenzie Mohr and W. Smith, New Society Publishers, 1999. A much-used UK example is Chris Rose and Pat Dade's *Values Modes*, http://www.cultdyn.co.uk/valuesmodes.html. Futerra's 2010 pamphlet *Sell the Sizzle*, http://bit.ly/futerra-2010, and DEFRA's 2008 report, *A Framework for Pro-Environmental Behaviours,*

http://bit.ly/defrareport-2008, also give a clear idea of the approach.

[134] 'American Risk Perceptions: Is Climate Change Dangerous?' *Risk Analysis,* 25 (6), 1433-1442, 2005, Anthony Leiserowitz, http://bit.ly/leiser-2005.

[135] 'Mind the Gap: Why Do People act Environmentally and What Are the Barriers to Pro-Environmental Behavior?' A. Kollmus and J. Aygeman, *Environmental Education Research,* Vol. 8, No. 3, 2002. For a critique of the behavioural approach: 'Beyond the ABC: Climate Change Policy and Theories of Social Change', Elizabeth Shove, *Environment and Planning A* 42(6) 1273–1285, 2010, http://bit.ly/Shove-2010. For an explanation of the psychoanalytic view of the mind's conflicts in relation to climate change, *Engaging with Climate Change: Psychoanalytic and Interdisciplinary Perspectives*, ed. Sally Weintrobe, Routledge, 2013.

[136] *Common Cause: the Case for Working with our Cultural Values*, Tom Crompton, WWF, 2010, http://bit.ly/Crompton-2010.

[137] *Common Cause* op cit.

[138] *Simple and Painless: the Limitations of Spillover in Environmental Campaigning,* Tom Crompton and John Thogerson, WWF, 2009, http://bit.ly/Thogerson-2009.

[139] The guru of framing is George Lakoff. *Don't Think of an Elephant! Know Your Values and Frame the Debate*, Chelsea Green Publishing, 2004, is a short summary, *Moral Politics: How Liberals and Conservatives Think,* University of Chicago Press, 1996, 2nd edition 2002, gives the detailed arguments. For UK applications: *Finding*

Frames: New Ways to Engage the UK Public in Global Poverty, Andrew Darnton and Martin Kirk, Bond, 2011, http://bit.ly/Darnton-2011, and *Common Cause* op cit.

[140] The workshops designed by Marshall Ganz will help you craft a public speech that is both inspiring and personal. *Story of Self*, Marshall Ganz, 2009, http://bit.ly/ganz-2009.

[141] 'Fear Won't Do It: Promoting Positive Engagement with Climate Change through Visual and Iconic Representations', Saffron O'Neill and Sophie Nicholson-Cole, *Science Communication,* March 2009, Vol. 30 no. 3 355-379, and 'More Bad News: the Risk of Neglecting Emotional Responses to Climate Change Information', Susanne Moser, in *Creating a Climate for Change,* op cit.

[142] *Story of Self*, op cit.

[143] *Creating a Climate for Change,* op cit

[144] *A New Agenda for Climate Change*, op cit

[145] 'Learning to Love the Natural World Enough to Protect it', Louise Chawla, *Barn* nr, 2 2006:57-78, ISSN 0800-1669. A summary of this paper and other relevant research: Centre for Confidence, http://bit.ly/Chawla-2006.

[146] *Ecopsychology: Restoring the Earth, Healing the Mind*, ed. Theodore Roszak et al, Sierra Club Books, 1995.

[147] "There are many people who go from denial to despair without pausing on the intermediate step of actually solving the problem." Al Gore, in the 2006 film *An Inconvenient Truth*.