Climate Change FAQs for Executives

Gareth Kane

Edition 2

1. What is climate change?

Certain components of the atmosphere trap the sun's heat – the 'greenhouse effect' – otherwise the average temperature would be about 30°C cooler than it is now. The most significant contributors to the greenhouse effect are water vapour and the 'greenhouse gases' like carbon dioxide and methane. Water vapour is self-regulating – if too much of it builds up in the atmosphere it simply drops out as rain or other precipitation – the average time one drop stays in the atmosphere is 10 days. The gases are a different issue – if they build up they must be removed by chemical or biological means, such as plants absorbing carbon dioxide – the average residence of carbon dioxide in the atmosphere is 100 years.

Simple laboratory experiments suggest that increasing the amount of greenhouse gas in the atmosphere should lead to an increase in heat retained and therefore temperature.

Since the industrial revolution, the concentration of greenhouse gases has increased in the atmosphere from 280ppm (parts per million) of carbon dioxide equivalent to 430 ppm today and is increasing at 2-3ppm per year. In the same time, average global temperatures have risen by 0.8°C. Computer models suggest that if we continue to add to the concentration then we could see temperature rises between 1.4-6°C by 2100.

2. Is this really a problem?

The world will not end due to climate change, but it may become a very unpleasant place to live. The more extreme predictions for a 6°C rise include severe drought, sea-level rises, mass exodus, food riots and war – and that's just the US Department of Defence's view! A recent paper in the Lancet journal stated that climate change represents the most severe future health risk to humans.

A rise of 2°C is regarded as the 'politically acceptable' maximum temperature rise that we can tolerate, but this still represents significant risks. Much of the Greenland icesheet could melt, raising sea level by over six meters and displacing hundreds of millions of people worldwide, and the world's rainforests and coral reefs would be threatened on a grand scale.

Note that some impacts are already occurring. Recent UN studies found that 300,000 premature deaths are already occurring each year due to climate change.

3. How do you know it's not just a natural cycle?

Here's four pieces of evidence:

- From basic climatology theory (see 1. above) and laboratory experimentation we would expect a rise in greenhouse gas concentrations to result in an increase in global temperature.
- Circumstantial evidence – since the industrial revolution concentrations of greenhouse gases have risen followed by rises in average temperatures have risen as the basic theory would suggest.
- There are two ways temperature can rise over the long term – either more radiation hits the earth from the sun, or more is captured in the atmosphere. We know that the radiation from the sun has been declining since 1985, so it must mean that more heat is being captured in the atmosphere. This rules out most natural cycles such as the Milankovich Cycle which is a major factor in ice ages.
- Computer models which model all the natural cycles cannot account for recent temperature rises. Only when the expected effect of man-made emissions are factored in can the temperature rises be accounted for.

4. Has this anything to do with the ozone layer?

No – this is a common misunderstanding. The only link is that the gases that cause the hole in the ozone level also have a greenhouse effect.

5. How come 2008 was cooler than 2005 if the concentration of greenhouse gases has increased?

To understand this, you have to understand the difference between *weather* and *climate*.

- Weather consists of the short-term patterns of temperature, pressure, winds rain etc from hour to hour, day to day, year to year.
- Climate is defined as the 30 year average of weather patterns.

If you imagine standing at the water's edge on a beach, weather is like the movement of the water backwards and forwards as the waves break and recede, but climate is like the tide – the longer term trend of the water in or out. You can easily see the former, but the latter is harder to notice until your feet get wet.

Man-made carbon emissions have weak effect on *weather*. Despite an increased concentration of greenhouse gases, winter will always be colder than its preceding summer, and each year has a reasonable possibility of being cooler than the previous one. Weather patterns are heavily influenced by short-term cycles such as the El Nino/La Nina system in the Pacific. For example 2008 was a strong La Nina year. La Nina brings temperature down which is a major reason why 2008 was the coolest year since 2000.

Man-made carbon emissions may have a weak effect on weather day-to-day or even year-to-year, but it is a *persistent* effect, slowly ratcheting up average temperatures behind the short-term fluctuations – resulting in *climate* change. So while 2008 was cool compared to 2005, it was still warmer than any year on record up to 2000 with the exception of 1998.

6. So how come there is a debate?

It has been estimated that 97-99% of suitably qualified scientists accept the basic premise of man-made climate change, although there may be some debate over the exact modelling and impact assessments. Most mainstream political leaders have also accepted the science and are beginning to act. Yet despite this, a debate rumbles on in the blogosphere and the columns of certain newspapers.

Why? The whole concept of climate change (and more generally, natural limits) is a huge threat to our way of life. There are a number of responses we can make in the face of such a threat:

- Passive acceptance: “this is a big problem, but there’s nothing we can do about it”.
- Active acceptance: “this is a big problem, and we’d better do something”.
- Denial: “there is no problem”.

The intangible nature of climate change makes denial easy – and it is very easy to cobble together a few selective facts, myths and subjective observations to persuade oneself and others that there are problems with the theory.

However climate change denial is an industry in itself, particularly in the US. The ‘Global Climate Coalition’, funded by many major oil companies and motor manufacturers, continued to brief the press on ‘uncertainties’ in the science until 2001 despite the fact they were told they were wrong by their own scientific advisors back in 1995. More recently academics were offered $10,000 to debunk the 2007 International Panel on Climate Change (IPCC) report and $1,000 to give presentations disproving climate change at a conference in early 2009. Also in 2009, lobby firms spent $45m trying to stop or water down President Obama’s climate change bill.

It is notable that the few scientists (and the throngs of unqualified pseudo-scientists) in the denial camp refuse to put their arguments forward for peer-review – the basic quality control system in the scientific world.

7. Is it not all China's fault?

In 2008, China overtook the USA as the biggest emitter of greenhouse gases. But before pointing the finger at China, we have to remember the following two points:

- China has 5 times as many people as the USA, so its per capita emissions are only 20% of the States'.
- These figures measure national production rather than national consumption. The West has outsourced much of its dirty industry to the East – it has been estimated that 33% of China's emissions are due to exported goods.

In a world of global supply chains we must take a global view of carbon footprints and, while it is still a major emitter, we can't blame China for climate change.

8. So what do we have to do?

There are two things we have to do:

- Mitigation: Cut carbon emissions and deforestation to limit future climate change;
- Adaption: To implement measures to reduce the impacts of unavoidable climate change.

In terms of mitigation, there is a divergence of views on how far carbon emissions need to be cut to avoid temperature rises exceeding 2°C, but a 80% cut in emissions by 2050 relative to 1990 is emerging as a political consensus. This is a huge challenge, particularly as we need to avoid simply shifting the problem elsewhere (see 7. above).

Adaptation is a more localised issue. Those at risk from flooding or sea level rises have quite different needs from those whose drinking water supply is at risk. Medical authorities will need to account for different disease infection patterns and rates and, say, heatstroke. Agricultural practices and patterns will also have to adapt to ne weather patterns.

Acknowledgements

This document has been compiled using facts, views and data from a wide range of sources including the Meteorological Office website (www.met.gov.uk), IPCC reports, the Real Climate blog (www.realclimate.org) written by a number of IPCC scientists, 'The Copenhagen Diagnosis' (www.copenhagendiagnosis.org), 'Blueprint for a Safer Planet' by Nicholas Stern and various news agencies such as the BBC and Guardian websites. To keep this document readable I have simplified the science dramatically and avoided the distracting raft of footnotes that would grace a scientific paper. Any errors are mine.

About Gareth Kane

In Gareth's eleven years' experience in the environmental and sustainability sector he has worked with hundreds of organisations from micro-companies through to trans-national corporations, across many sectors including construction, pharmaceuticals, engineering and hospitality.

Gareth is an approved expert advisor for Envirowise, a co-ordinating reviewer of research for the UK Government's Sustainable Consumption and Production programme, an expert reviewer of EU Interreg energy project proposals and has been appointed to the pool of experts for the EU's URBACT programme. His first book "The Three Secrets of Green Business" was published by Earthscan in 2009.

Gareth has a Bachelor's degree in Engineering from Cambridge University and a Master's Degree in Eco-Design at Newcastle University. He is a member of the Institute of Engineering and Technology and a Chartered Engineer.

Our clients say:

"If you want to incorporate sustainability principles into your business, you need to talk to Terra Infirma."

Dale Robinson, MD,
Stone Homes Ltd

"I thoroughly recommend Gareth Kane and Terra Infirma to anyone who needs to put sustainability principles at the heart of their project or organisation."

Nick Devitt
Dott07

About Terra Infirma

Terra Infirma's slogan, "bringing sustainability to life", sums up our company ethos: turning the theory of sustainability into practical reality. The company delivers a wide range of services in the sustainability field:

- Consultancy: feasibility studies, scoping reports, carbon footprinting, business planning, change management, staff engagement etc;
- Embedding Sustainability: working with our clients' staff to develop and implement sustainability programmes such our 'Lean, Mean & Green' service;
- Training: a wide range of off the shelf and bespoke training courses are available;
- Facilitation of events and workshops.

Recent clients include: AEA Technology Ltd, The UK Government's Environment Department (DEFRA), Dott 07, Durham County Council, the European Union, Gentoo Housing Group, the Low Carbon Innovation Network, Middlesbrough Council, the UK's National Health Service, the National Industrial Symbiosis Programme, RWE nPower and Stone Homes Ltd.

Contact Details:

Terra Infirma Ltd, 157 Stratford Road, Newcastle upon Tyne, NE6 5AS, United Kingdom

Tel: +[44](0)191 265 7899

E-mail: info@terrainfirma.co.uk

WWW: http://www.terrainfirma.co.uk