

RIBA 

Climate Change Briefing Executive Summary

RIBA 

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The government's advisor
on architecture, urban design
and public space

About this Document:

This document summarises *Climate Change Briefing*, developed by the RIBA as part of a suite of Climate Change Tools to encourage architects to engage with the issue of climate change and to deliver low-carbon new buildings and low-carbon refurbishment of existing buildings.

You can explore all the Climate Change Tools and download the full *Climate Change Briefing* at www.architecture.com/climatechange

Introduction

Climate change brought about by man-made emissions of greenhouse gases has been identified as the greatest challenge facing human society at the beginning of the twenty-first century.

Each person in the UK is responsible for around ten tonnes of greenhouse gas emissions per year. Stabilising global greenhouse gas (GHG) emissions at a sustainable level would involve reducing UK GHG emissions to two tonnes per person per year.

This summary briefing:

- Outlines the basic mechanisms and likely effects of climate change
- Summarises international and UK GHG emissions reductions targets
- Highlights the contribution of buildings to the UK's national GHG emissions, and the effect of growth and replacement rates
- Signposts the RIBA's key climate change policies and its expectations of members for the buildings that they design and specify.

Cover image National Assembly for Wales, Rogers Stirk Harbour & Partners. Debating chamber natural ventilation funnel with mirrored reflector. Sustainable strategies and renewable energy systems were implemented throughout the building.

Photo James Brittain/VIEW

Climate Change: The Greenhouse Effect

Global temperatures are rising because of the increasing concentration of greenhouse gases, particularly carbon dioxide, in the atmosphere.

The concentration of carbon dioxide in the atmosphere increased from approximately 280 parts per million by volume in the pre-industrial era to 380 parts per million in 2007. It is projected to increase to over 500 parts per million by 2050.

The complex mechanisms of climate change involve the balance of carbon in the atmosphere, in the oceans and in all living things. The main mechanism is the greenhouse effect, by which levels of greenhouse gases in the atmosphere affect the heat balance of the earth. The process is summarised in **Figure 1** below.

The major greenhouse gases are carbon dioxide, nitrous oxide and methane.

There is an overwhelming scientific consensus that climate change is taking place as a consequence of man-made greenhouse gas emissions.

A recent report by the United Nations Intergovernmental Panel on Climate Change confirms that global greenhouse gas emissions increased by 70% and carbon dioxide emissions by 80% between 1970 and 2004¹.

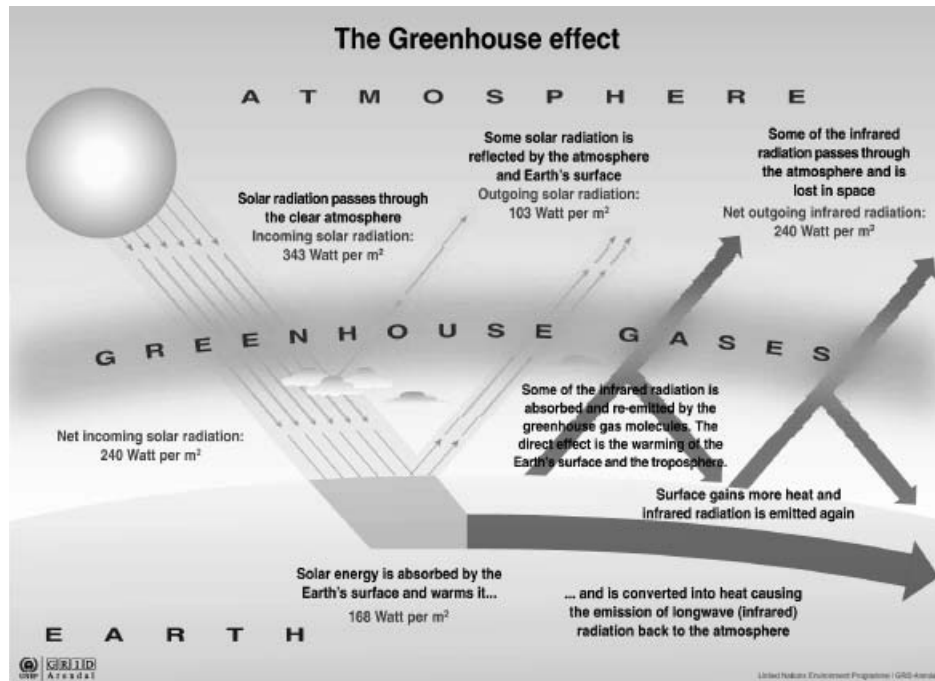


Figure 1 The mechanism of global warming. Source: Okanagan University College, University of Oxford, EPA, IPCC, Philippe Rekacewicz

¹ *Climate Change 2007: Mitigation of Climate Change*, Working Group III Contribution to the Fourth IPCC Assessment Report, UNIPCC, 2007

The Effects of Climate Change

The effects of climate change are complex. They include:

- Increased average temperatures
- Rising sea levels (because of the melting of glaciers and of polar ice caps)
- Increased precipitation
- More frequent extreme weather events.

UK Carbon Dioxide Emissions

Figure 2 shows projected UK carbon dioxide emissions broken down by source to the period 2020.

Although the graphs suggest that emissions are being reduced, measures to cut emissions are being inhibited (and in some cases cancelled out) by growth in economic activity, and associated growth in the number of dwellings, the amount of industrial and commercial floorspace, the number of vehicles etc.

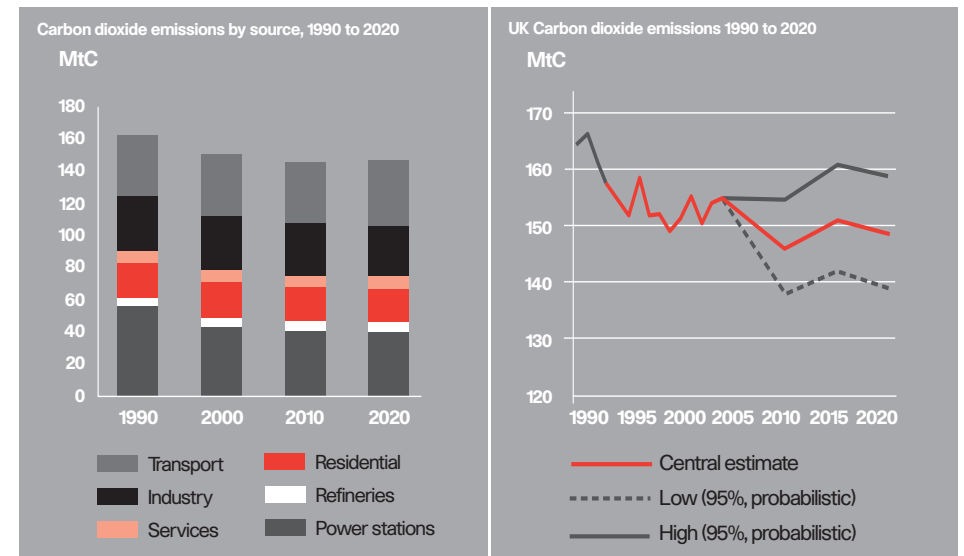


Figure 2 UK carbon dioxide emissions, 1990-2020, in millions of tonnes of carbon (MtC). Source: Defra

Tackling Climate Change

A summary of international policies and programmes is included in the full *Climate Change Briefing*.

The Energy White Papers in 2003 and 2007 established an 'aspirational' target:

'to put ourselves on the path to cut the UK's carbon dioxide emissions by some 60% by about 2050, with real progress by 2020.'

This has become known as the 'carbon 60' (or C60) target.

Some climate change scientists now suggest that deeper cuts in GHG emissions will be required before 2050.

Action to address climate change falls into two categories: mitigation policies are designed to reduce greenhouse gas emissions to slow down or stop climate change; adaptation policies are designed to adjust society to cope with climate changes that are already happening or are likely consequences of current GHG emissions.

The UK's national target under the Kyoto Protocol is to reduce greenhouse gas emissions by 12.5% by 2012 (based on 1990 levels).

The UK Government has also adopted a voluntary target to reduce emissions by 20% by 2010 (based on 1990 levels).

The Contribution of Buildings to Greenhouse Gas Emissions

Housing

There are approximately 25 million domestic buildings in the UK. The stock has grown from 18 million in 1976 and is expected to reach 27 million by 2020 – 50% growth in less than 50 years.

Despite measures to improve the energy efficiency of dwellings, carbon dioxide emissions are rising, mostly because of a significant increase in the numbers of electrical and electronic appliances in homes, increasing household numbers and a tendency to heat our properties to higher temperatures.

The replacement rate of the existing domestic stock is less than 1% per year. Emissions from the existing stock dominate – accounting for 99.7% of the total.

At the current rate of turnover of the stock, 80% of the dwellings that exist today will still exist in 2050². This means it is impossible for the UK to meet its carbon emissions reduction targets without an extensive programme of improvements to the energy efficiency of existing dwellings.

In 2003, carbon dioxide emissions associated with energy use in the UK were approximately 560 million tonnes. Almost half of this came from energy use in buildings.

Energy use in housing accounts for slightly more than half of the emissions associated with energy use in all buildings, amounting to 27% of the UK total.

Carbon Dioxide Emissions from Our Homes

Average emissions per dwelling are around six tonnes of carbon dioxide per year.

A new dwelling built to modern standards will produce around three tonnes of carbon dioxide emissions per year.

A large, uninsulated, inefficiently heated dwelling could produce over 40 tonnes per year.

² *The 40% House*, Environmental Change Institute, University of Oxford, 2005

Non-Domestic Buildings

The number of non-domestic buildings in the UK is difficult to estimate³. However, best estimates suggest that in 1994 there were approximately two million non-domestic premises in the UK. Some premises embraced several buildings (e.g. college campuses) and some formed only part of a building (e.g. office suites in a multi-tenanted office block), so the total number of buildings was probably also of the order of two million⁴.

The replacement rate is thought to average 1% per year and to be fastest in the retail and offices sectors. There is also some movement between sectors (e.g. conversion of dockside warehouses into dwellings).

Energy use and carbon dioxide emissions in the non-domestic building stock are less well understood than for dwellings, but similar considerations apply:

- New buildings contribute a small proportion of the total emissions
- Most existing buildings will still be in use in 2050
- Emissions reductions targets are unattainable without significant improvement of existing buildings and/or an increase in the replacement rate.

³ 'An introduction to the national non-domestic building stock database', *Environment and Planning B: Planning and Design*, Steadman, JP et al, 2000

⁴ 'Types, numbers and floor areas of non-domestic premises in England and Wales, classified by activity', *Environment and Planning B: Planning and Design*, Bruhns, HR et al, 2000

RIBA's Climate Change Policy

The Royal Institute of British Architects has adopted a robust Climate Change Policy, which has been developed over two years by the Policy & Strategy Group and the Sustainability Futures Group.

It acknowledges that individual architects and professional institutions such as the RIBA have limited opportunity to make a significant difference by themselves.

Tackling climate change requires concerted and focused action. This will include reducing carbon dioxide emissions by changing the ways in which buildings are designed, constructed, managed and used. The broad principles of sustainable development are complementary to the measures needed to mitigate climate change, but addressing climate change has emerged as a matter that must be tackled in its own right.

Architects are centrally involved in a sector of the national economy that is responsible for between 40% and 50% of UK national emissions. The RIBA and its members therefore have a part to play and an opportunity to work with others to influence the future.

Useful Links

United Nations International Panel on Climate Change (UNIPCC)

www.ipcc.ch

UK Climate Change Programme

www.defra.gov.uk/environment/climatechange/uk/ukccp/index.htm

Carbon Trust

www.carbontrust.co.uk

Energy Saving Trust

www.energysavingtrust.org.uk

RIBA Climate Change Policy

www.architecture.com/climatechange

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