



CCCC


KICK THE HABIT

INTRODUCTION

Climate change is the defining issue of our era. Hardly a day passes without a newspaper, a broadcast or a politician making at least one reference to the threats it poses and the urgency of taking action, immediately to limit the effects and, in the longer term, to adapt to the changes that are sure to come.

For climate change is upon us, and the problem is here to stay. But it is still in our power – as individuals, businesses, cities and governments – to influence just how serious the problem will become. We have the choice how to act, but the change we need to make ourselves. We can make a difference by supporting the transition to a climate-neutral world. This concept – climate neutrality – is the subject of this book.

True, there is a huge gulf between where we are now and the climate-neutral future that we need if we are to achieve sustainable development. But the message of this book is that the gulf is



not uncrossable and that there is also a lot to gain. It will take patience, persistence and determination, but it can be done.

There is plenty of information and advice about how to live a greener, cleaner life. What is often difficult is finding your way through it all – knowing what gets results fast, what really delivers instead of just being greenwash, and what works best for you. If you are confused, this book is certainly for you. It should provide the answers you want. It explains in practical terms how individuals, companies, corporations, cities and countries can start to change. And even if you are not confused, the book will provide you with some useful additional information.

Climate neutrality

The term **climate neutrality** is used in this book to mean living in a way

Carbon-neutral, yes – that sounds familiar. But climate? The answer is simple: it is not just carbon dioxide, CO₂, that is driving climate change, even if it makes up almost 80 per cent of the climate gases (including contributions from changes in land use) emitted by human activities. Carbon dioxide is the most abundant greenhouse gas we are adding to the atmosphere, but it is not the only one.

The international climate change treaty, the Kyoto Protocol, limits the emissions of six main GHGs produced by human activities (see table). The gases are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFC), perfluorocarbons (PFC), and sulphur hexafluoride (SF₆).

which produces no net greenhouse gas (GHG) emissions. This should be achieved by reducing your own GHG emissions as much as possible, and using carbon offsets to neutralize the remaining emissions.

Kick the Habit – the analogy with a diet is apt: the commitment to try to lose weight comes quite close to what is needed to become climate-neutral. We need to kick the habit of releasing large quantities of GHGs. Of course, nobody diets for fun, but only in the hope of achieving something really worthwhile – perhaps a new slim and sexy you, perhaps the chance of survival itself. And diets are a reminder of something else involved in reducing GHGs. It is not an event but a process. No one embarks on a diet, loses weight, then resumes their old lifestyle – or at least, if they do then they can expect the whole exercise to prove pointless. So reducing the unnecessary consumption that underlies so much of many people's GHG emissions is not a question of aiming to cut your wasteful behaviour to a given point and then relaxing. The journey to climate neutrality is not a

Gas name	Pre-industrial concentration (ppmv *)	Concentration in 1998 (ppmv)	Atmospheric lifetime (years)	Main human activity source	GWP **
Water vapour	1 to 3	1 to 3	a few days	-	-
Carbon dioxide (CO ₂)	280	365	variable	Fossil fuels, cement production, land use change	1
Methane (CH ₄)	0,7	1,75	12	Fossil fuels, rice paddies waste dumps, livestock	21
Nitrous oxide (N ₂ O)	0,27	0,31	114	Fertilizers, combustion industrial processes	310
HFC 23 (CHF ₃)	0	0,000014	250	Electronics, refrigerants	12 000
HFC 134 a (CF ₃ CH ₂ F)	0	0,0000075	13,8	Refrigerants	1 300
HFC 152 a (CH ₃ CHF ₂)	0	0,0000005	1,4	Industrial processes	120
Perfluoromethane (CF ₄)	0,0004	0,00008	>50 000	Aluminium production	5 700
Perfluoroethane (C ₂ F ₆)	0	0,000003	10 000	Aluminium production	11 900
Sulphur hexafluoride (SF ₆)	0	0,0000042	3 200	Dielectric fluid	22 200

* ppmv = parts per million by volume, ** GWP = Global warming potential (for 100 year time horizon).

straight line, but a cycle, a matter of slimming down the GHGs that are within our responsibility and offsetting the remainder. In the next round you look at how you can cut your own emissions further, and continue the cycle moving away from offsetting and towards reducing your own emissions in your balance. Going on a climate diet will not be exactly fun, either, though it may help us to rediscover the forgotten delights that come from doing more with less. But it will give us and future generations the hope of survival on a sustaining Earth.

Four reasons to become climate neutral

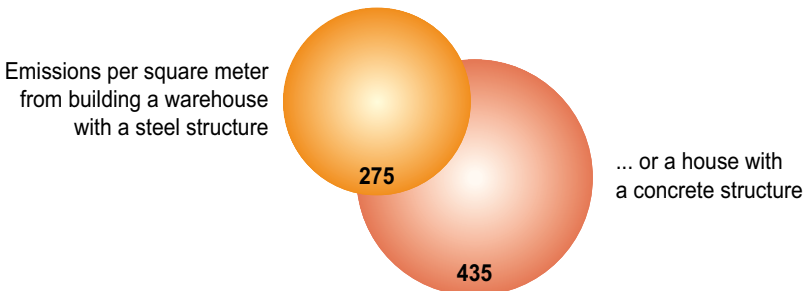
There are several good reasons for reducing our climate footprint.

One – sparing the climate

The build-up of GHGs threatens to set the Earth inexorably on the path to a unpredictably different climate. The Intergovernmental Panel on Climate Change (**IPCC**) says many parts of the planet will be warmer. Droughts,

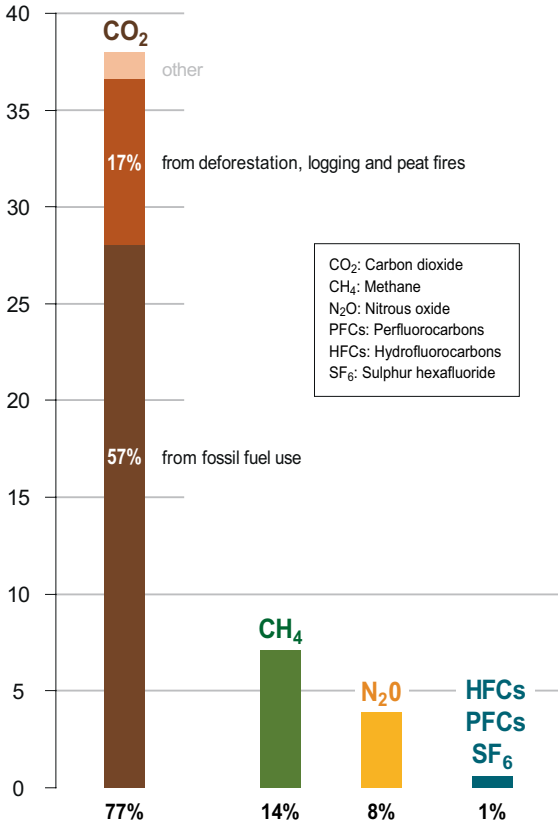
The United Nations Environment Programme and the World Meteorological Organization set up the IPCC, which brings together more than 2 000 scientists and government representatives to assess the risk posed by human-induced changes in climate. The IPCC does not itself conduct any research, nor does it monitor climate data. Its job is to assess the latest scientific, technical and socio-economic literature on understanding the risk of climate change, its observed and projected impacts, and options for adaptation and mitigation. In November 2007 it released its Fourth Assessment Report, comprising four sections: The Physical Science Basis, by Working Group I; Impacts, Adaptation and Vulnerability, by Working Group II; Mitigation of Climate Change, by Working Group III; and an overall Synthesis Report. It took six years to complete the report, which runs to several thousand pages. For this and its work over the last 20 years the IPCC was the joint winner of the 2007 Nobel Peace Prize.

floods and other forms of extreme weather will become more frequent, threatening food supplies. Plants and animals which cannot adjust will die out. Sea-levels are rising and will continue to do so, forcing hundreds of thousands of people in coastal zones to migrate. One of the main GHGs which humans are adding to the atmosphere, carbon dioxide (CO₂), is increasing rapidly. Around 1750, about the start of the Industrial Revolution in Europe, there were 280 parts per million (ppm) of CO₂ in the atmosphere. Today the overall amount of GHGs has topped 390 ppm CO₂e (parts per million of carbon dioxide equivalent – all GHGs expressed as a common metric in relation to their warming



Emissions by gas

Thousand million tonnes of CO₂ equivalent per year
(1970-2004 period)

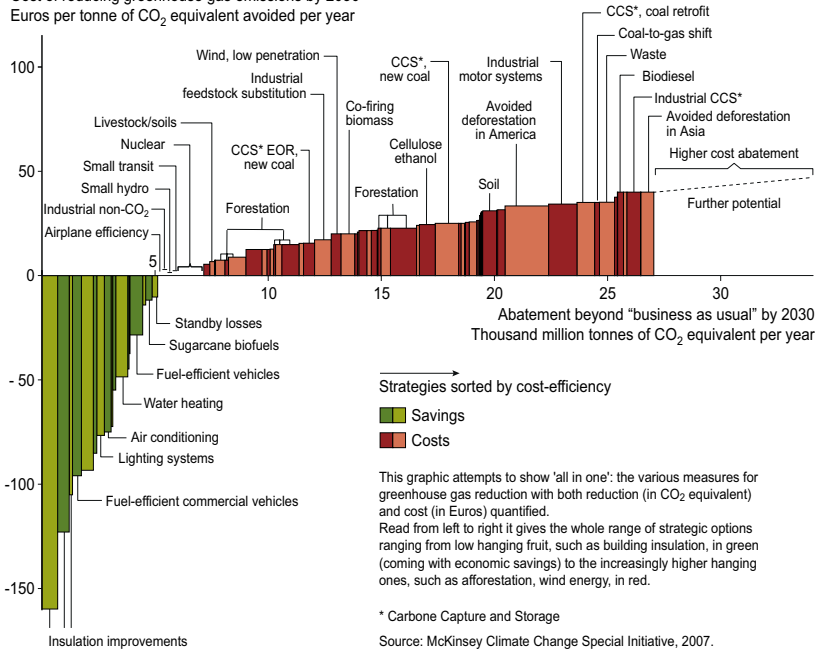


Source: IPCC Fourth Assessment Report, Working Group III Report: Mitigation of Climate Change; 2007
(figure adapted from Olivier et al., 2005; 2006; Hooijer et al., 2006).

Strategic options for climate change mitigation

Global cost curve for greenhouse gas abatement measures

Cost of reducing greenhouse gas emissions by 2030
Euros per tonne of CO₂ equivalent avoided per year



potential) and the figure is rising by 1.5–2 ppm annually. Reputable scientists believe the Earth's average temperature should not rise by more than 2°C over pre-industrial levels. Among others, the European Union indicated that this is essential to minimize the risk of what the UN Framework Convention for Climate Change calls dangerous climate change and keep the costs of adapting to a warmer world bearable. Scientists say there is a 50 per cent chance of keeping to 2°C if the total GHG concentration remains below 450 ppm.

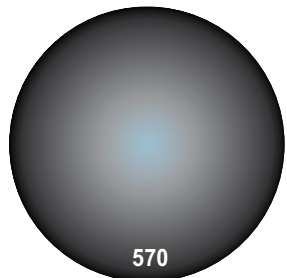
Two – conserving natural resources

There is growing evidence of another and quite different threat developing: we may soon run short of the fossil fuels (gas and oil) which keep

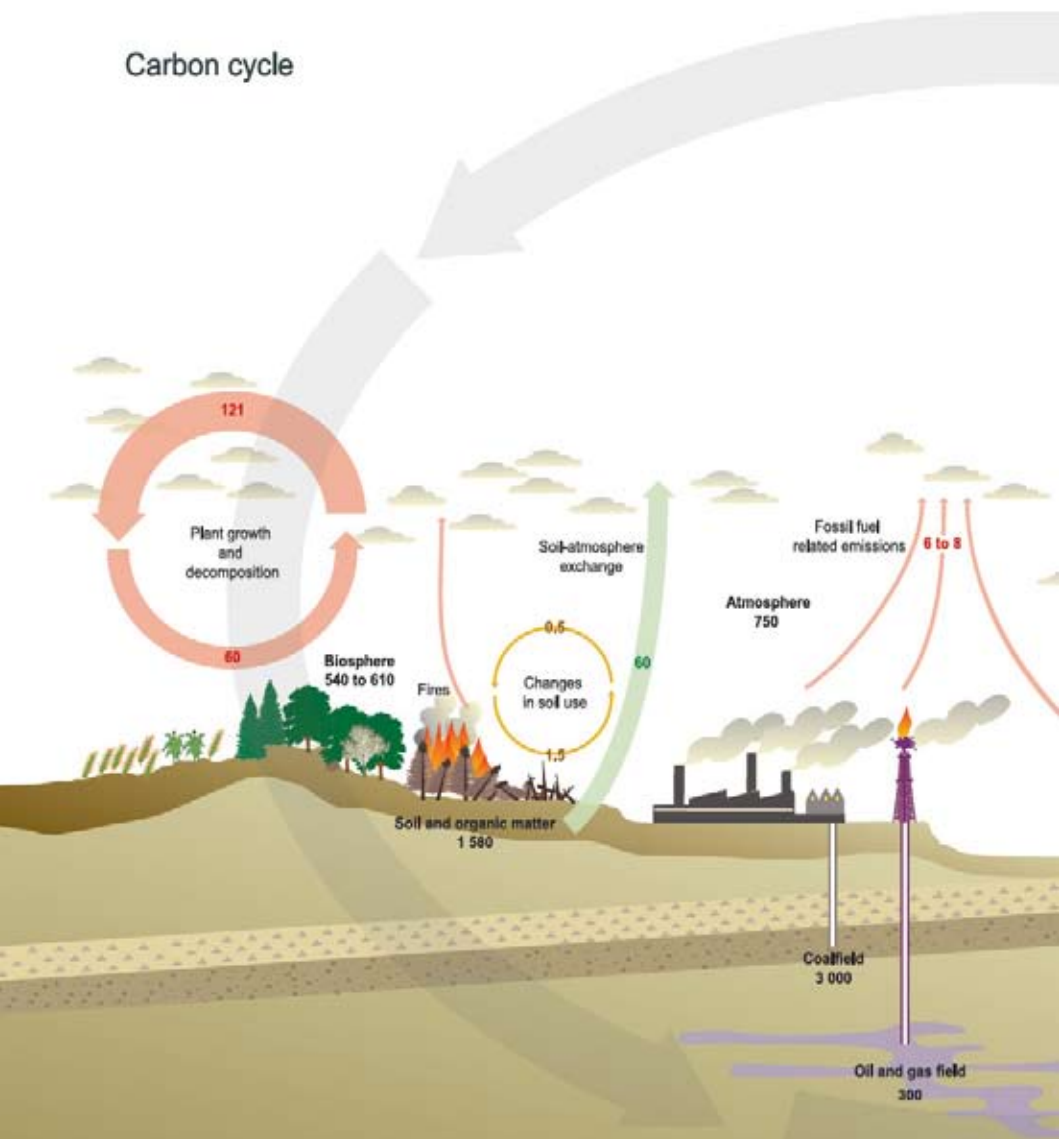
modern society going. Not only do they provide heat, light and electricity. Agriculture, pharmaceuticals, communications and most of the other features of life we take for granted depend on the reserves of fossil fuels, directly (e.g. for plastics) or indirectly. ASPO, the Association for the Study of Peak Oil and Gas, says: “The world faces the dawn of the second half of the age of oil, when this critical commodity, which plays such a fundamental part in the modern economy, heads into decline due to natural depletion.” Some economists believe that the scarcer and more expensive a commodity becomes, the more effort will go into finding it, and that the market will ensure plentiful supplies of fossil fuel for many years ahead. But there are rational grounds for thinking we risk the exhaustion of recoverable reserves of oil and gas as well as an unpredictably warmer Earth if we do not kick the CO₂ habit. By 2030, projections suggest, world energy use will probably have increased by more than 50 per cent. We can attain energy security only if we move from fossil fuels to fossil free alternatives.

A related argument is that a growing human population is putting the Earth under increasing strain, and that it is in everyone’s interest to try to reduce the strain. There were more than 6.6 thousand million people in the world in early 2008, and the UN Population Fund expects the total to reach about 9 thousand million before it starts to decline. Add to that a growing global appetite for consumer goods, and it becomes clear that unless we disconnect consumption and growing standards of living from the use of natural resources, we shall soon run short of many essential resources – minerals, like uranium, copper and gold, for example.

Extraction and refinery of crude oil
to make one tonne of petrol



Carbon cycle



Sources: Centre for Climatic Research, Institute for Environmental Studies, University of Wisconsin at Madison (USA); Okanagan University College (Canada), Geography Department, *World Watch*, November-December 1998; Nature; Intergovernmental Panel on Climate Change, 2001 and 2007.

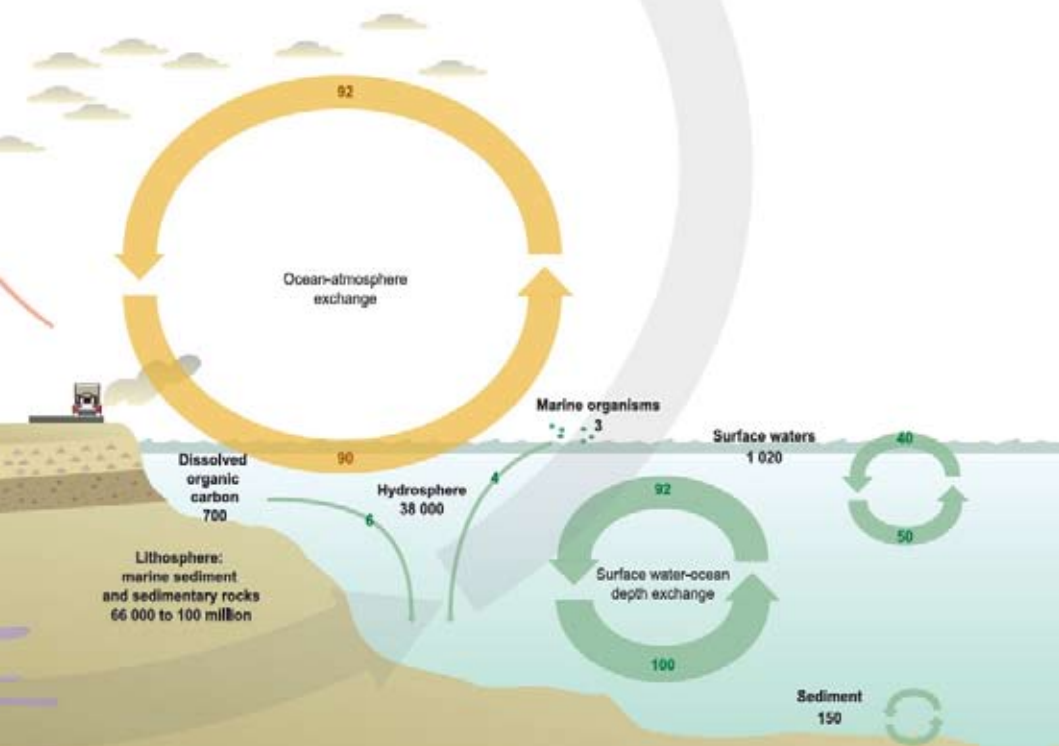
The figures indicate carbon storage and flows, expressed in Gigatonnes (1 000 million tonnes) of carbon.

The arrows are proportionate to the volume of carbon.

The figures for the flows express amounts exchanged annually.

Speed of exchange process

- Very fast (less than a year)
- Fast (1 to 10 years)
- Slow (10 to 100 years)
- Very slow (more than 100 years)



Three – protecting human health

Emissions linked to the burning of fossil fuels’ – e.g. sulfur oxides (SO_x) and nitrogen oxides (NO_x) – often help to make people ill, or even to kill them. Air pollution cuts 8.6 months off the life of the average European, causing 310 000 of the continent’s people to die before their time every year. World-wide three million people a year die because of outdoor air pollution, the World Health Organization says. Normally healthy people may not notice what polluted air is doing to them, but those affected by lung disease or heart problems probably will. The pollution is pervasive: it comes from vehicles, power stations and factories. It also damages the natural world, through acid rain and smog. The marathon runner Haile Gebreselassie refused to compete in the 2008 Olympics because he said Beijing’s pollution – all fossil-fuel related – was too dangerous for his health.

Four – boosting the economy

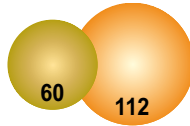
Individuals who reduce their energy consumption and thus their climate impact also save money. On a more macro-economic level, economic opportunities arise from measures taken to reduce GHGs: insulating buildings for example will not only save energy costs, but also give the building sector an enormous boost and create employment. While some sectors might suffer increased costs, many will seize the opportunity to innovate and get a step ahead of their competitors in adapting to changed market conditions.

Mitigating climate change addresses all these factors – directly or indirectly

Of all the reasons to try to reduce our climate footprint, the prospect of climate change is definitely the most pressing, because it will cause the most far-reaching changes, to humans directly, but also to all the ecosystems on which we depend for our well-being. The IPCC’s Fourth Assessment Report, released in 2007, describes in detail various emission scenarios and the associated impacts of temperature rise.

One of the IPCC’s conclusions was that warming caused by human activities could lead to “abrupt or irreversible” impacts. Scientists warn that

Manufacturing a cell phone



Using a cellphone for a year

climate change may not be a smooth linear process of a world warming gradually and steadily, but rather a series of sudden jolts, like the flips from one stable climate to another, radically different. Ice cores show this happened in the distant past, sometimes in the space of a single decade. The climate can alter very fast; many climatologists say the pace of change is already much faster than they expected ten years ago.

In that perspective, climate change is every bit as alarming as any of the threats facing humanity, and probably more alarming than most, because – without drastic change – its impacts appear certain.

So climate change and its effects matter fundamentally to everyone: what is at issue is not comfort, or lifestyle, but survival. Food security is at stake, climate refugees might hamper political security, and more uncomfortable changes will put humanity under strain. Scientists have never tried to hide the reality their research has uncovered. The danger threatening the Earth has never been a closely-guarded secret. They have tried consistently to get their message across in every way possible, including the use of the mass media.

For a long time, although the message was as clear as it could be, the audience remained unreceptive. But gradually the efforts to disseminate the warnings of science are beginning to pay off. The apathy and outright resistance are starting to crumble, and the climatologists' message is getting through to many people. Ever since the IPCC was established in 1988, the evidence of human induced climate change has grown stronger. Today IPCC says it is a 90 per cent probability of humans being responsible for most of the increase in global temperatures, and that global warming is happening faster than was predicted in the first reports.

That is the start of the change the planet needs.

Tackling climate change: mitigation and adaptation

Reducing our GHG emissions means attempting climate change *mitigation*, trying to reduce the impact we must expect. This will include new policies, innovative technologies and a change in lifestyle for all of us, all of which will certainly come **at a price**. We also need to go flat out at the

In his report on the economics of climate change, the development economist and former chief economist at the World Bank, Nicolas Stern, calculated the cost of keeping CO₂e concentrations below a 550 ppm threshold at around 1 per cent of global GDP by 2050. But if we do not act, he says, the overall costs and risks of climate change will be equivalent to losing at least 5 per cent of global GDP each year, now and permanently. If a wider range of risks and impacts is taken into account, the estimates of damage could rise to 20 per cent of GDP or more. The IPCC calculated the macroeconomic cost in 2030 at less than 3 per cent for stabilizing the CO₂e in the atmosphere between 445 and 535 ppm and the 2008 UNDP Human Development Report estimates that the cost of limiting temperature rise to 2°C could be less than 1.6 per cent of global GDP up till 2030. These estimates, whichever is more accurate, are significant. But with total global military spending at around 2.5 per cent of global GDP, they are far from prohibitive.

same time on a quite different strategy, **climate adaptation**, preparing to

“Adaptation actions are taken to cope with a changing climate, e.g. increasing rainfall, higher temperatures, scarcer water resources or more frequent storms, at present or anticipating such changes in future. Adaptation aims at reducing the risk and damage from current and future harmful impacts cost-effectively or exploiting potential benefits. Examples of actions include using scarce water more efficiently, adapting existing building codes to withstand future climate conditions and extreme weather events, construction of flood walls and raising levels of dykes against sea level rise, development of drought-tolerant crops, selection of forestry species and practices less vulnerable to storms and fires, development of spatial plans and corridors to help species migrate.” (this definition is taken from the European Commission’s Green Paper – Adapting to climate change in Europe – options for EU action, SEC(2007)849)

cope with the inevitable changes ahead (inevitable because of the inertia locked up in the atmosphere and the oceans: much of the warming we are experiencing today was caused by GHGs emitted several decades ago). Climate neutrality is a way to mitigation which will help to reduce the likely damage. This will, in turn, lessen the need for adaptation and alleviate the cost of adapting. Adaptation and mitigation can complement each other

and together can significantly reduce the consequences of anthropogenic climate change – change caused by **human activities**.

Most greenhouse gases have both natural and man-made sources. There are many natural processes that release and store GHGs, for example volcanic activity and swamps which account for considerable amounts of GHG emissions. Their concentration in the atmosphere consequently also varied in pre-industrial times. But today atmospheric concentrations of CO₂ and CH₄ far exceed the natural range over the last 650,000 years. It is clear that these enormous amounts of GHG are closely linked to human activities, such as fossil fuel combustion and land-use change, that release GHGs into the atmosphere. Nature is not capable of balancing this development.

Fat versus thin?

Who, then, needs to kick the habit and go on a climate diet? For now the answer is simple, whatever complexities may lie ahead. Equitable access to affordable energy is a priority if there is to be sustainable development. This guide is for everyone who has access to energy, and who has the possibility to use it more sustainably and responsibly than at present. That probably means most of us.

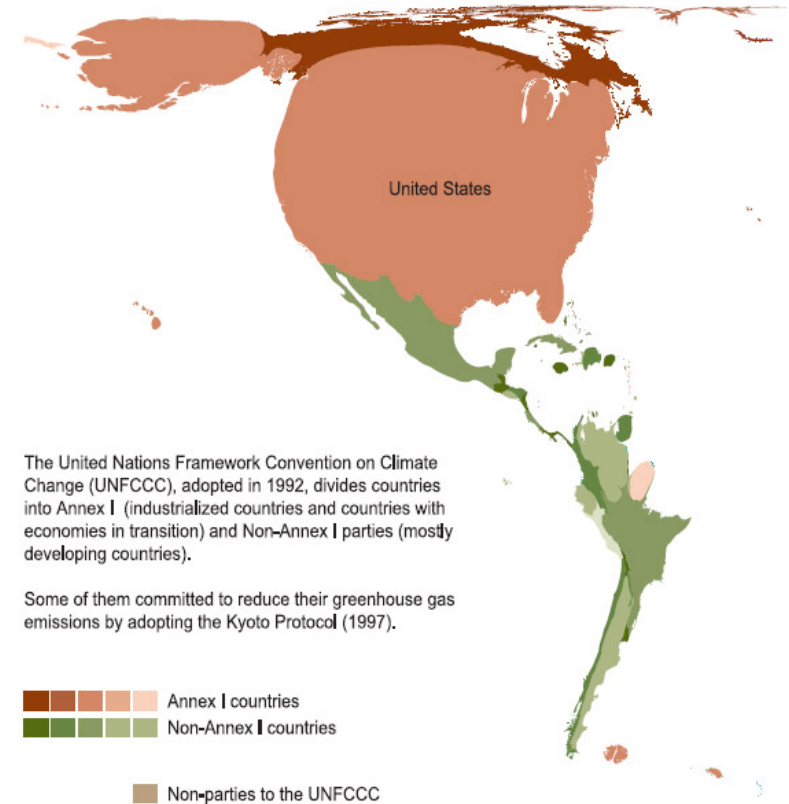
Some will argue that kicking the habit only applies to developed countries. After all, they bear a historic responsibility for most of the GHGs emitted so far. Developing countries, by contrast, have until recently depended far more on agriculture. (But this too, along with land use change – deforestation and growing crops on peat bogs – and forestry contributes to climate change.) Needless to say, much of this agricultural produce is exported – yet again – to consumers in the developed world with their insatiable appetites.

Using a diet analogy, some would say it is only the fat who can afford to diet. The thin have no surplus to shed, and would only damage themselves if they made the attempt. That is true – up to a point. But there are of course rich, climate-profligate people and organizations in the developing world, for example multinational corporations, who can make an effort to improve themselves.

The diet is certainly for them. Some developing country emissions result from rich countries' dependence on imports. Many of them produce

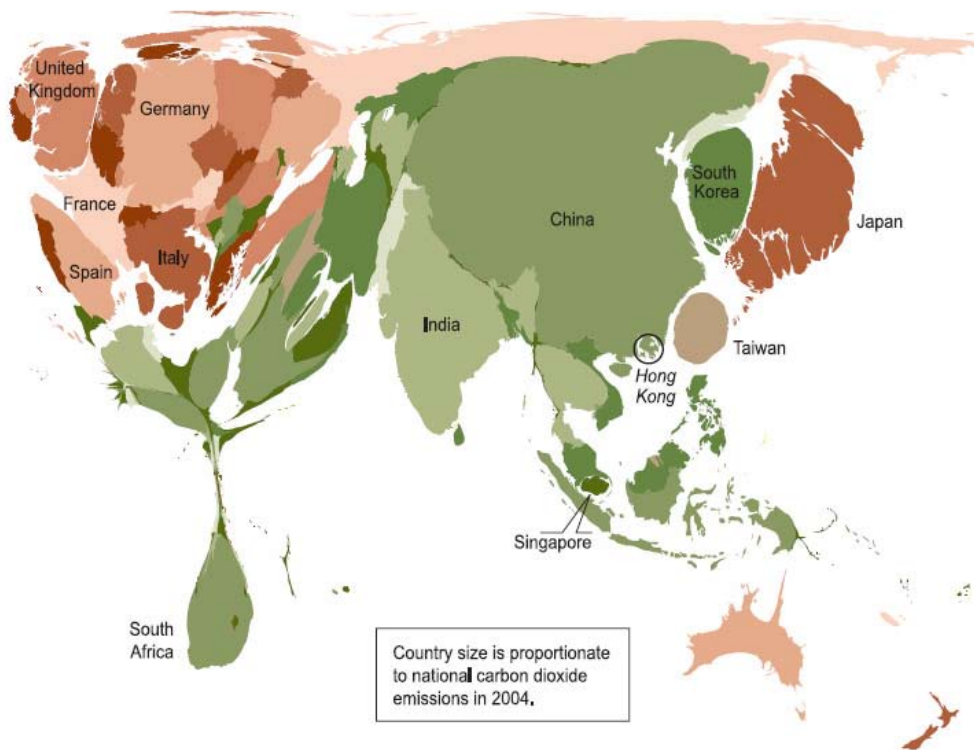
goods or provide services from which developed countries benefit. Climate neutrality is for them too. On the other hand, there are those who live in energy poverty in richer countries who may not need to cut their emissions at all.

But that leaves a wider point unexplored: should people who are already climate-thin have the opportunity to get fatter before having to slim down to an ideal size? Or could they achieve the lifestyle they want without having



to put on much GHG weight at all? And if they do get fatter, does that mean those who are already fat agreeing to become thinner? Not many politicians campaign on a platform of telling electors they can look forward to fewer of the good things in life. The argument goes beyond the strict question of climate change, in the sense that it embraces the whole range of resources modern society demands. But in another sense it is still about greenhouse gases, because energy is what makes things happen – just about everything that does happen.

Total CO₂ emissions from fossil-fuel burning, cement production and gas flaring



Cartography: SASI Group, University of Sheffield; Mark Newman, University of Michigan, 2006 (updated in 2008), www.worldmapper.org.
Data source: Gregg Marland, Tom Boden, Bob Andres, Oak Ridge National Laboratory, Please note that data for Norway is inaccurate,

Who is responsible?

Individual responsibility for climate change mitigation decreases with decreasing economic power. In poor countries more responsibility lies with those who can act, such as governments and companies.

The UN Development Programme's 2008 *Human Development Report* draws a helpful distinction between developed and developing countries. In order to stay below a global 2°C temperature rise, it suggests emissions reductions by developed countries of 80 per cent by 2050, with 30 per cent reductions by 2020. Under this scenario, developing countries would need to cut their emissions by 20 per cent by 2050, with emissions rising until 2020. Average emissions in both developed and developing countries would converge by 2060 to about 2.0 tonnes per head of CO₂e.

Another distinction is between the least-developed countries (LDCs), and the fast-developing ones, like Brazil, Russia, India and China (BRICs).

While developed countries would need to cut their emissions, some analysts suggest, the BRICs should aim to minimise their rising emissions by leapfrogging the industrialized bloc with clean technology. The LDCs would do that too, but with additional emphasis on providing support for ecosystem protection, for example by moving away from charcoal, and protecting forests and other carbon sinks. In future discussions about the share of responsibilities in reducing GHG emissions, the question of financing action will be central. The next round of negotiations for a post-Kyoto Protocol agreement will have to deal with these funding issues.