

Technology Strategy Board

Driving Innovation



Design for a future climate

What does the construction industry need to know?

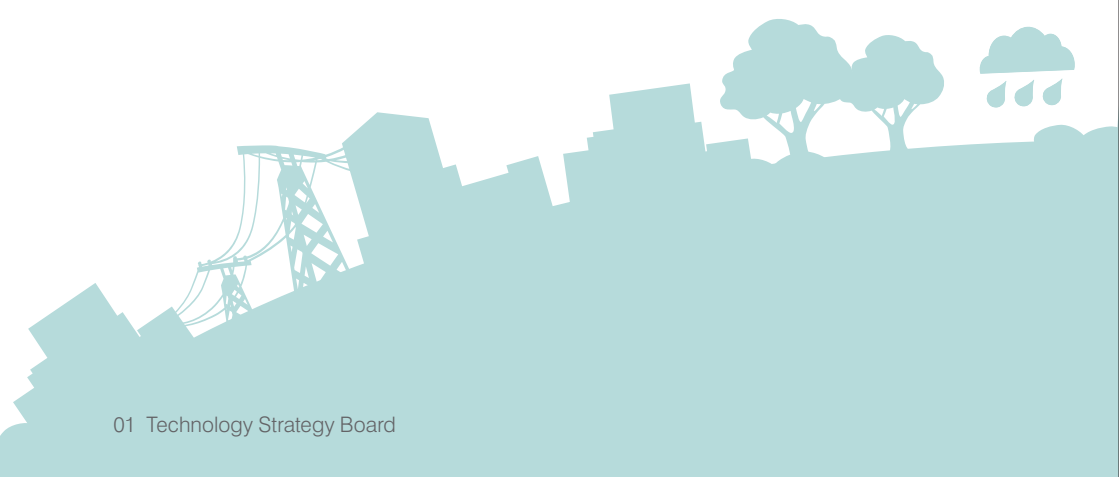
The Earth's climate is changing – wetter winters and drier summers will affect existing buildings and change the requirements of new buildings.

The increasing release of greenhouse gases like carbon dioxide is causing climate change. To try to halt the rate of change the government aims to cut carbon dioxide emissions by 80% by 2050 – but nearly half the UK's carbon emissions come from buildings.

Buildings last a long time, so we need to design buildings that dramatically cut their energy consumption and carbon emissions to slow down climate change, that can adapt to the changes that are already inevitable, and which people enjoy living and working in.

Designers and builders need to understand the likely impacts of climate change to create robust and future proof buildings.

In spring 2010 we are launching an R&D competition 'Design for Future Climate' to help develop innovative ideas to make our buildings fit for the future.



What have we done so far?

- In December 2008 we brought together climate scientists and construction experts to debate what was known about climate change, and how it related to the built environment.
- Although the climate scientists have a huge amount of knowledge about the possible impacts of climate change, it is not available in a way that is useful to the construction industry.
- Since then a group of industry experts has been working with us, the Natural Environment Research Council and the UK Climate Impact Programme - to turn the scientific knowledge into practical, usable advice.

What happens next?

- We'll get feedback on this work at our workshop at the Innovate '09 conference.
- We will work with the Modern Built Environment Knowledge Transfer Network, professional bodies and trade

associations to make the advice and guidance on climate change impacts as clear and usable as possible.

- In early 2010 we will make this advice and guidance available as part of the preparation for our 'Design for Future Climate' competition.
- We'll work with the knowledge transfer networks, professional bodies and trade associations to spread the advice and guidance as widely as possible through industry.



Not only will existing buildings need to withstand the predicted wetter winters and drier summers, but by the 2080s or sooner, buildings of the future will need to respond to possible greater extremes of wind, rain and temperature.

We must all take action now

We're working with the Natural Environment Research Council and the Engineering and Physical Sciences Research Council (EPSRC) to pinpoint the information that the construction industry needs and make sure it's available to architects and builders in a user-friendly format.

The EPSRC-funded Living with Environmental Change programme accredited a range of research projects on Adaptation and Resilience in a Changing Climate in 2007-08. These projects allow academics to convert

climate change prediction data into more usable forms for industries working with existing buildings and infrastructure including transport and water resource systems. The project work is available by joining the Adaptation and Resilience in a Changing Climate network, open to all at www.ukcip-arcc.org.uk

The Technology Strategy Board competition will further support this effort by funding industry R&D for adaptation to the future climate.



We are working with the construction industry to:

- appreciate that climate change is also going to change the way the industry works and makes money
- begin working together to change construction practice, products and processes
- provide the right information to the construction industry so that the built environment can cope with climate change.

By the 2080s

The latest predictions from UK Climate Projections 2009 point to a very different weather pattern for the UK in the future. We could be faced with:

- a wetter winter and a drier summer in every part of the UK
- a 22% decrease in average summer rainfall in the South East – which is already water-stressed
- an increase of 16% in average winter rainfall in the North West, with increases in the amount of rain on the wettest days leading to a higher risk of flooding
- a rise in sea levels by up to 36cm.



The big questions

'Data and modelling on temperature, rainfall and solar radiation have to be closely linked together and not treated in isolation in order to be useful for design.'

'There's too much information about climate change but where can we find the relevant data and how do we use it? I need low cost, trustworthy, factual information.'

'We need practical information about the implications of climate change on the built environment, not what caused it.'

'What about building codes and building regulations? Surely climate change information has to be integrated into these.'

Understandably there are many questions on climate change being posed by the construction industry. And so far there's no easy route to the answers. We recognise the urgency of assisting the construction industry and have taken action to begin a process of transferring and translating information between the academic sector and the industry.



'National data on climate change is all very well but we need to understand local, and even micro-climate, variations to be able to design, specify and construct buildings for the future.'

'I've heard the new climate predictions are based on 10%, 50% and 90% probabilities. We still aren't fully using the single figure predictions from 2002. We need help in using the data. What climate change consequences can be predicted with confidence?'

Information needed by the construction industry

- local microclimate information including temperature, rainfall, solar radiation and wind
- how the predicted availability of resources, such as gas/electricity energy sources, are influenced by climate change
- urban wind and urban flooding predictions, to indicate both the likelihood and potential impact
- clarification on extreme events. Can the probability of extreme weather events be broken down regionally?
- What will extremes of climate be like in 30 years' time? And will more regular extreme weather events such as storms, flooding, heat waves and droughts affect structural and material stability?
- site-specific climate change information for designers
- how climate change will affect the population; how will they react? Will the public tolerate the change or will their actions make predictions worse?
- engineers need help interpreting the practical implications of climate change margins of error.

Who are we working with?

The following organisations have helped us so far: Aecom, Arup, Atkins, British Geological Survey, Buro Happold, Chartered Institution of Building Services Engineers, Construction Industry Council, Kier, Modern Built Environment Knowledge Transfer Network, Land Securities, Liverpool John Moores University, Newcastle University, Southampton University, Taylor Woodrow and the Zero Carbon Hub.

We would like to hear from you

To get involved in this work and for further information about the Design for Future Climate competition, please contact:

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Who we are

The Technology Strategy Board is the UK's innovation agency set up in 2007.
www.innovateuk.org

The **Natural Environment Research Council** funds world-class science in universities and its own research centres.
www.nerc.ac.uk

The **Engineering and Physical Sciences Research Council** is the UK's main agency for funding research in engineering and the physical sciences.
www.epsrc.ac.uk

The **UK Climate Impacts Programme** helps organisations to adapt to inevitable climate change.
www.ukcip.org.uk

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