Committee on Climate Change

UK Committee on Climate Change: Emission Scenarios & Targets

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UK Climate Change Bill (Nov 2008)

- Commitment to reduce CO2 emissions by at least 60% (80%) from 1990 levels by 2050
- Established system of legally binding “carbon budgets”
- Established the CCC as an independent body to provide expert advice on budget levels and the policies to reach them

Climate Change Committee: Responsibilities

Recommend

- 2050 CO_2 target:
  - 60%, 80%, or other
- First 3 CO_2 budgets:

2008-12, 2013-2017, 2018-2022 (≥26%)

- How much buy-in of credits allowed
- Whether & how international aviation & shipping should be included
- Budgets for CO_2 or all GHGs

www.theccc.org.uk

Identify implications of proposed budgets for

- Competitiveness
- Security of supply
- Fuel poverty
- Fiscal revenues
- The regions
- Ancillary environmental effects

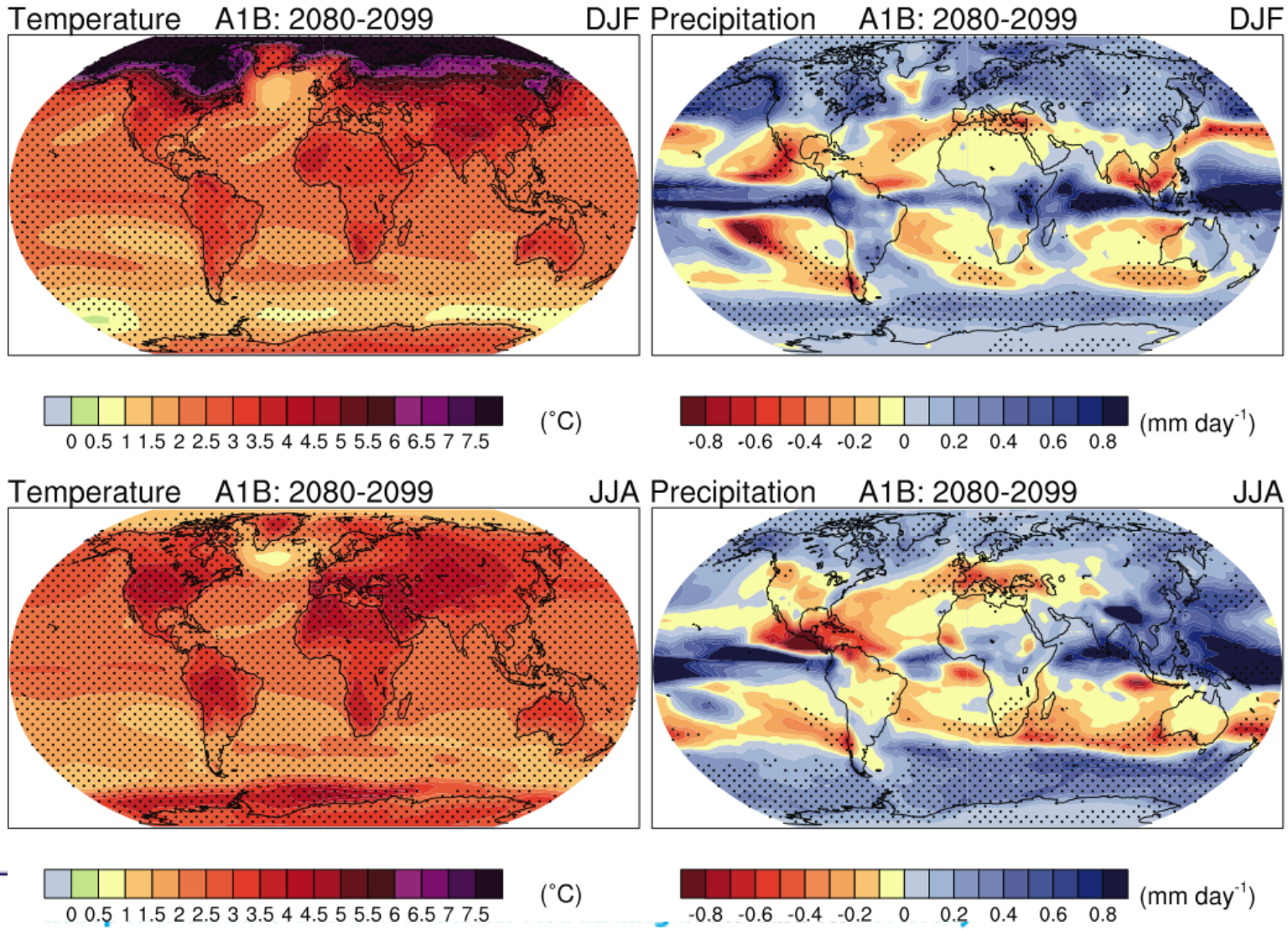
Annual reports on

- Progress against budgets
- Extent of borrowing/banking
- Other?

Contents

IPCC A1B Surface Temperature & Precipitation Projections
Dec-Feb and June-Aug: 2090s relative to 1980-99

Committee on Climate Change



CCC Climate Change Emission Scenario Criteria

For the maximum temperature rise in the 21st Century

1. The 50:50 level should be close to 2ºC

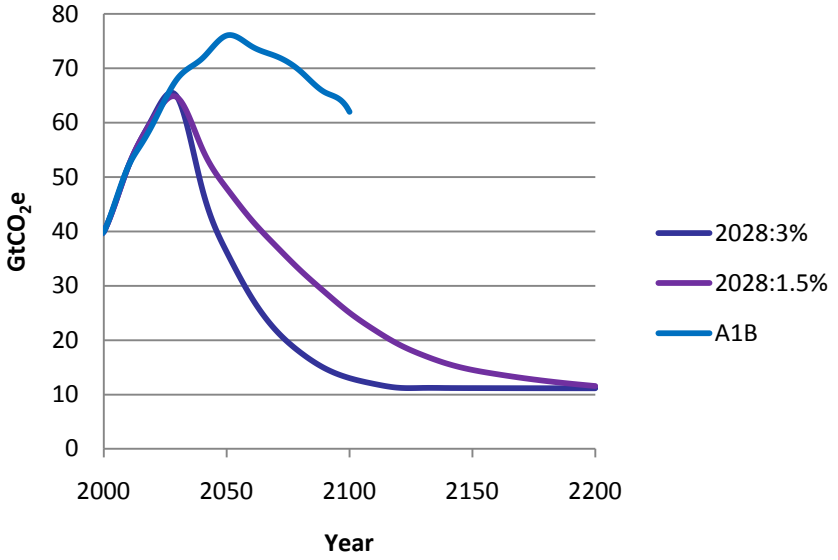
2. The probability of reaching 3-4ºC should be very low

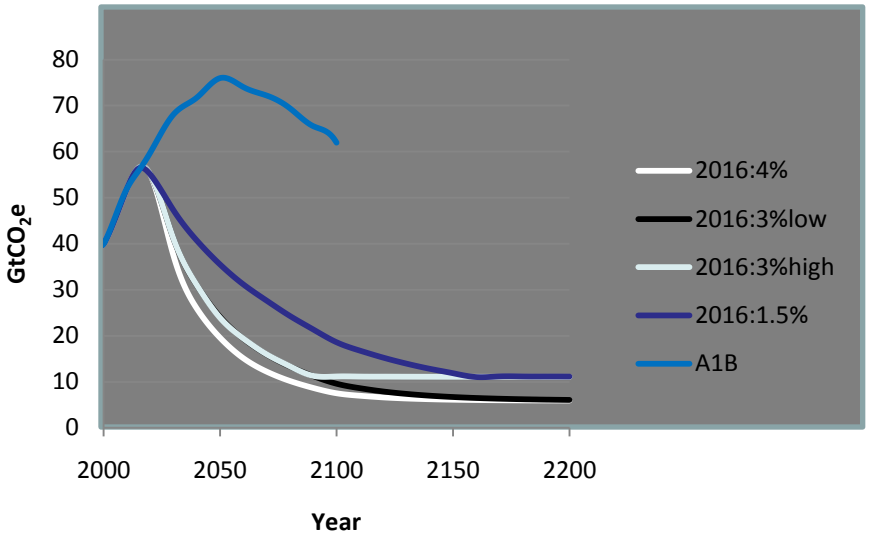
MAGICC model with a range of possible values for 3 crucial parameters: climate sensitivity, ocean diffusivity, & carbon cycle feedback

Modelling runs performed by Jason Lowe (UK MetO Hadley Centre)

Kyoto GHG emissions trajectories designed by the CCC

- Peak in emissions around 2028 or 2016.
- Subsequent reductions in CO_2 emissions range from 1.5% to 4% per year.
- Other Kyoto gas emissions are reduced at consistent rates, with consideration of the ultimate emissions 'floor' that might be reasonably reached.

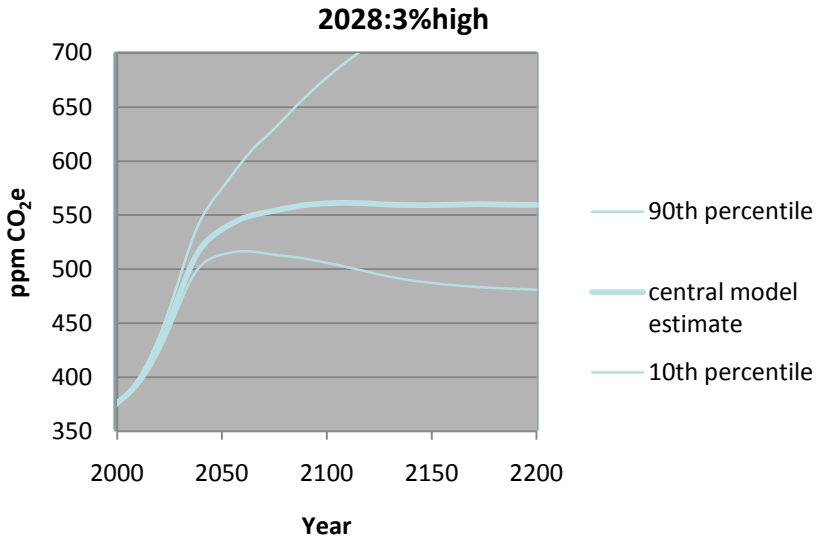


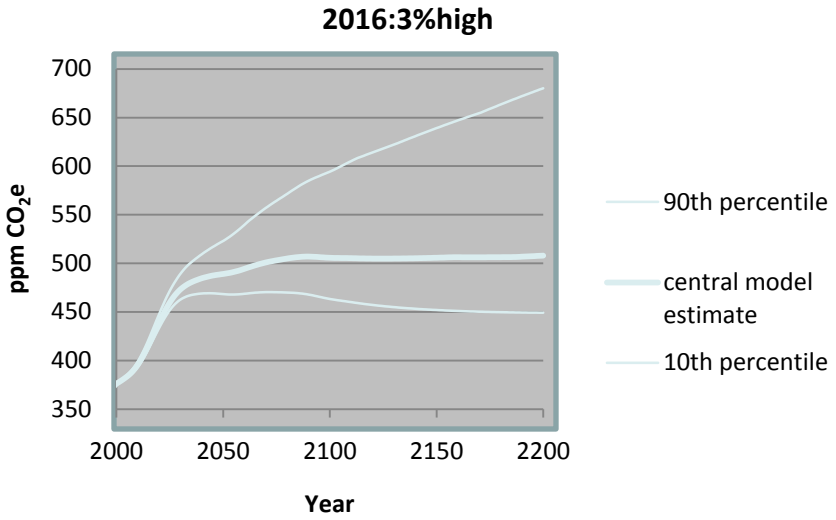


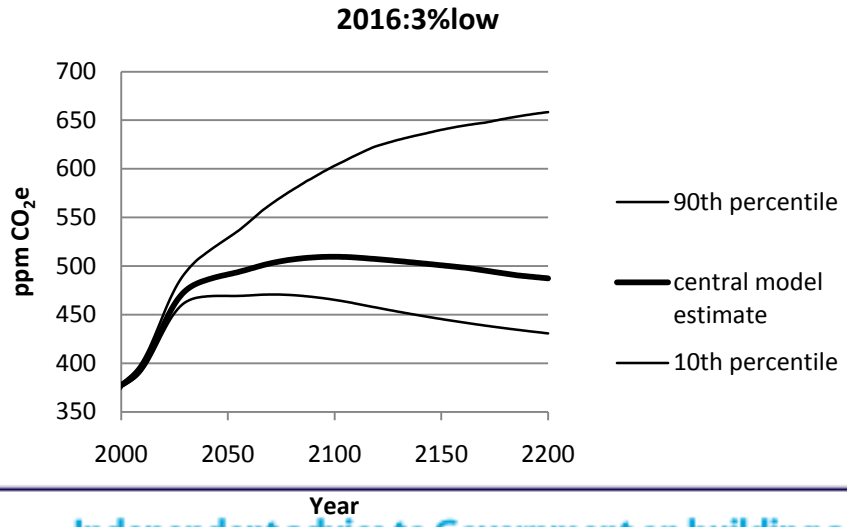
Peak 2028
CO_2 emissions reducing at 1.5% or 4%.

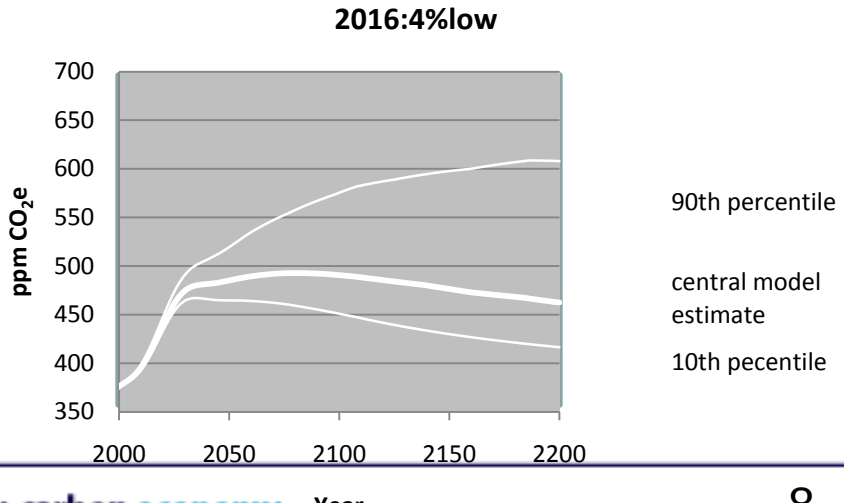
Peak 2016
CO_2 emissions reducing at 1.5% , 3% or 4%. 2016:3% and 2016:4% were also given lower emissions floors

Some projected CO_2e concentrations

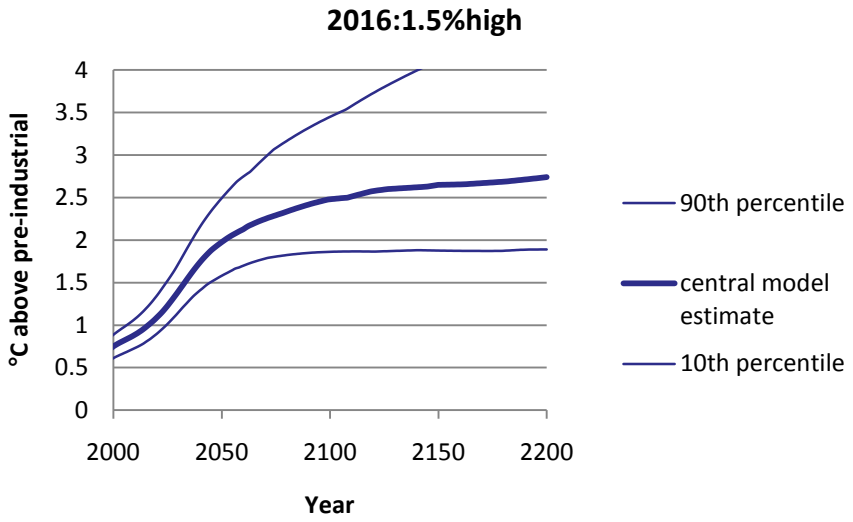


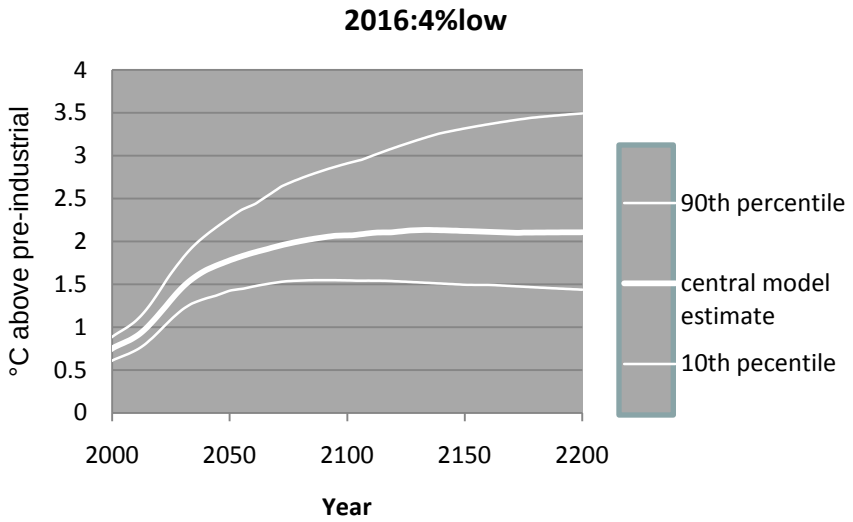






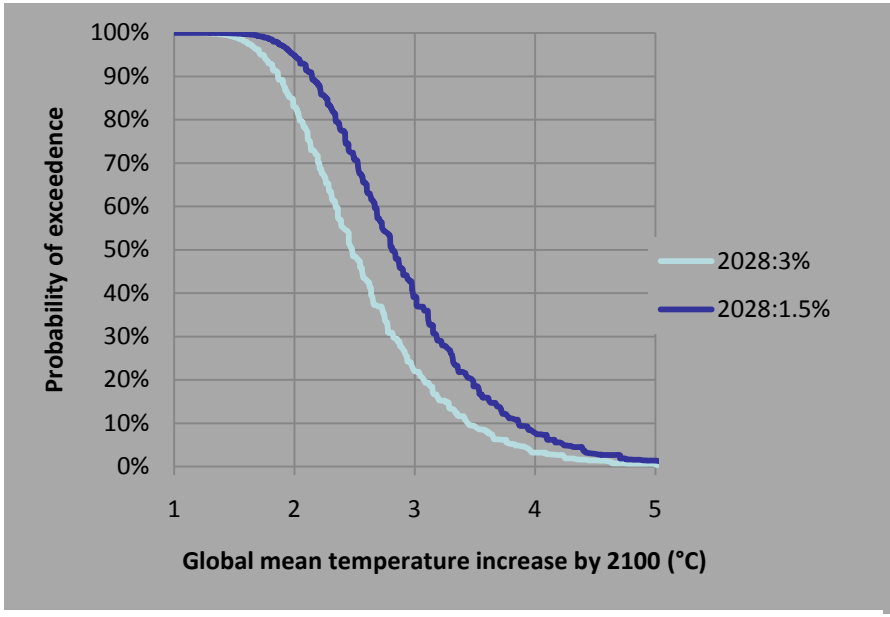
Examples of projected global mean temperatures

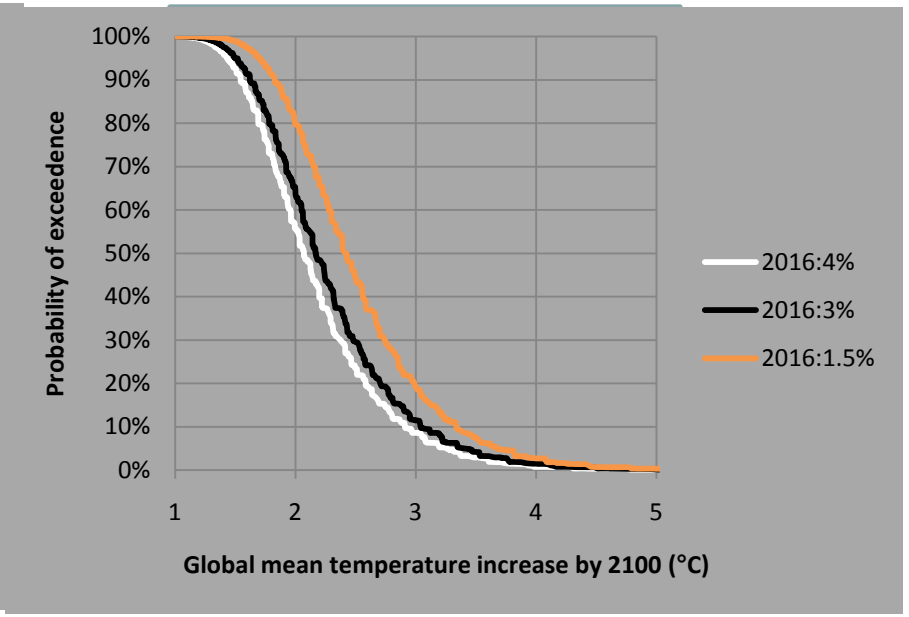




Cumulative probability distributions of global mean temperature increase by 2100

Chance of exceeding ....



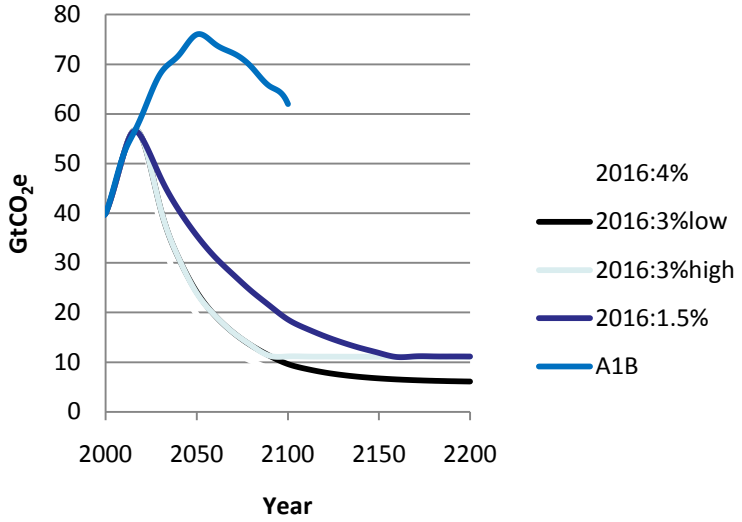


Preferred trajectories: emissions target for 2050

CCC 2008

Emissions trajectory	Kyoto gas emissions ($GtCO_2e$)			2050 emissions cut, from	
	1990	2007	2050	1990	2007
2016:3%	36.1	48.1	23.9	34%	50%
2016:4%	36.1	48.1	19.6	46%	59%

Broadly in line with the G8 commitment to halve emissions by 2050.



Cumulative emissions perspective

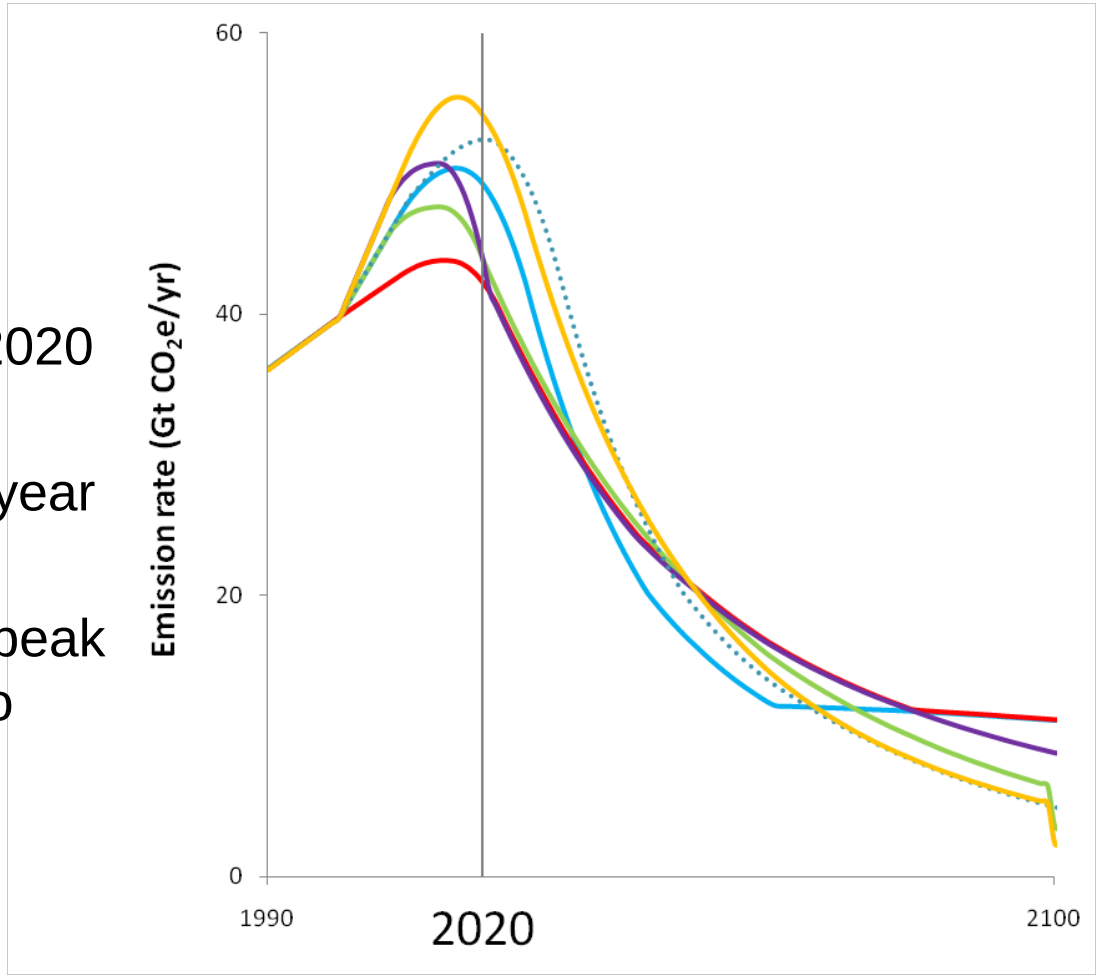
Years	Gt CO_2e	Tt Ce
1990-2008	800	0.22
1990-2050	2420-2540	0.66-0.69
1990-2100	3000-3200	0.82-0.87

Some 50:50 2C Scenarios

Met Office Hadley Centre

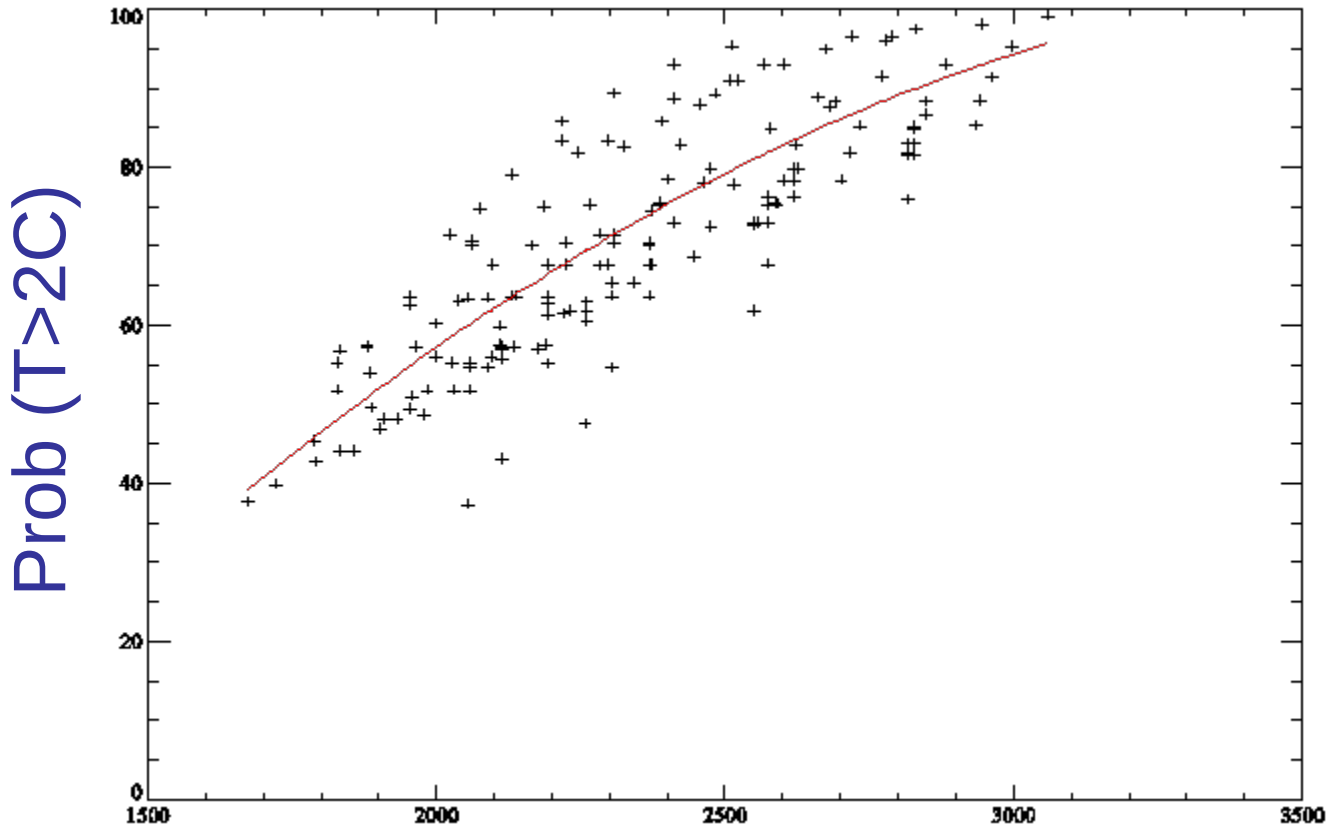
Jason Lowe

- Peak emissions in 2014, 2016, 2020
- Reduction rates at least 3% per year
- Later peak needs stronger post-peak reduction rates and/or lower/zero long-term emissions



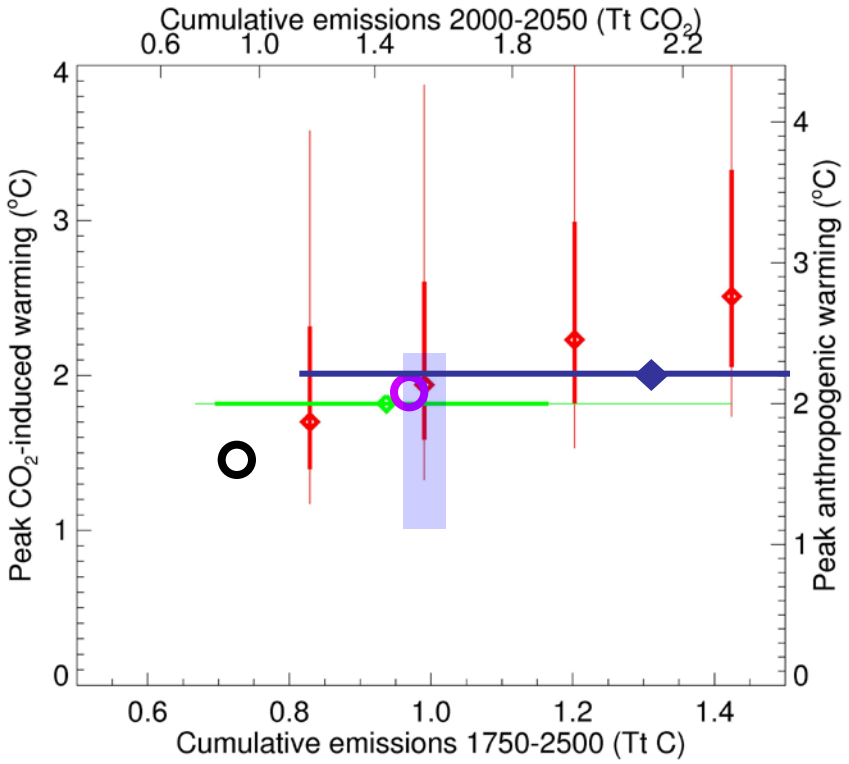
Prob(T>2C) vs. cumulative emissions

Jason Lowe



Met Office Hadley Centre

Cumulative Carbon Perspective Summary



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Myles Allen

- "Likely" & "very likely" confidence intervals on peak CO_2-induced warming, A09 (left and lower axes).
- "Likely" & "very likely" intervals on probability of temperatures >2°C, M09 (right and upper axes).
- "Very likely" interval on peak °C/TtC from Matthews et al (2009).
- "Likely" interval on 1750-2500 emissions giving 2°C, Zickfeld (2009)
- UKCCC recommended budget:
  - 2,100 $GtCO_2e$ over 1990-2050.
  - ≈ 0.96 TtC 1750-2500.
  - 50% chance of exceeding 2°C.
- WBGU recommended budget:
  - 750$GtCO_2$ over 2010-2050
  - ≈ 0.75 TtC 1750-2500.
  - 30% chance of exceeding 2°C.

Preferred trajectories: emissions target for 2050

CCC 2008

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2016:3%	36.1	48.1	23.9	34%	50%
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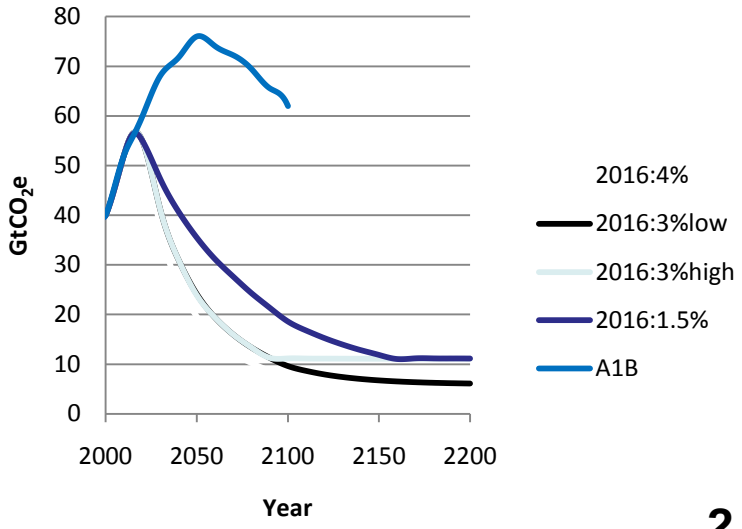

Cumulative emissions perspectiveb

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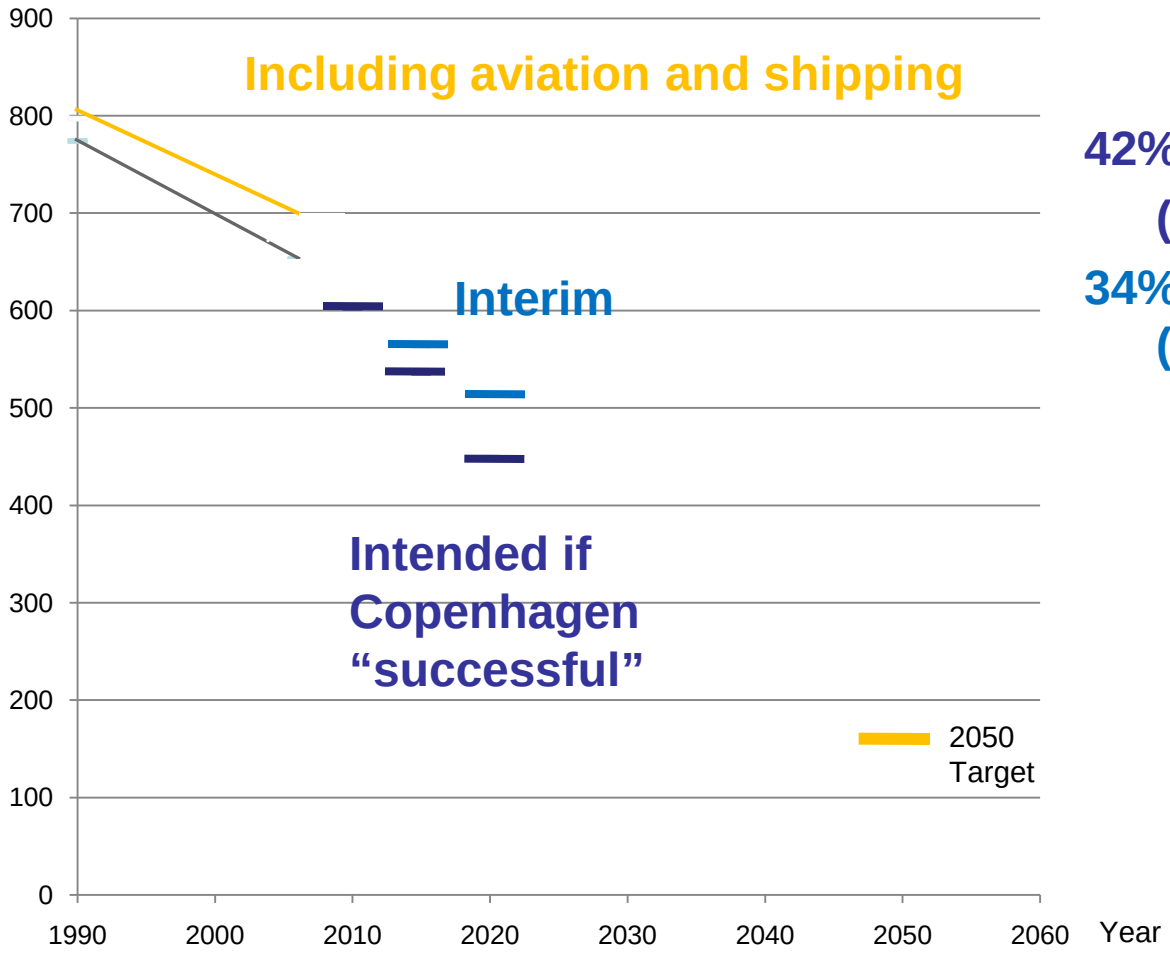
1990-2008	800	0.22
1990-2050	2420-2540	0.66-0.69
1990-2100	3000-3200	0.82-0.87

2.1-2.6 tCO_2e per capita in 2050

UK CO_2e emission targets



42% below 1990 in 2020

(31% below 2005)

34% below 1990 in 2020

(21% below 2005)

Interim budgets accepted by UK Government & Parliament

Meeting required reductions in UK

Reducing power sector emissions:

Renewables (Wind, solar, tidal and marine, biomass), nuclear, CCS

Application of power to transport and heat

Reducing transport emissions:

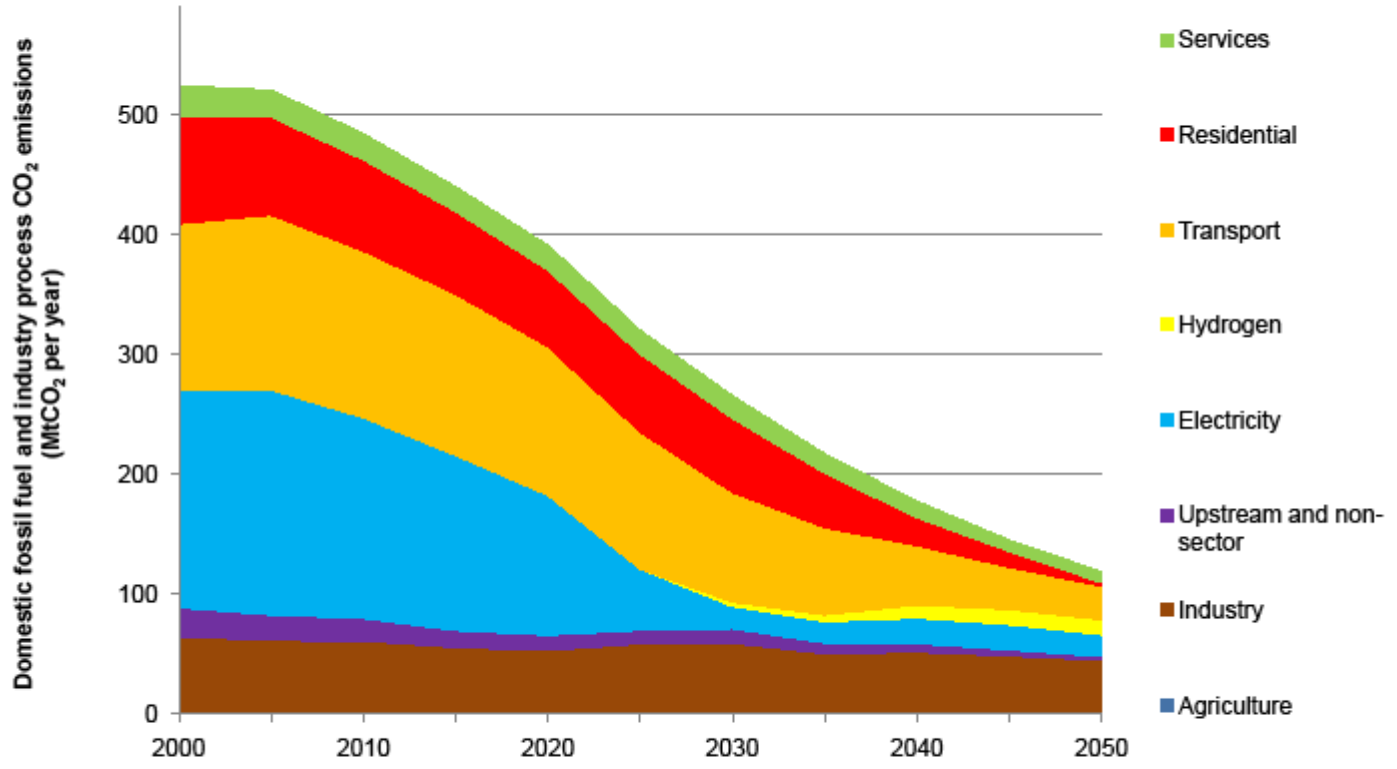
- Fuel efficiency
- Electric/plug-in hybrids

  Bio fuels (first vs. second generation)

Reducing heat emissions:

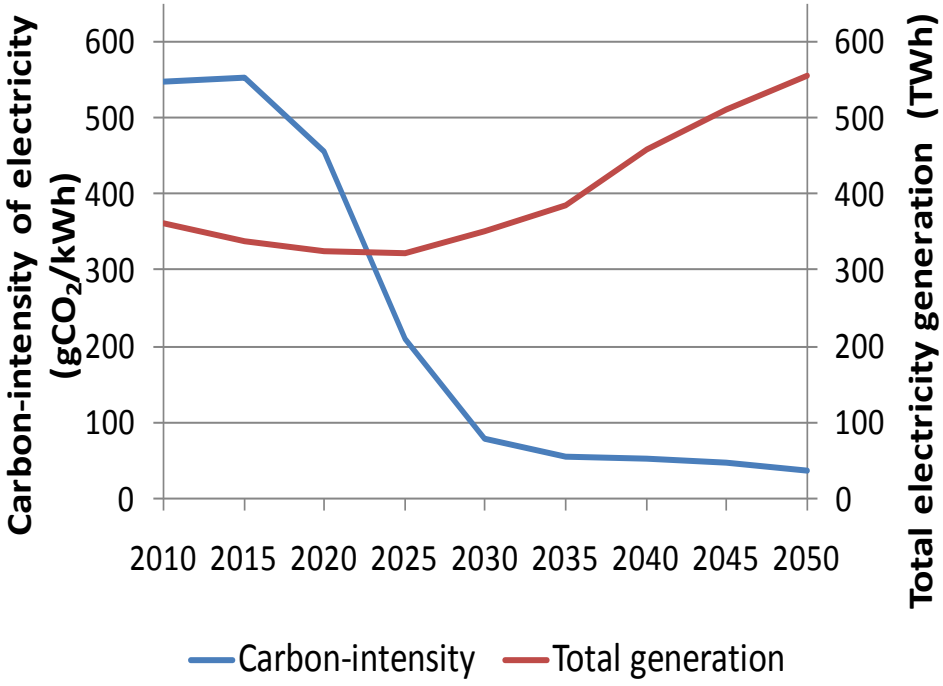
- Energy efficiency
- Lifestyle change
- Electric heat (e.g. heat pumps, storage heating)
- Biomass boilers
- CCS in industry

UK sectoral CO_2 emissions for 80% reduction at 2050 (MARKAL)



Feasible emissions reductions in UK Power Sector

CCC 2008



- Renewable and nuclear
- Preparation for CCS
- Required policies
  - EU ETS development
  - CCS demonstration
  - Price/non-price policies to drive renewables

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Meeting carbon budgets – The need for a step change

Progress report to Parliament
Committee on Climate Change, October 2009

www.theccc.org.uk

Focus of report

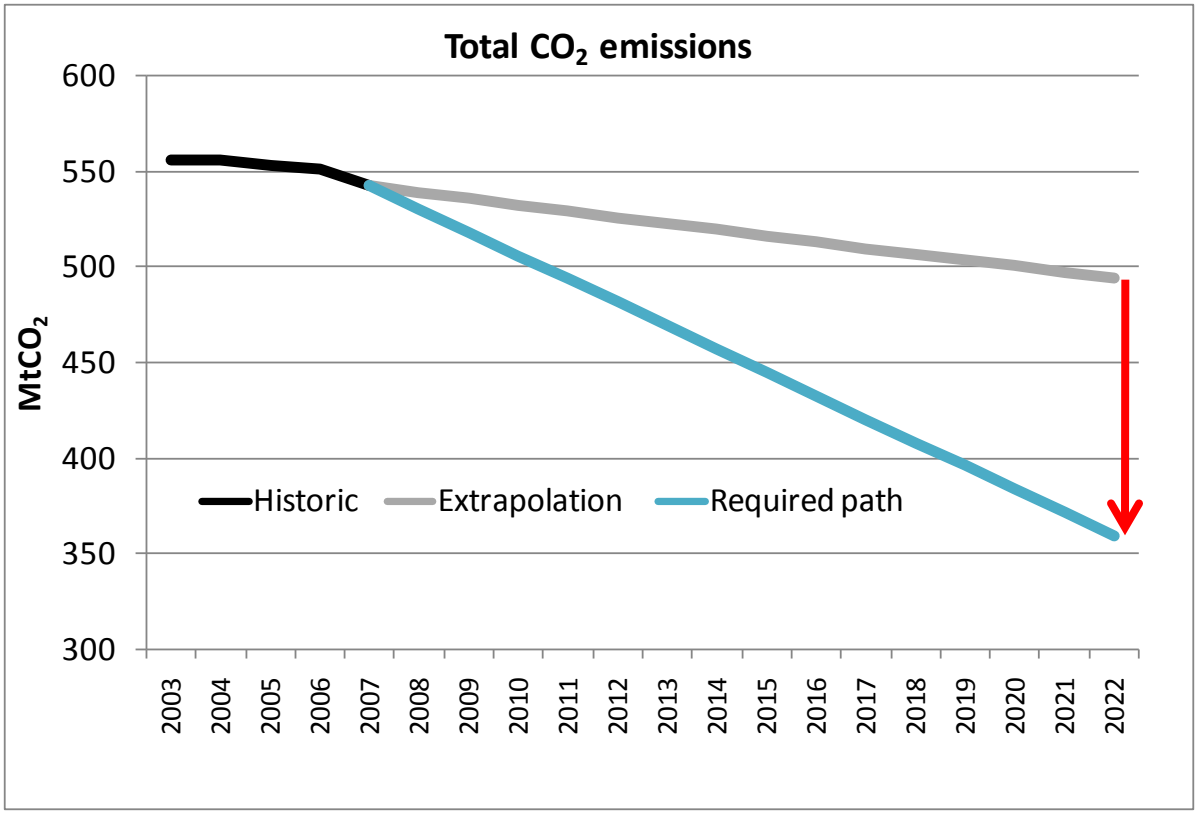
Monitoring framework: forward indicators as well as emission results

Impact of recession: distinguishing cyclical from underlying trends

Fine tuning estimates of feasible emissions reductions

Trends over last five years (2003-2007) compared with reductions now required

Future UK CO2 emissions



CO_2 emissions fell 0.5% annually 2003-07

Cuts of **2-3%** p.a. are required through first three budgets

A **major shift in the pace of reduction** is therefore required across **all** sectors

Need for a step change in rate of emissions reduction

Overall Conclusions of October Report

Recession induced emissions reductions could:

- Produce over rosy impression of progress
- Undermine long-term progress through lower carbon price

Recent progress (2003-2007) far slower than we now require

- Step change essential

Future work of UK CCC

- Report on Aviation (2050 back to 2005)
- Reconsider targets & set 2023-2027 GHG target
- Non CO2 GHGs
- Incorporation of International Aviation & Shipping
- Annual Progress Report to Parliament on attainment of targets