

Building on the Paris Agreement

The role of low carbon construction in the UK

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CIEMAP

Our mission

- » *Working closely with government and industry, CIEMAP conducts research to identify all the opportunities along the product supply chain that ultimately deliver a reduction in industrial energy use*
- » One of 6 RCUK funded centres focussing on end use energy demand in the UK
- » Interdisciplinary team from the universities of Leeds, Bath, Cardiff and Nottingham Trent, plus contributions from the Green Alliance



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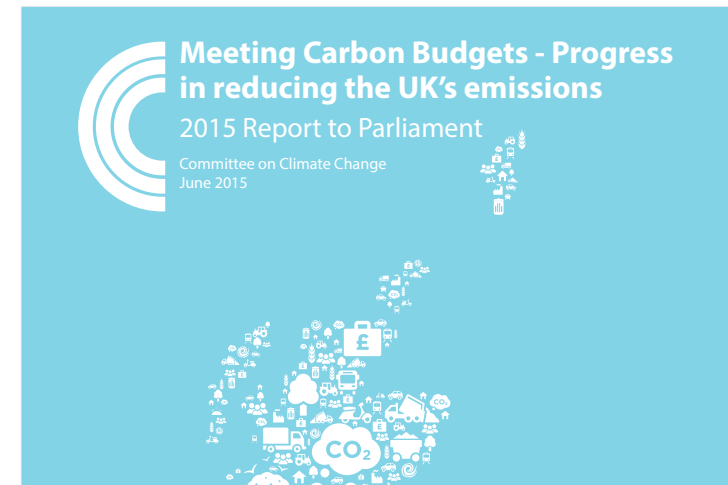
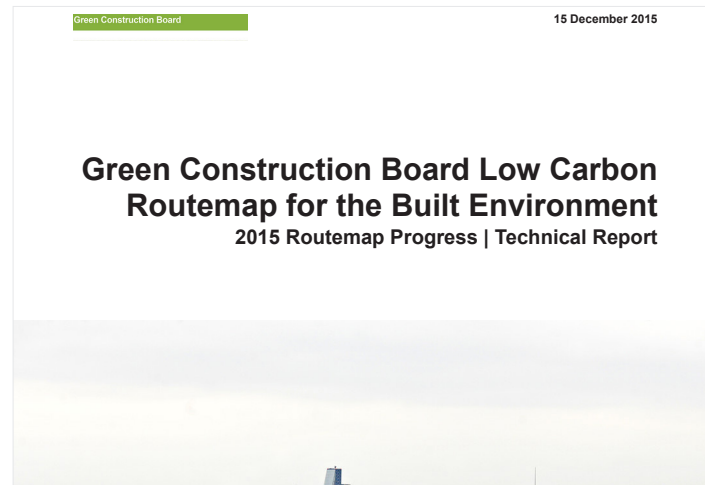
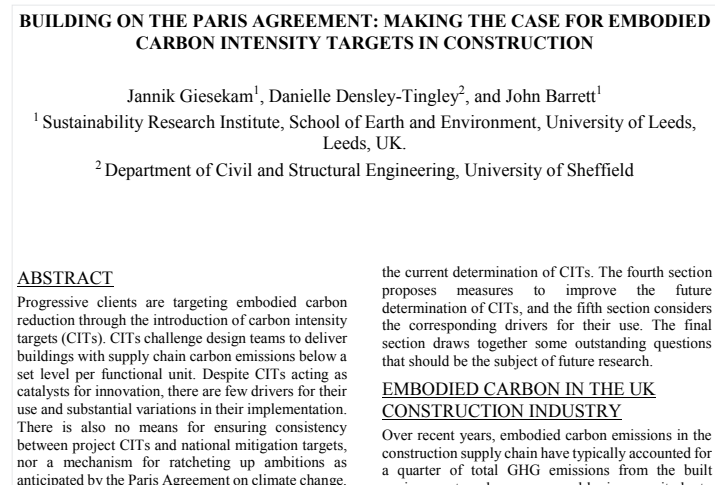
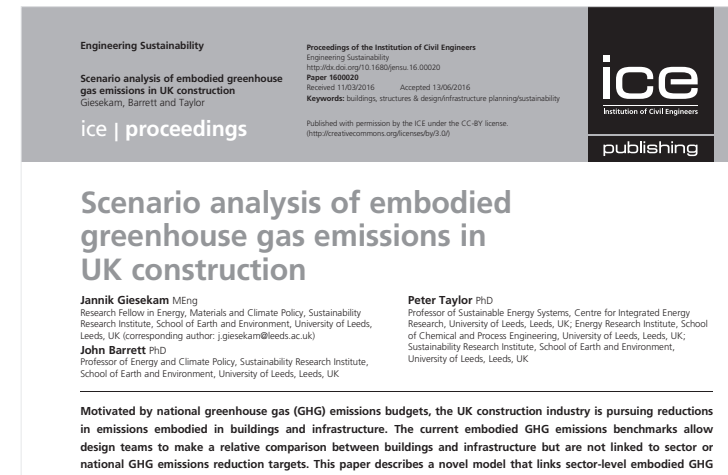
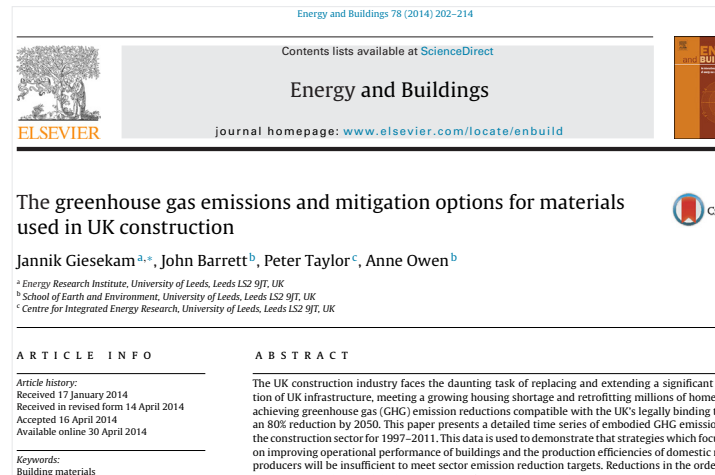
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CIEMAP work in construction

Two key areas



- » Modelling future material use and associated carbon emissions
- » Understanding the barriers to greater material efficiency and the use of low carbon materials



Paris Agreement on climate change

Global agreement in December 2015

- » Came into force on 4th November 2016
- » Commits to *“holding the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels”*
- » Goal of achieving *“a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century”*
i.e. net zero emissions
- » Commits parties to global stock-take and ratcheting up of ambitions every 5 years
- » Recent COP 22 negotiations have provided further details of how this will be implemented

	United Nations	FCCC/CP/2015/L.9/Rev.1
	Framework Convention on Climate Change	Distr.: Limited 12 December 2015 Original: English


Conference of the Parties
Twenty-first session
Paris, 30 November to 11 December 2015
Agenda item 4(b)
Durban Platform for Enhanced Action (decision 1/CP.17)
Adoption of a protocol, another legal instrument, or an agreed outcome with legal force under the Convention applicable to all Parties



ADOPTION OF THE PARIS AGREEMENT

Proposal by the President

Draft decision -/CP.21

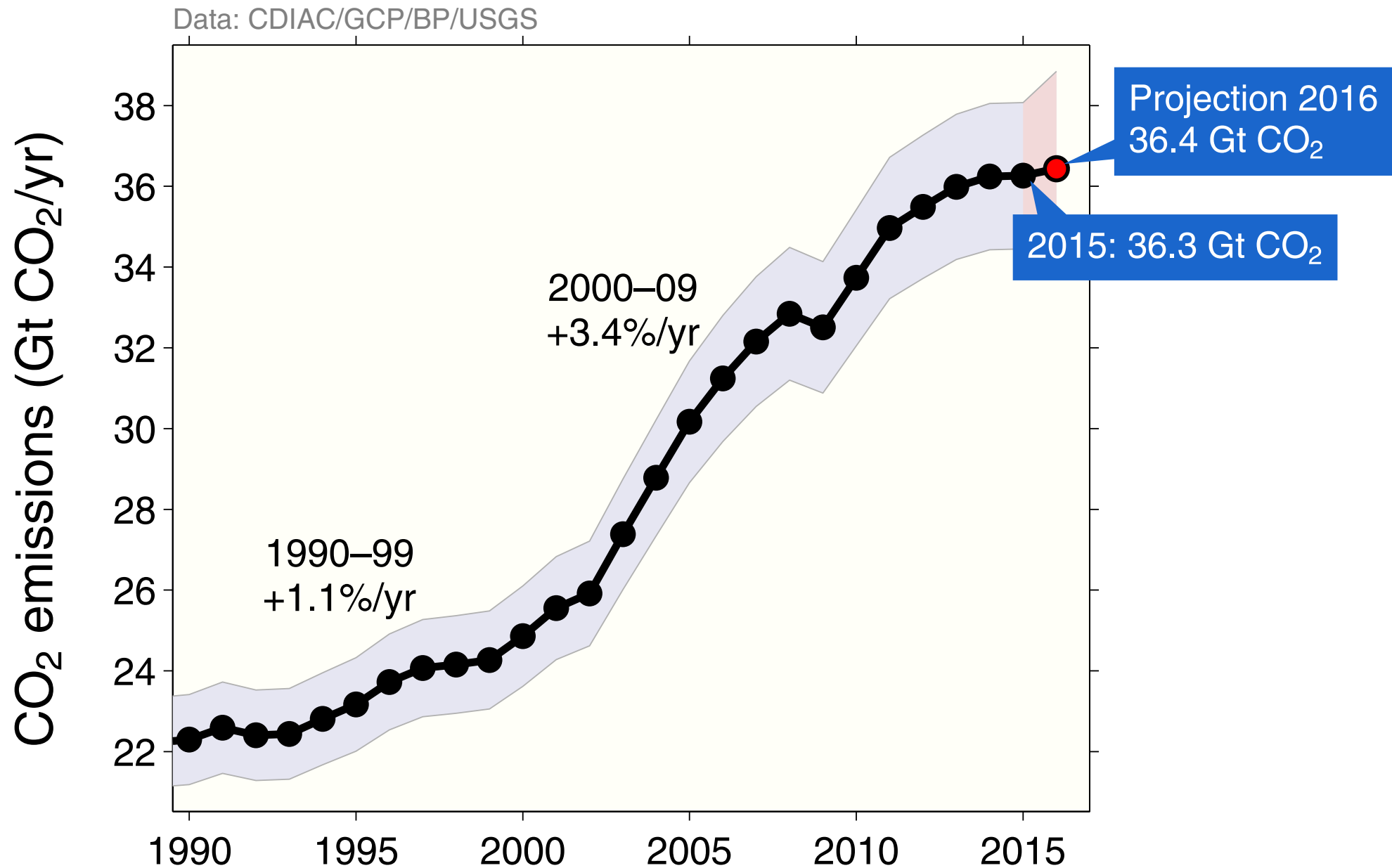
The Conference of the Parties,
Recalling decision 1/CP.17 on the establishment of the Ad Hoc Working Group on the Durban Platform for Enhanced Action,
Also recalling Articles 2, 3 and 4 of the Convention,
Further recalling relevant decisions of the Conference of the Parties, including decisions 1/CP.16, 2/CP.18, 1/CP.19 and 1/CP.20,
Welcoming the adoption of United Nations General Assembly resolution A/RES/70/1, “Transforming our world: the 2030 Agenda for Sustainable Development”, in particular its goal 13, and the adoption of the Addis Ababa Action Agenda of the third International Conference on Financing for Development and the adoption of the Sendai Framework for Disaster Risk Reduction,
Recognizing that climate change represents an urgent and potentially irreversible threat to human societies and the planet and thus requires the widest possible cooperation by all countries, and their participation in an effective and appropriate international response, with a view to accelerating the reduction of global greenhouse gas emissions,
Also recognizing that deep reductions in global emissions will be required in order to achieve the ultimate objective of the Convention and emphasizing the need for urgency in addressing climate change,
Acknowledging that climate change is a common concern of humankind, Parties should, when taking action to address climate change, respect, promote and consider their respective obligations on human rights, the right to health, the rights of indigenous peoples

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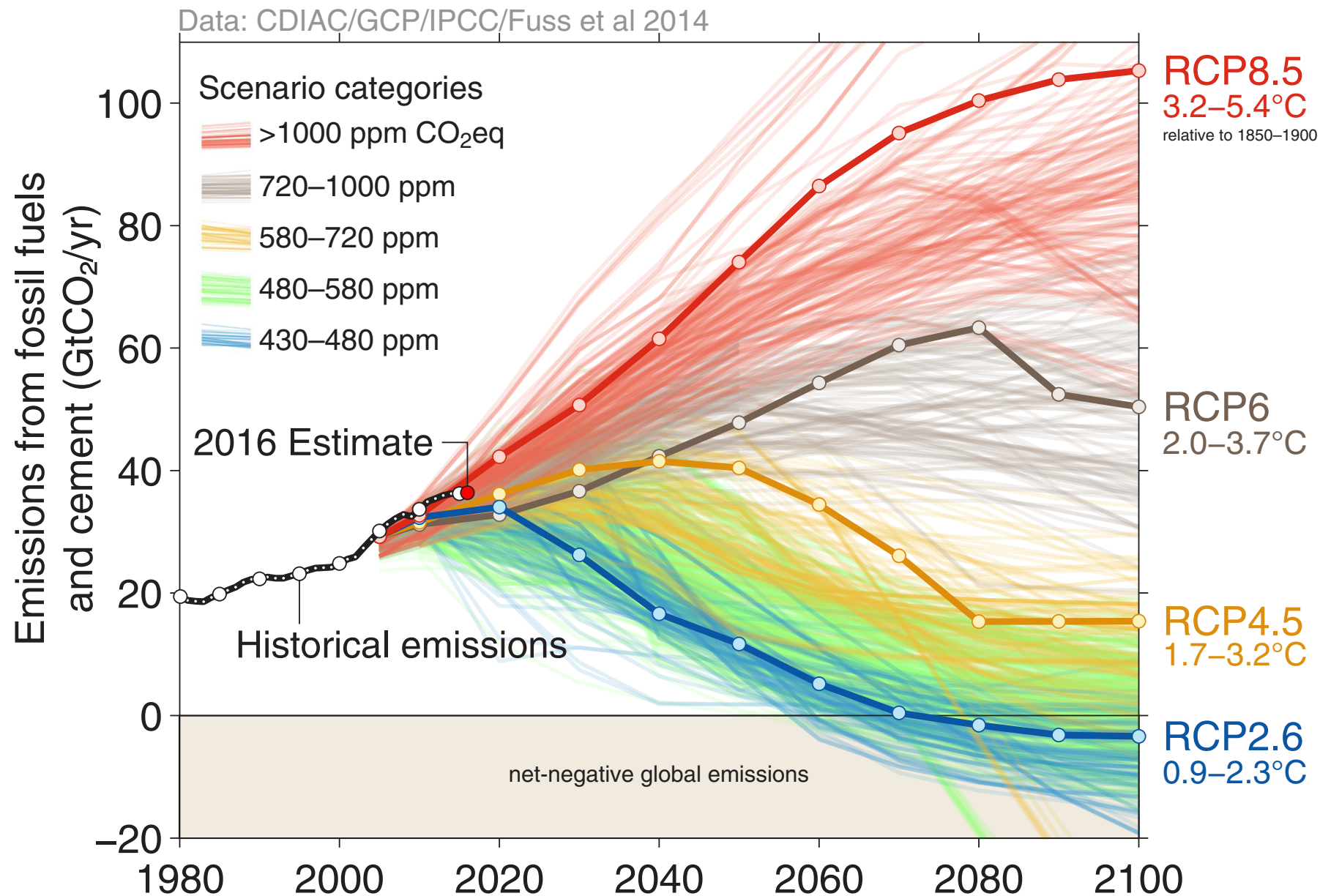
Global emissions trend

Latest projections suggest 2016 total will be similar to 2014



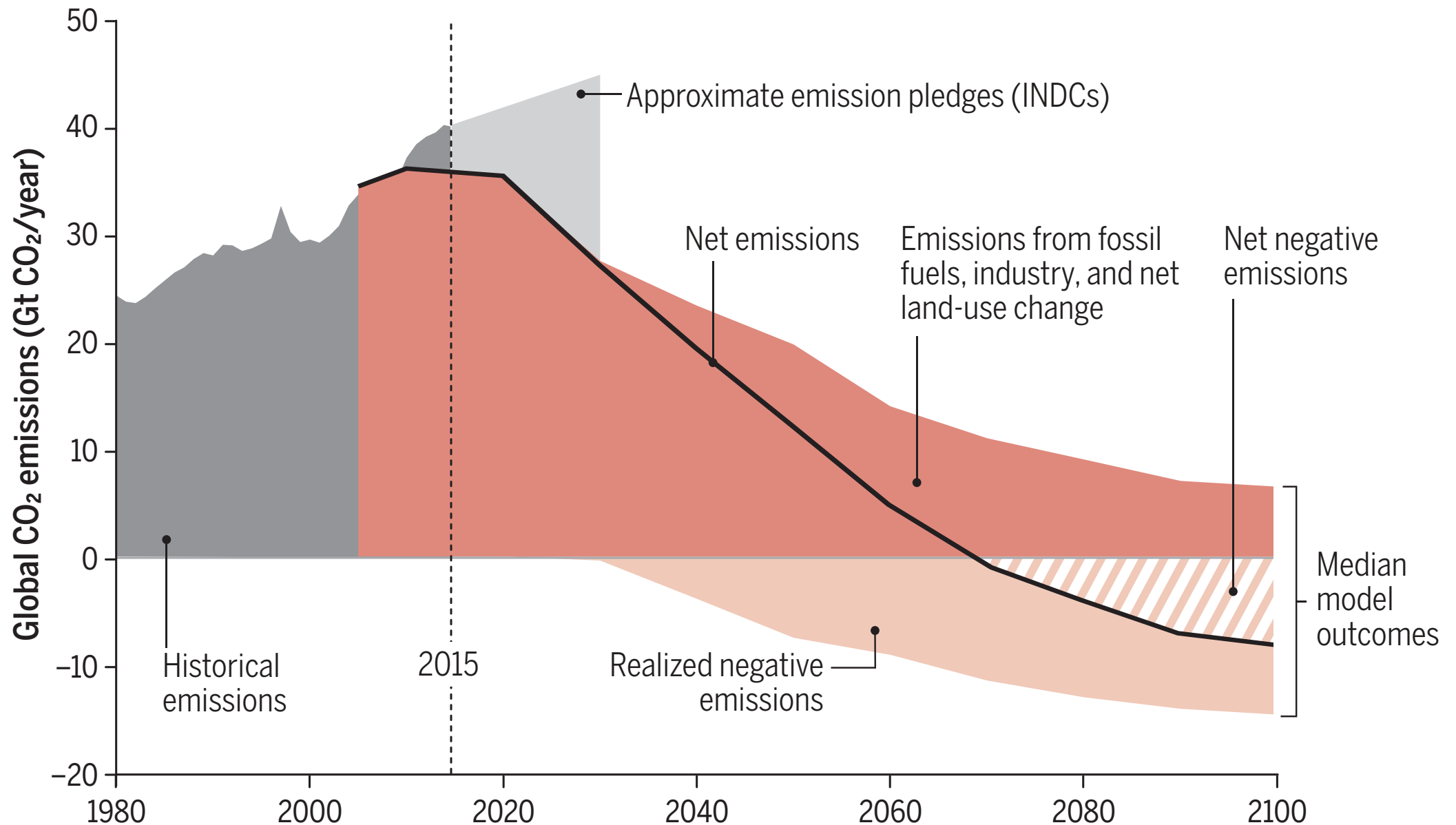
Emissions scenarios to 2100

Current commitments likely to yield around 3°C increase



Current models for >66% chance of 2°C

Are heavily dependent on negative emissions technologies

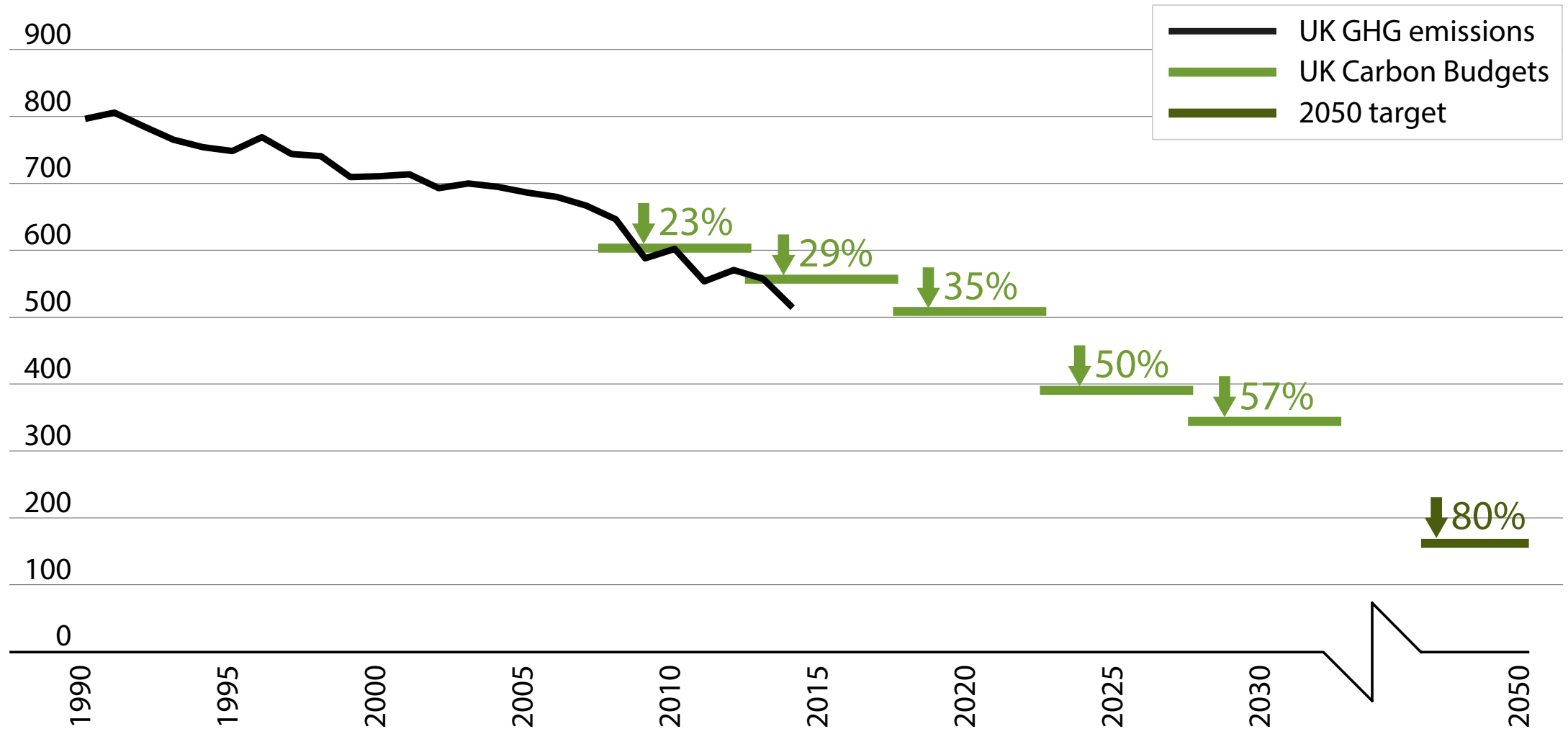


Current targets for the UK

Based on series of legally binding 5 year carbon budgets

1000 MtCO₂e

All targets are relative to baseline of territorial emissions in 1990



New UK goal is net zero emissions

Near the middle of this century

- » UK Government has already intimated that the net zero goal must enter UK law:
“The question is not whether but how we do it”
- » CCC advise goal means UK must be net zero CO₂ by 2055-2075 for >66% chance of achieving 2°C or before 2050 for 1.5°C

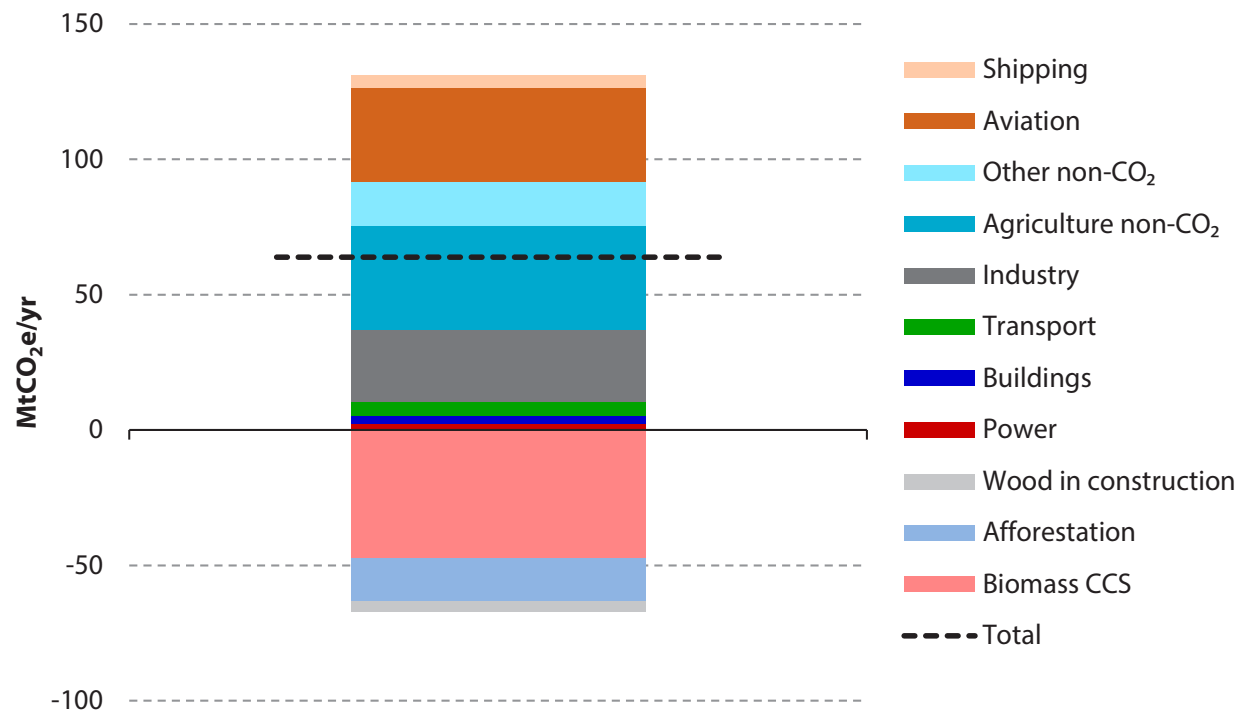


Achieving net zero in the UK

Will be extremely difficult

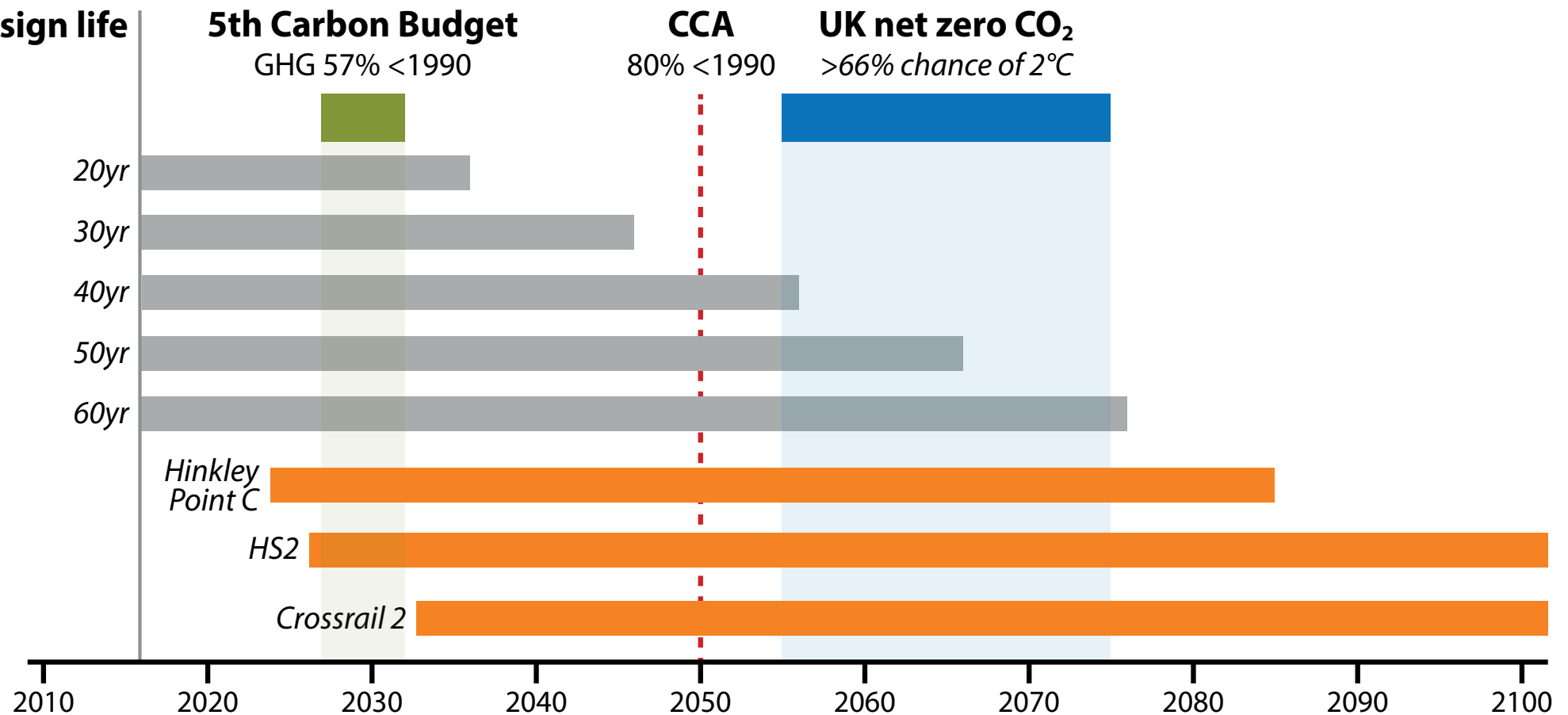
- » Requires maximum deployment of all identified mitigation options
- » Plus deployment of negative emissions technologies (up to max $\sim 100 \text{ MtCO}_2\text{e/yr}$)
- » Plus further offsetting elsewhere
- » Remaining emissions in current CCC scenarios are predominantly from aviation, agriculture and industry (mainly materials production *i.e. construction products*)

Figure 3.1. Residual UK greenhouse gas emissions in 2050 under Max deployment across all sectors



The implications for construction

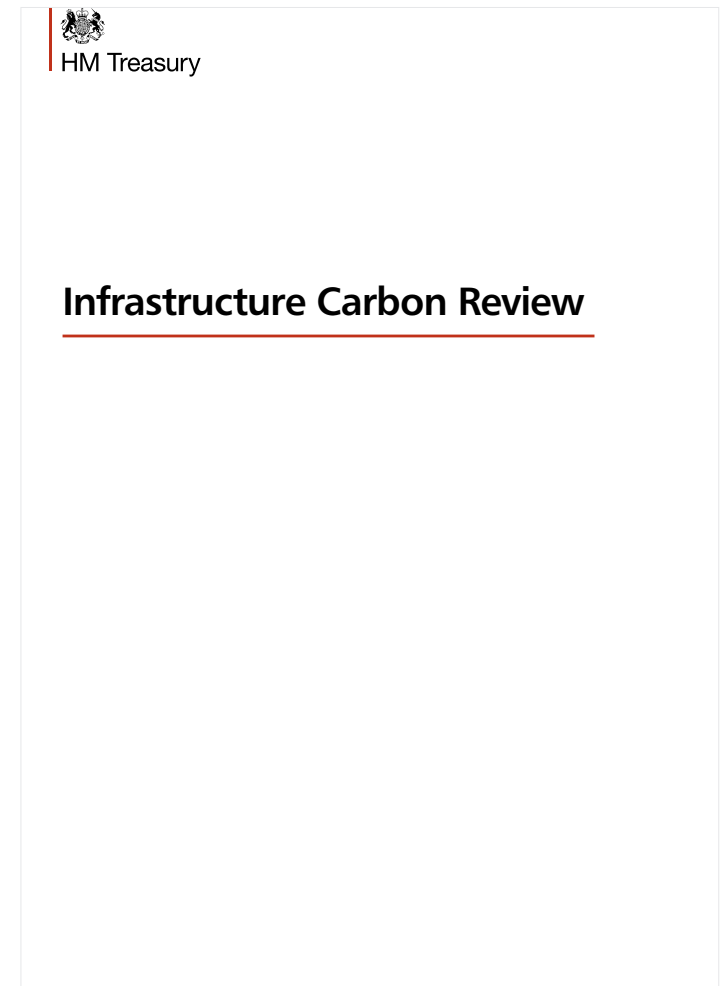
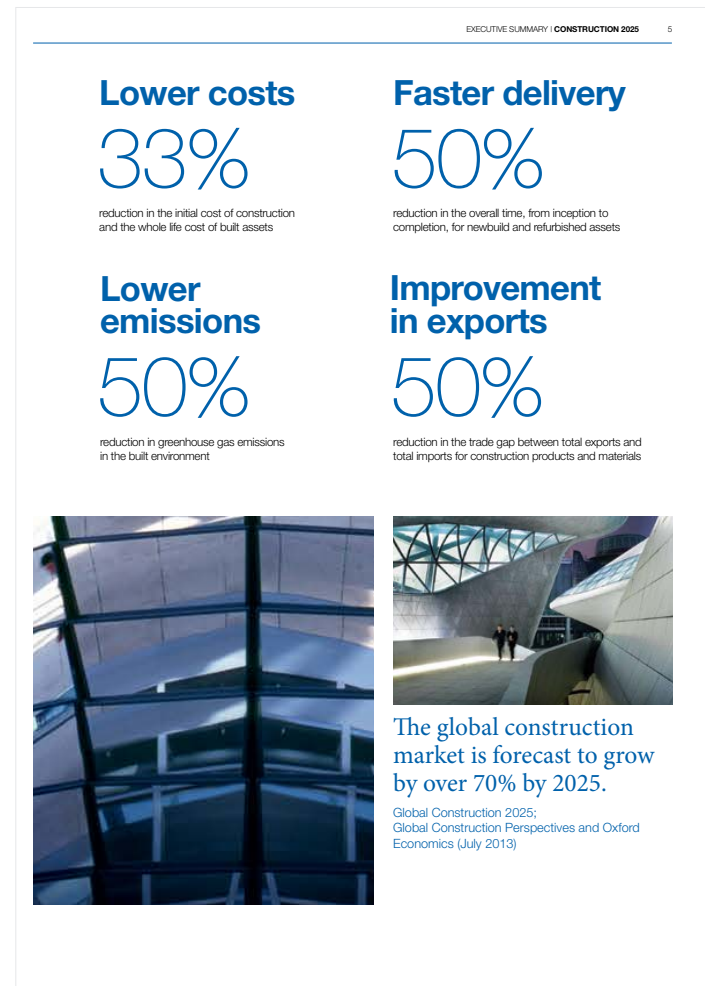
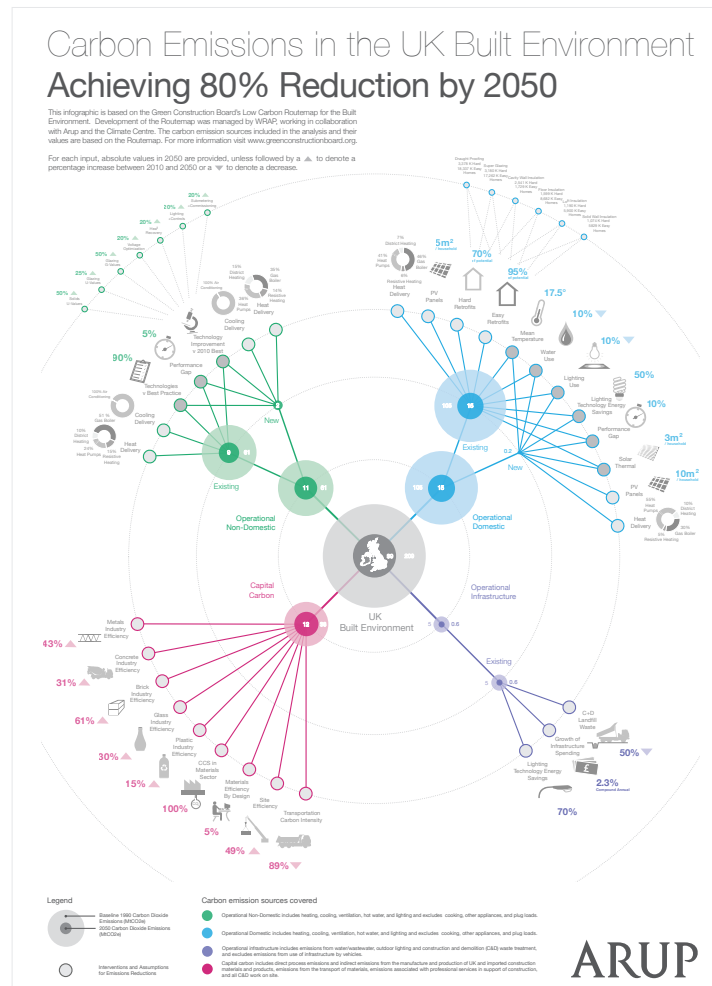
Many assets under design now must operate in a net zero nation



Construction 2025, Routemap and ICR

Reports set out required changes and target trajectory to 2050

- » Include ambitious carbon reduction targets
- » Provide baselines for *'built environment'* and *'infrastructure'* carbon emissions



Important considerations

Boundaries and objectives

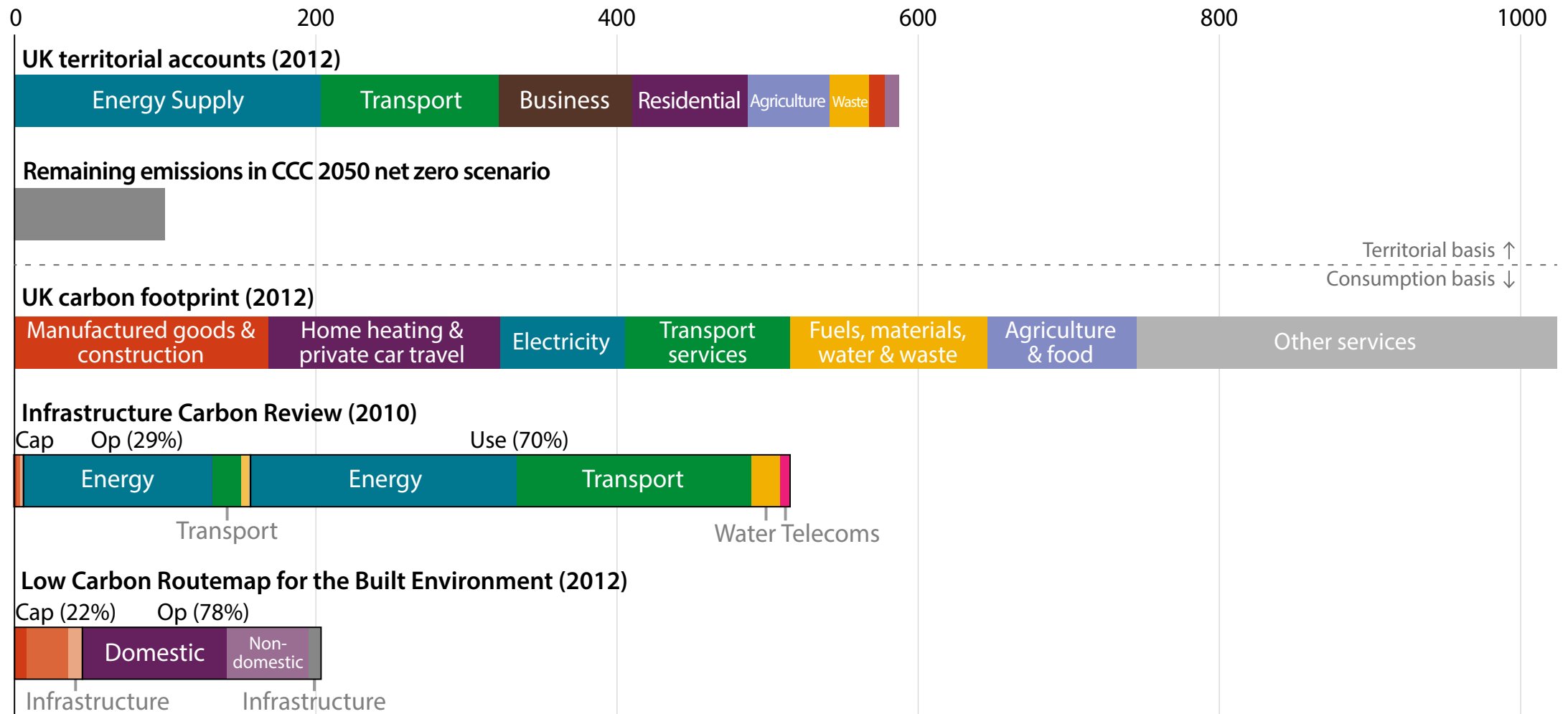
- » The goal is reducing whole life carbon on a whole economy basis across a growing stock of assets
- » Whole life carbon is made up of *Capital Carbon*, *Operational Carbon* and *Use Carbon* – though the precise definitions vary between reports
- » Important to consider whether industry has **control** or **influence** over the carbon, **when** the emissions will occur, and what the realistic scope for mitigation is

Baselines and methodologies

- » Numerous means of dividing the data, results in different baselines
- » Methodologies still under development and dependent upon coarse data
- » More collaboration and sharing of data will be crucial in improving understanding of how carbon is distributed along supply chains
- » The distribution of carbon varies widely between projects, the following slides are an industry overview

The challenge

A snapshot of UK greenhouse gas emissions (MtCO₂e)



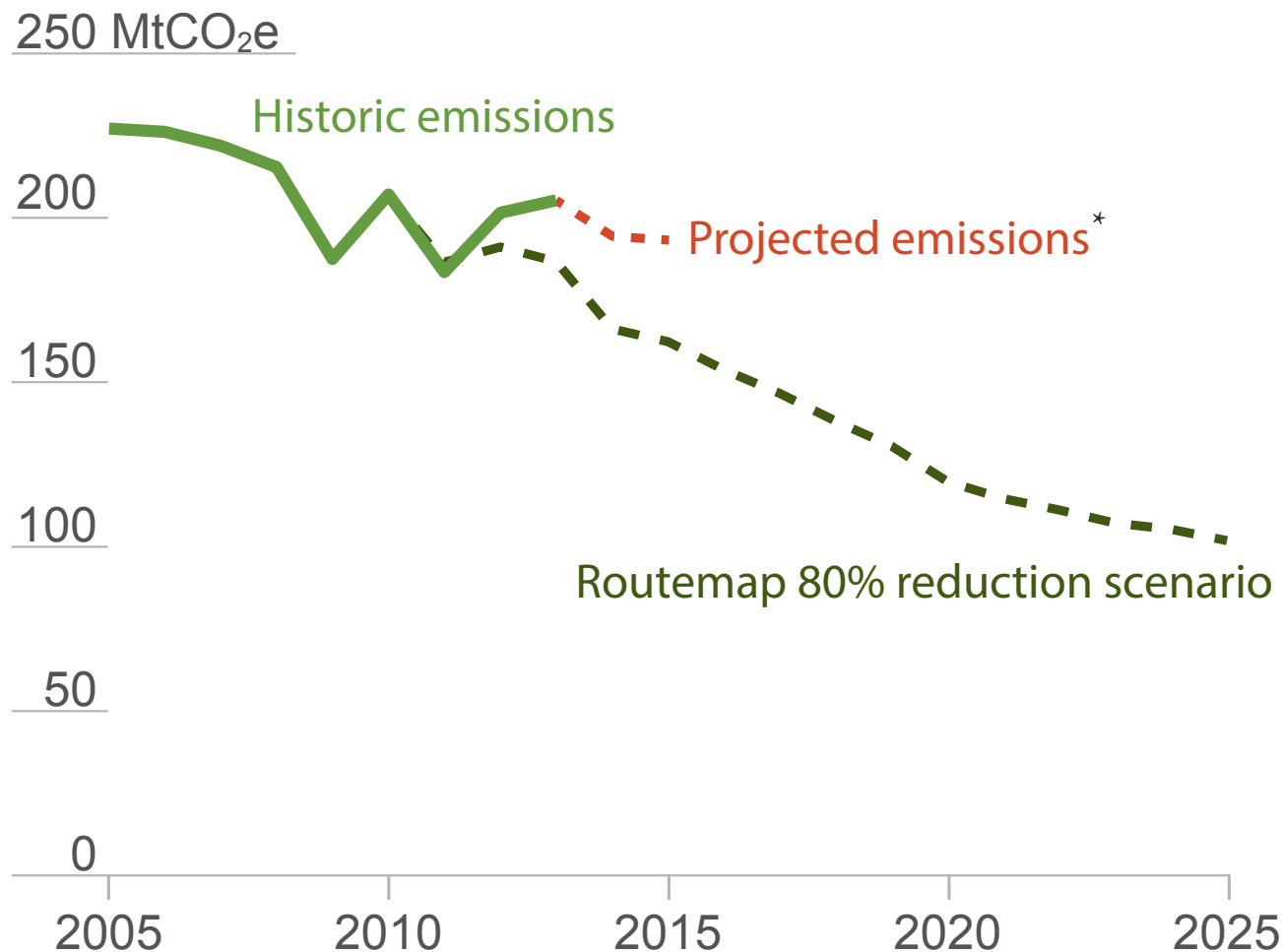
» Priorities are energy and transport

» However long term targets require reductions everywhere, including CapCarb

Progress so far

Routemap progress report produced in December 2015

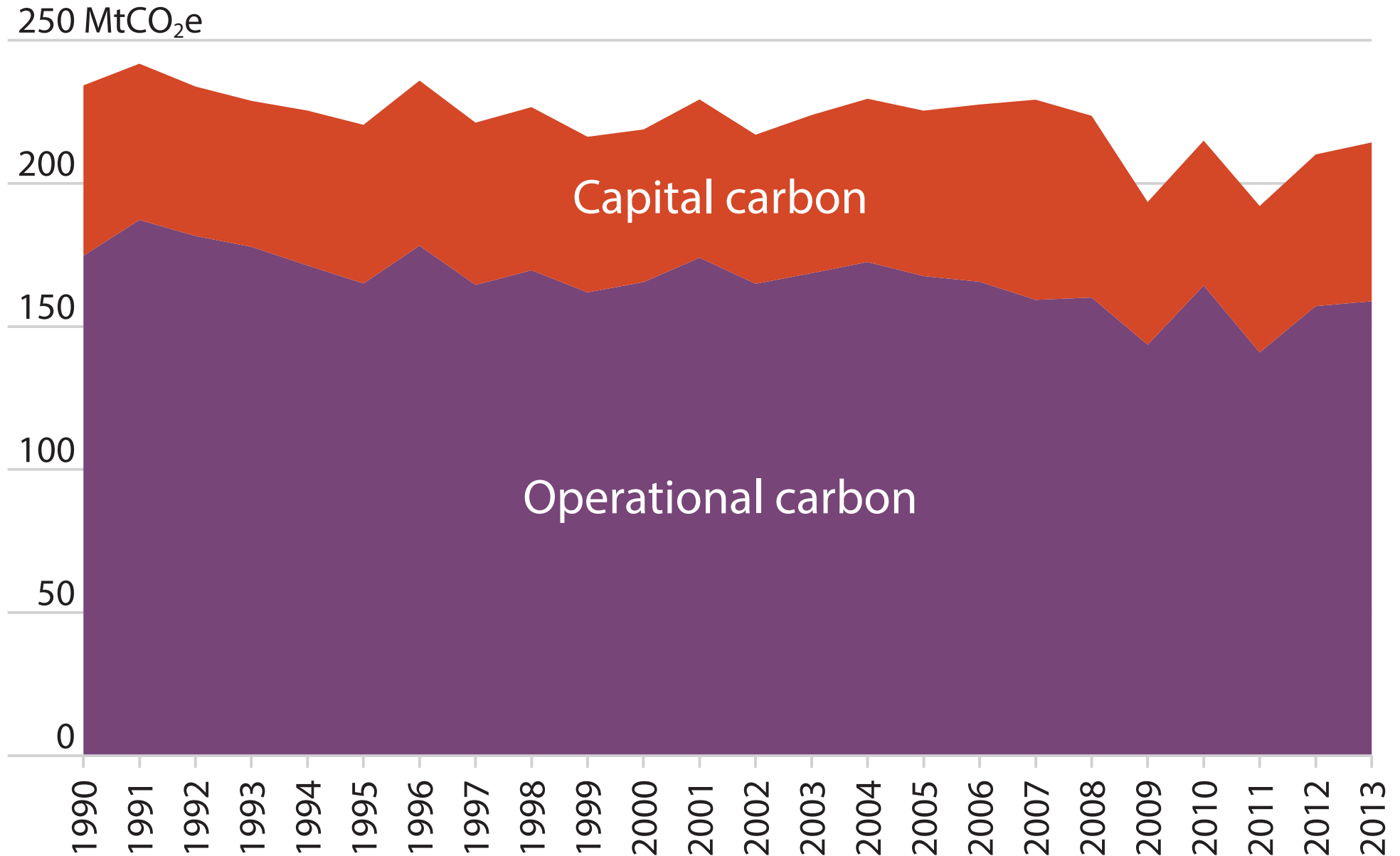
- » Progress to 2013 suggests we are not on trend to meet 2025 ambitions
- » Capital carbon emissions have increased since 2013 Routemap report



* Projected emissions based upon analysis by presenter using reported OpCarb (including provisional statistics for 2015) and projected CapCarb (using reported financial value of output and extrapolating historic emissions intensity trend)

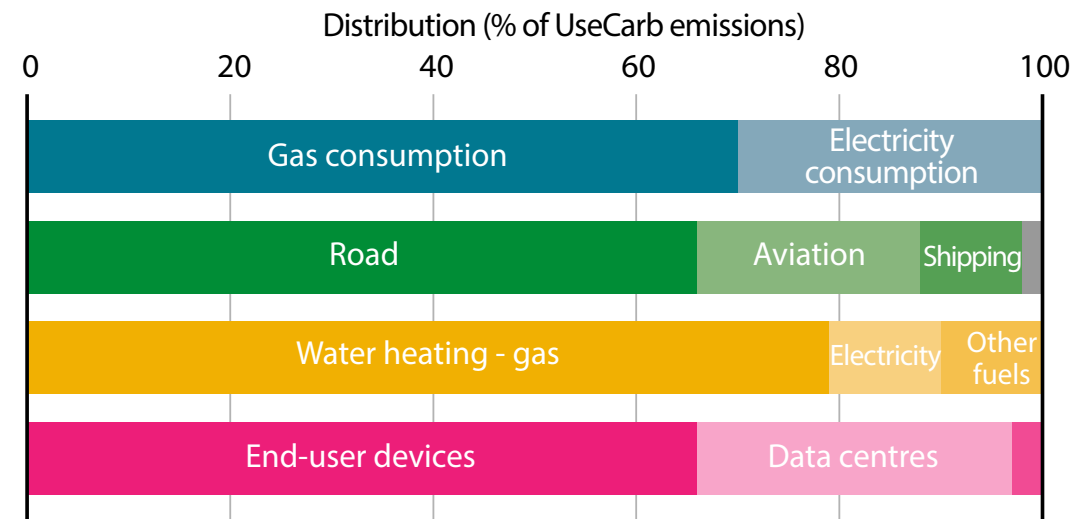
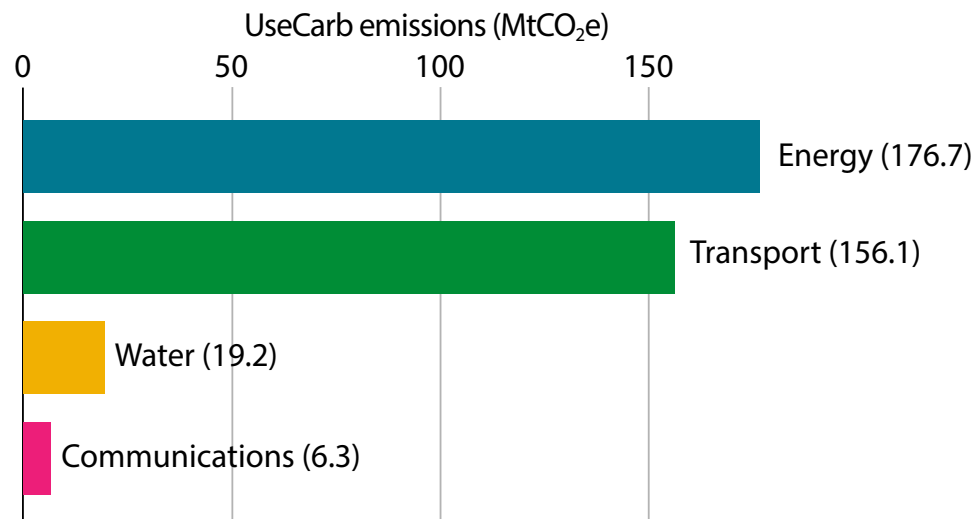
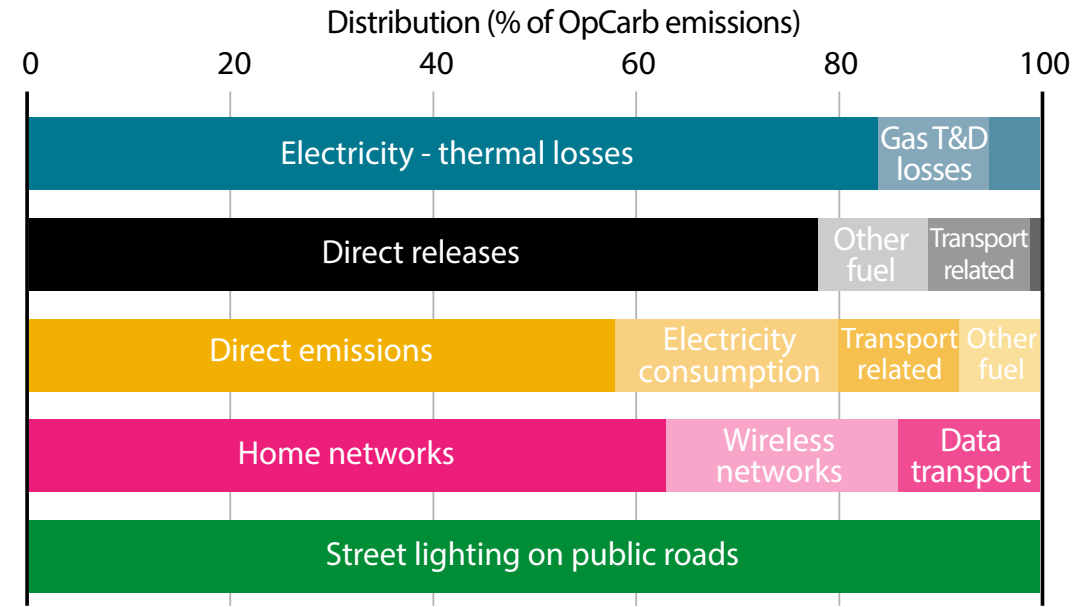
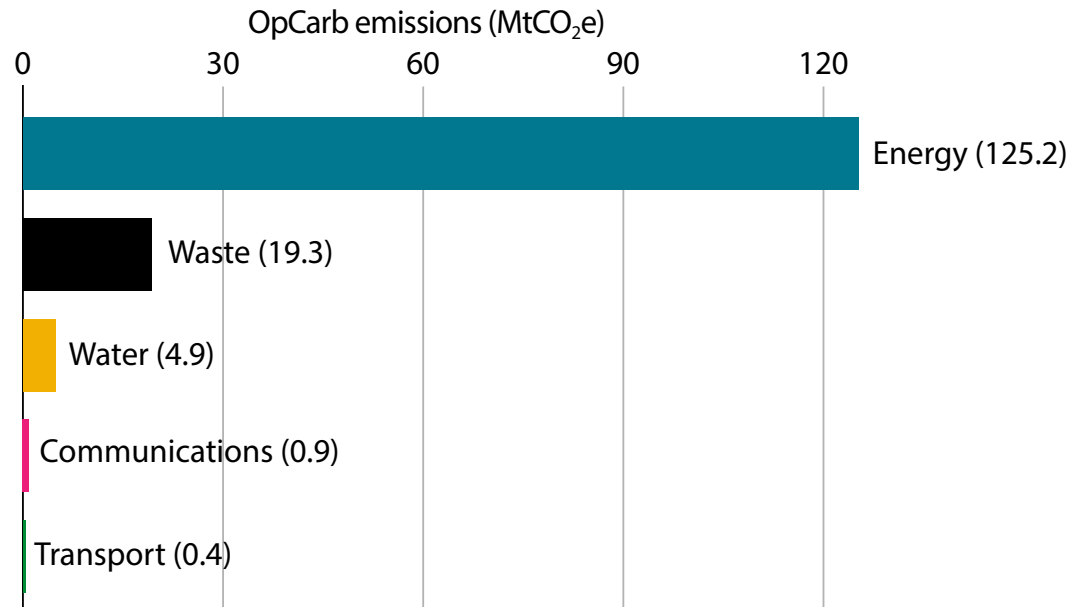
The trend

Built environment emissions 1990-2013



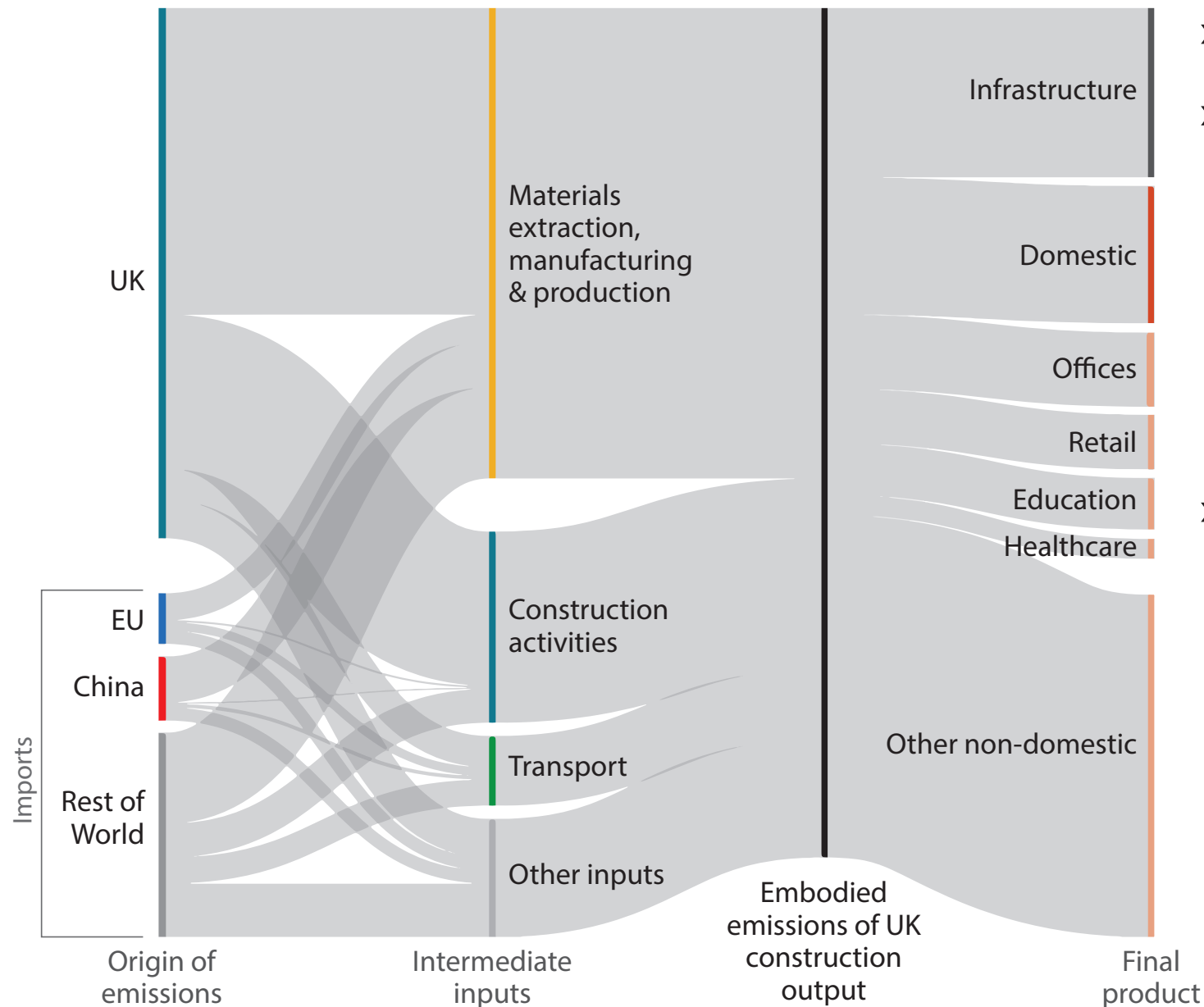
OpCarb & UseCarb in infrastructure

The bulk of emissions are related to energy and transport



CapCarb in the built environment

Estimated carbon footprint of UK construction supply chains

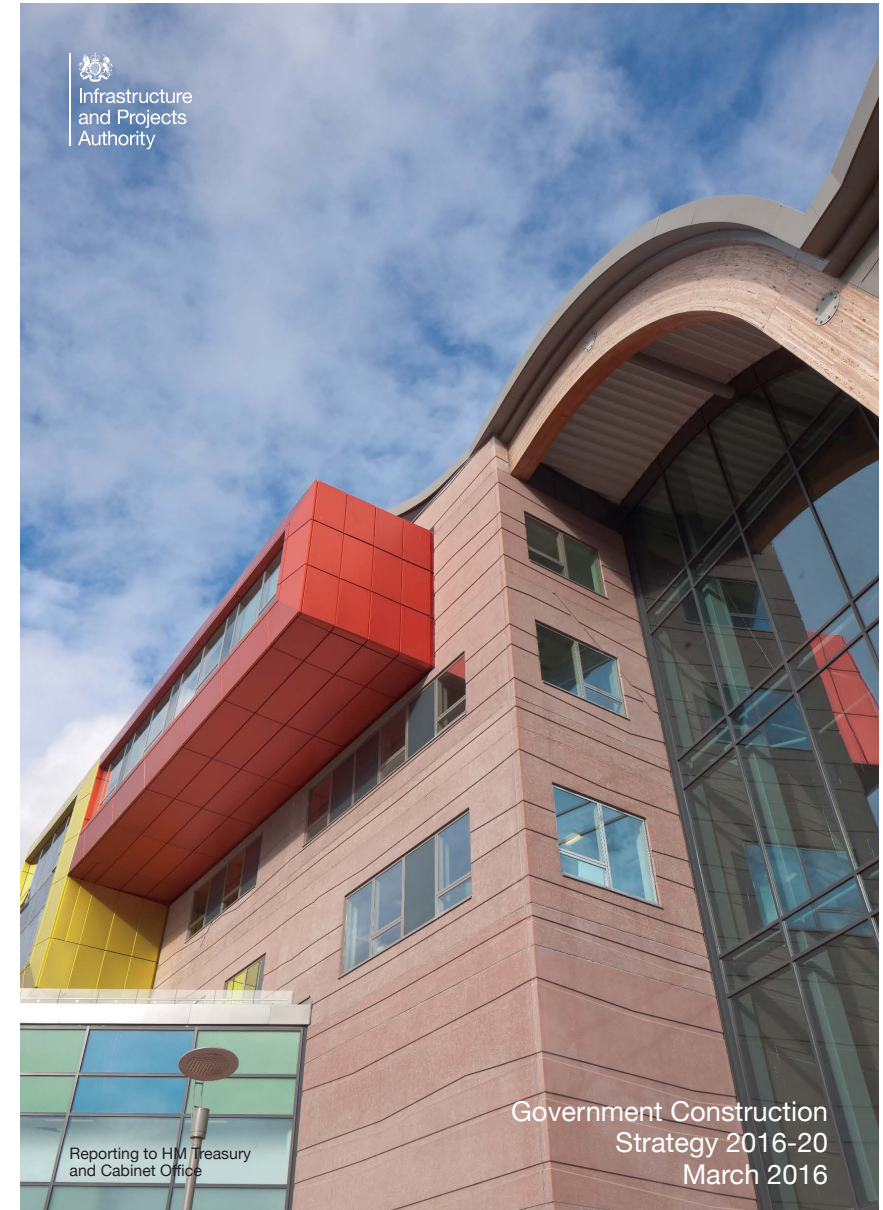


- » Based on limited data
- » Past approaches (e.g. ICR) have mostly relied on financial proxies, disregarding the carbon intensity of different asset types
- » Inclusion of more asset level data and sectoral projections will improve understanding

Government Construction Strategy

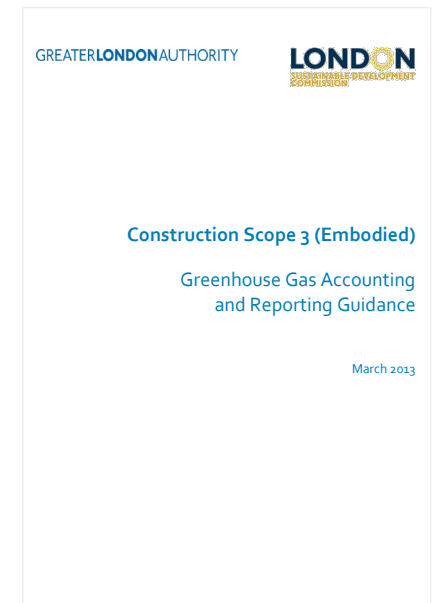
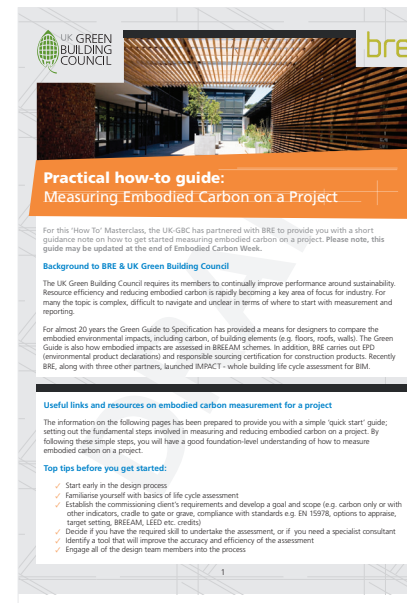
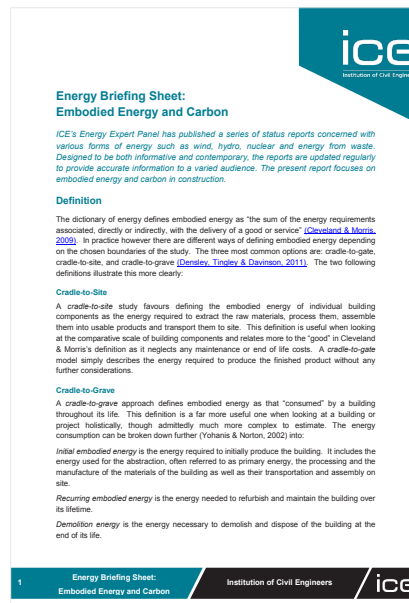
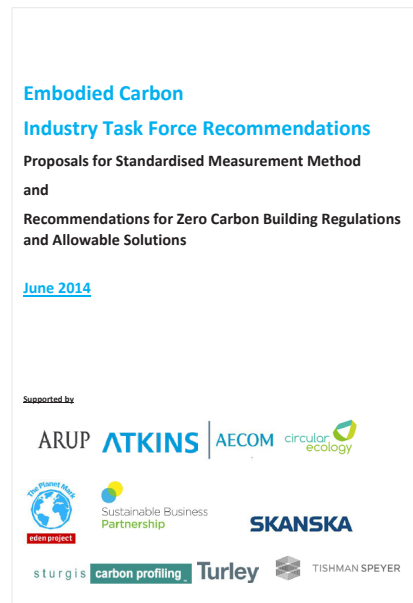
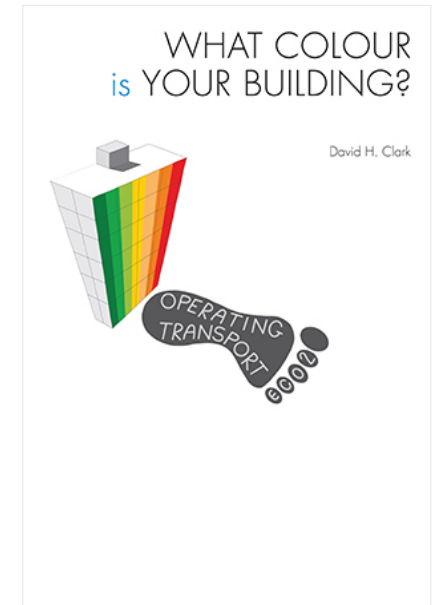
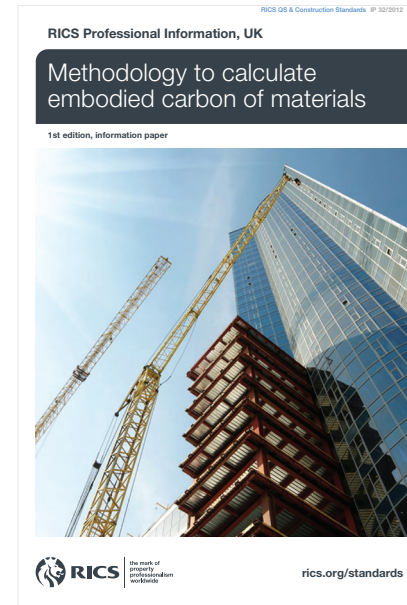
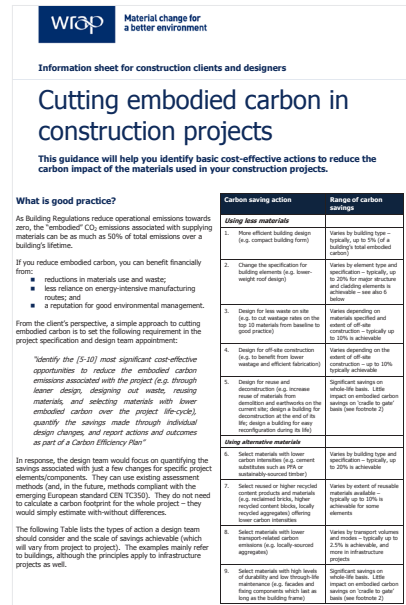
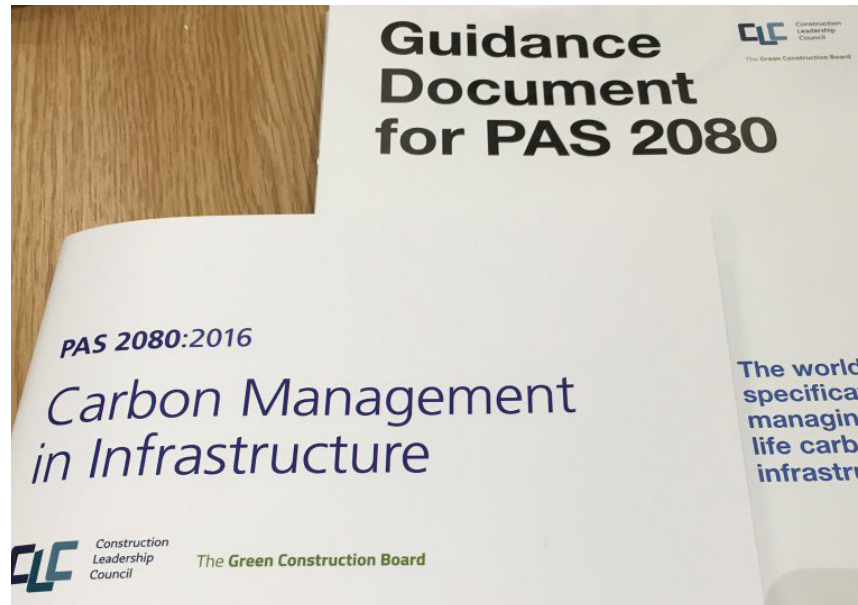
For the current parliament

- » One of the principal objectives is to *“enable and drive whole-life approaches to cost and carbon reduction”*
- » Objective 3.6 is to *“Develop data requirements and benchmarks for measurement of whole-life cost and whole-life carbon (embodied and operational)”*
- » *“Government contracts will encourage innovative sustainability solutions on carbon reduction where value can be demonstrated”*
- » Ultimately forming *“recommendations for a future approach”*



Guidance on carbon reduction

Array of recent industry publications



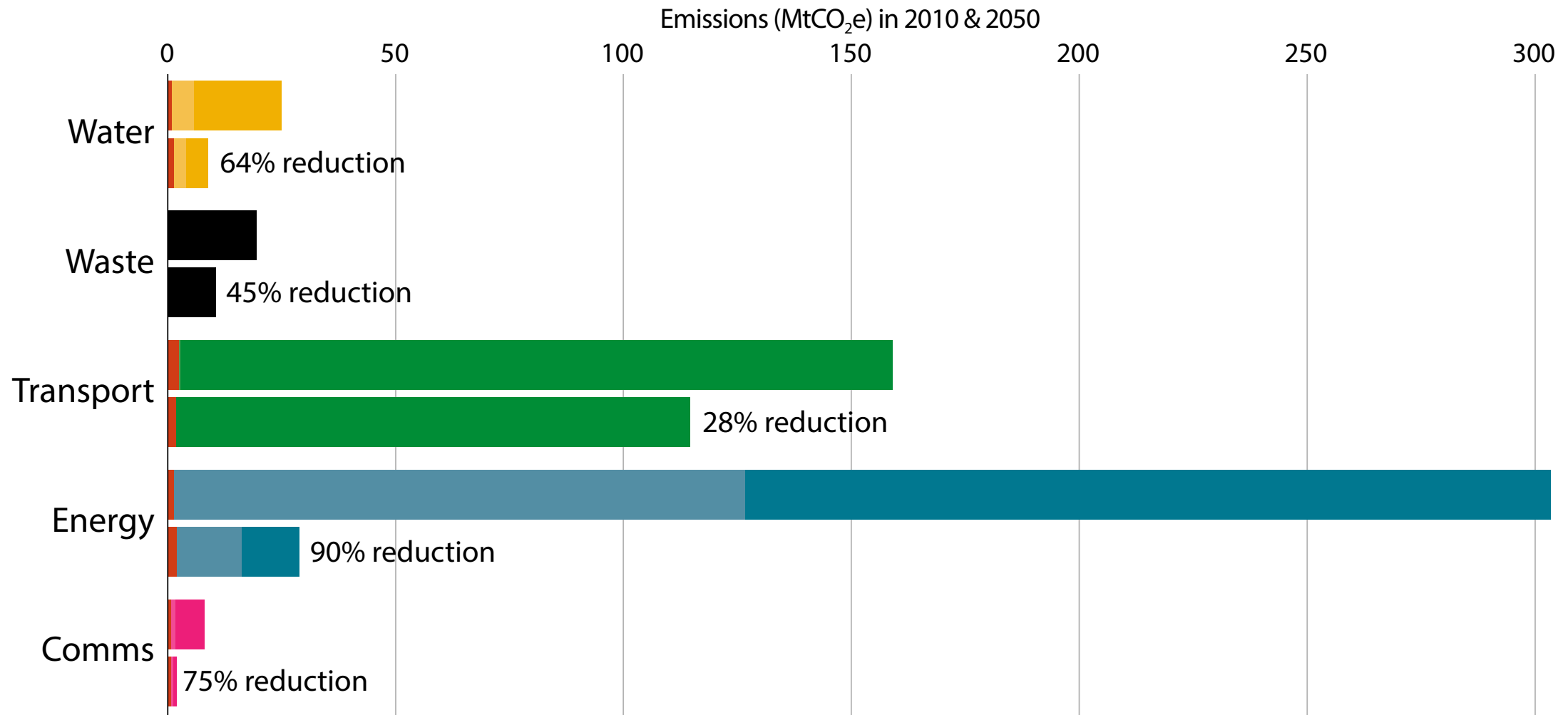
Progress in carbon assessment practice

Recent improvements but still much to be done

- » Assessment now routine in some sectors but still non-existent in others
- » Best practice yet to be effectively shared between infrastructure and buildings
- » Increasing availability of product data (e.g. 3000+ EPDs) but still high dependency upon generic data
- » Many challenges still to be overcome, particularly in gathering accurate data on site and improving carbon literacy
- » Benchmark data are slowly emerging for some project types
- » Project carbon intensity targets have been introduced by some clients but project targets are not yet consistent with sectoral or national targets
- » International precedents for using carbon criteria to assess tenders in public procurement; the introduction of regulations requiring whole life carbon measurement and reporting; and regulation of environmental claims from product manufacturers

Future scenarios

Infrastructure Carbon Review 'best case' reductions

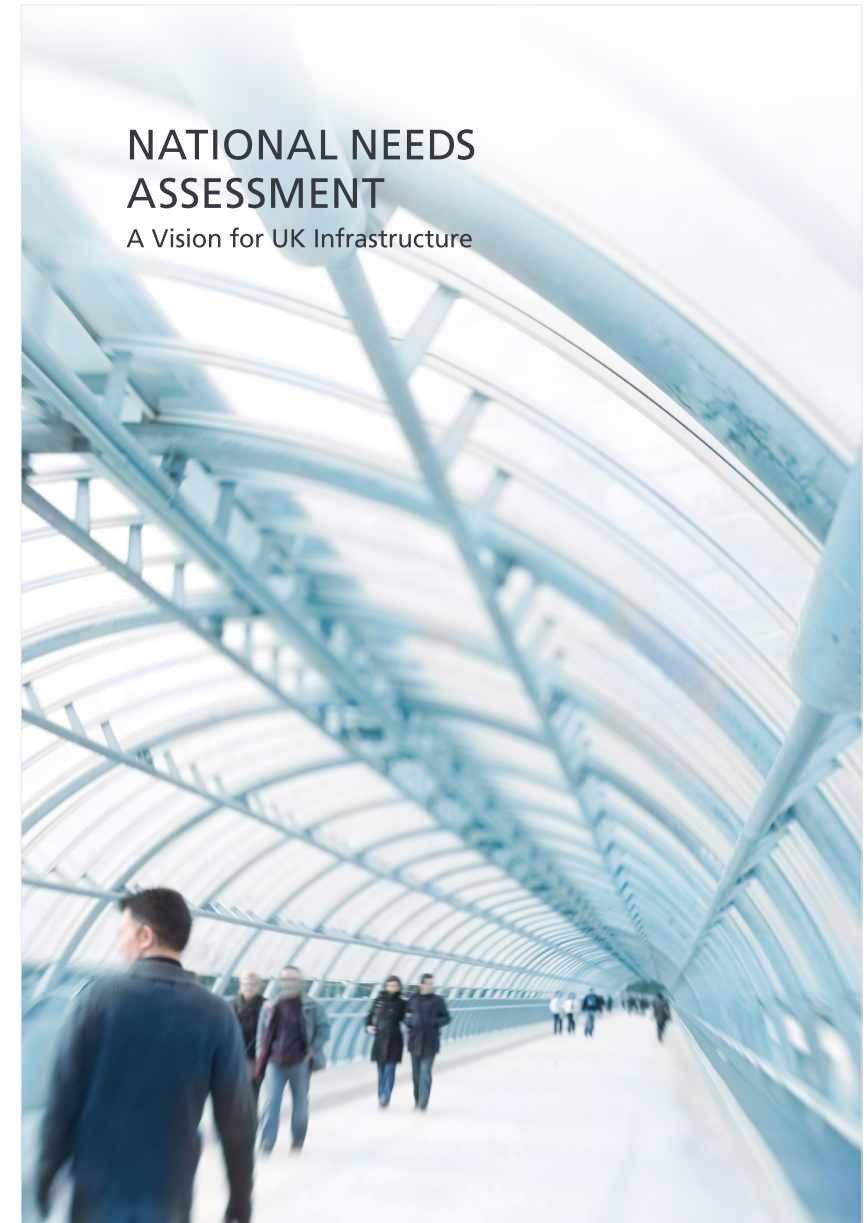


- » Suggests infrastructure makes up 93% of total UK emissions in 2050 (by applying highest possible level of known measures in each sector)

National Needs Assessment

Sets out significant challenges ahead

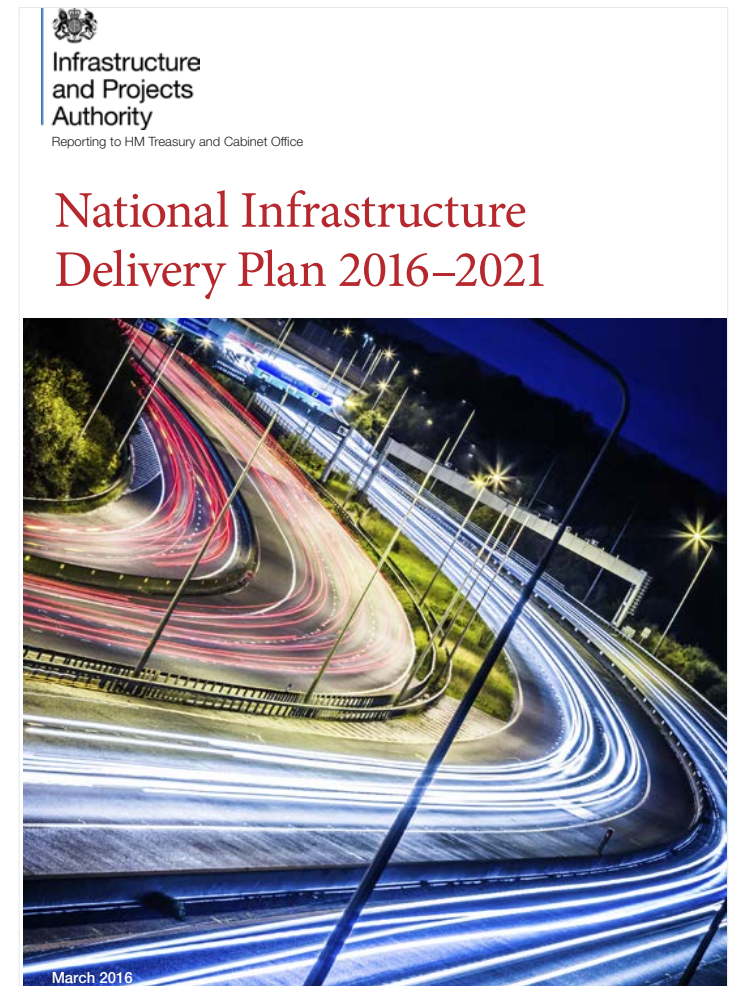
- » Projected population of 75 million by 2050
- » Need 300,000 new homes per year for foreseeable future
- » Traffic growth of up to 50% in some regions
- » High projected costs of flood risk management
- » Total energy demand may increase from 900 to 1200 TWh/year
- » Supporting ITRC analysis sets out carbon implications for a range of scenarios
- » Greater understanding of local considerations and interactions across this system of systems is essential in determining carbon impacts



Scope for mitigation in infrastructure

CIEMAP assessment of embodied carbon in NIP for CCC

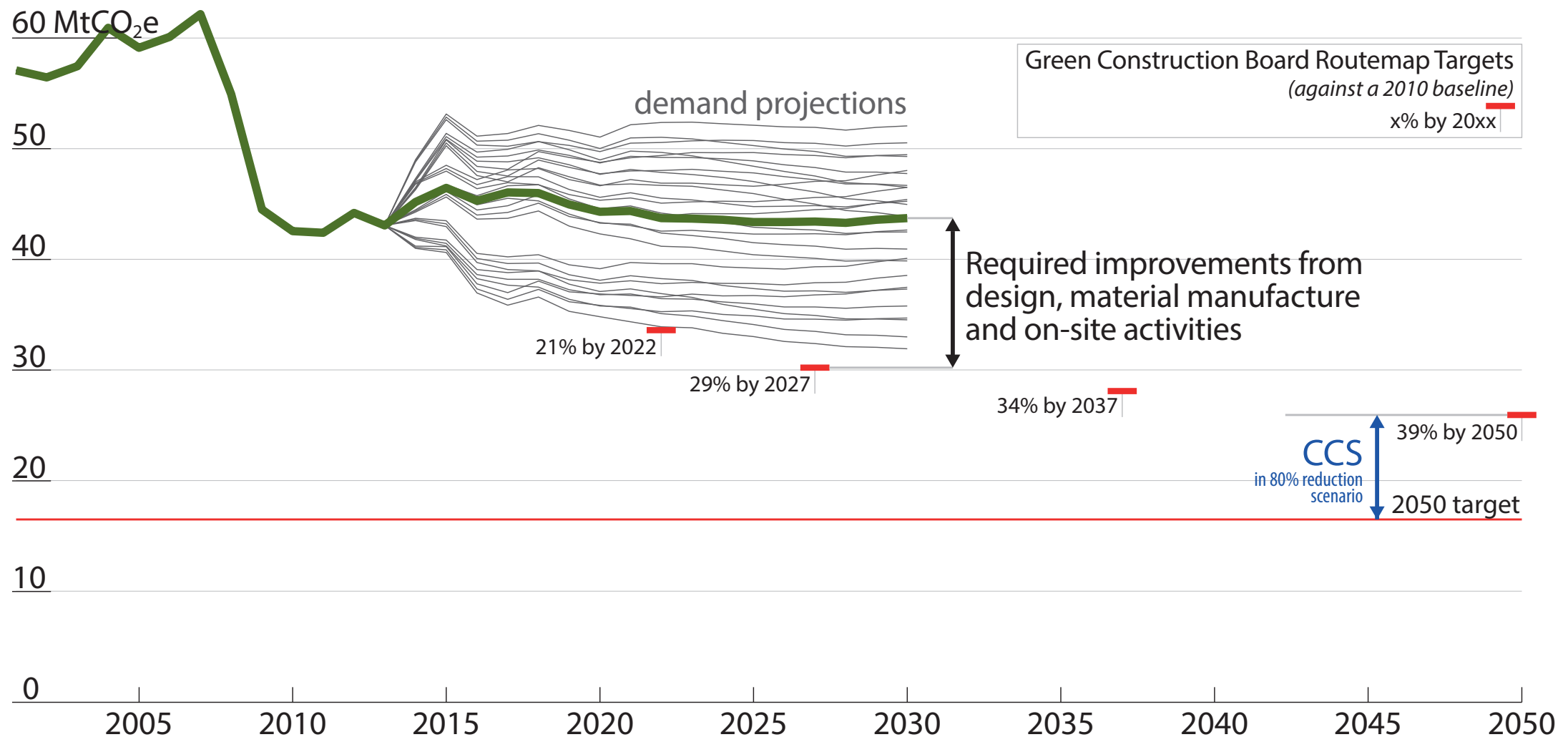
- » High level assessment projected ~244 MtCO₂e associated with 2014 NIP
- » Next step is to integrate embodied carbon into asset level demand projections



Required reductions in CapCarb

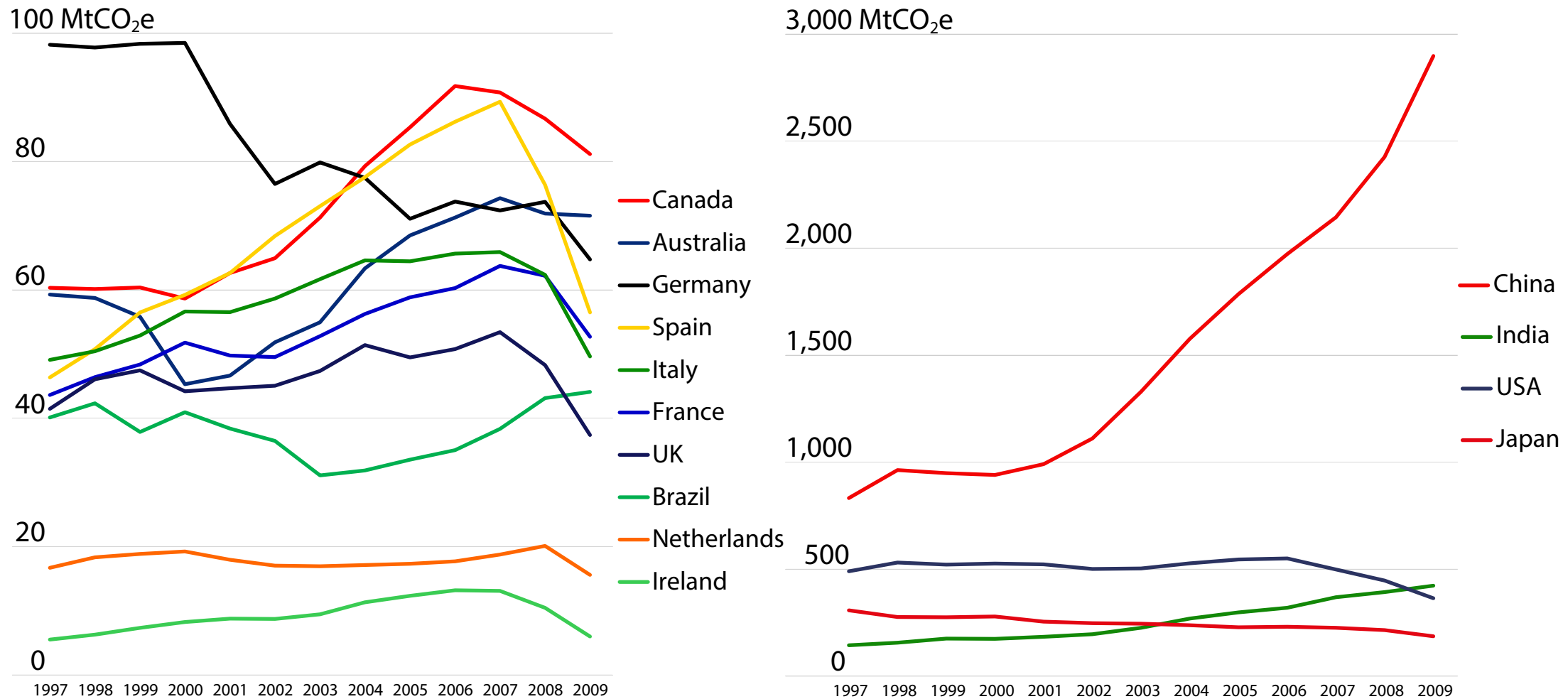
Anticipated embodied emissions of UK construction 2001-2030

- » 27 scenarios using UK Buildings and Infrastructure Embodied Carbon model
- » **Including** improvements in grid intensity from DECC (2014)



Vast international scope

GHG emissions of construction sector supply chain by country



» Construction firms in these 14 countries alone influence 4.4 GtCO₂e of supply chain emissions

Summary

Achieving net zero later this century requires urgent action now

- » The net zero emissions goal creates a new carbon context
- » Earlier mitigation will be more cost effective and reduces dependence upon unproven negative emissions technologies
- » Faster progress is needed to get the construction industry back on a trajectory that is consistent with national targets
- » New tools and guidance have supported improvements in practice but these changes have only permeated certain sectors of the industry
- » Collaboration is needed to improve our understanding of how carbon is distributed
- » Scenario analyses show the likely impact of demographic trends and increasing significance of CapCarb
- » The substantial global scope for mitigation in construction means there will be a market for low carbon skills, products and expertise
- » The UK is well positioned to tap into this market but needs to stay ahead of the competition. That means driving best practice at home now.