



# The role of energy in meeting the UK's net zero greenhouse gas targets

Monday 9 September | 14:00 – 16:30

Conference Auditorium 2, University of Leeds





#### 10 September 2019

## Net Zero

Chris Stark

Committee on Climate Change

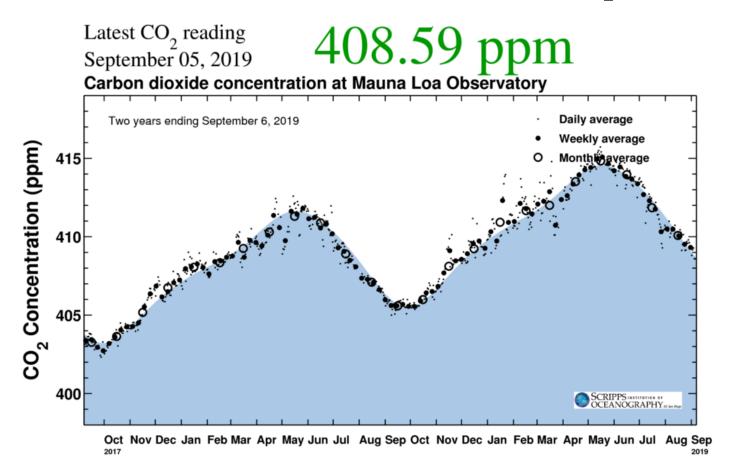


## Where do we stand?





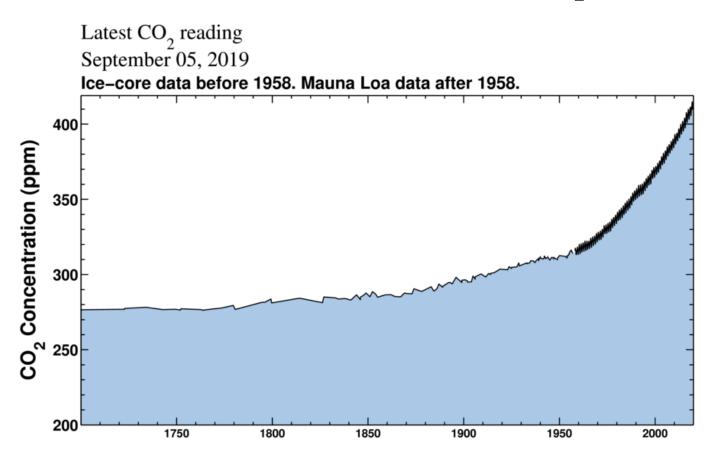
 $CO_2$  Concentration – 2017 to 2019





#### Global warming

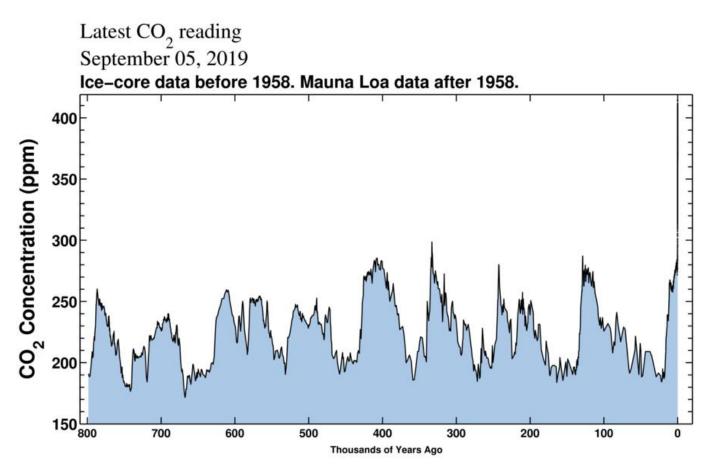
 $CO_2$  Concentration – 1700 to Present







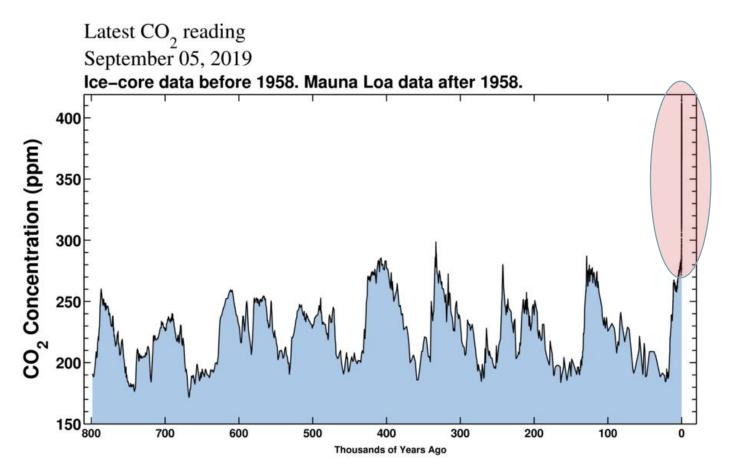
 $CO_2$  Concentration – 800,000 years



## Global warming



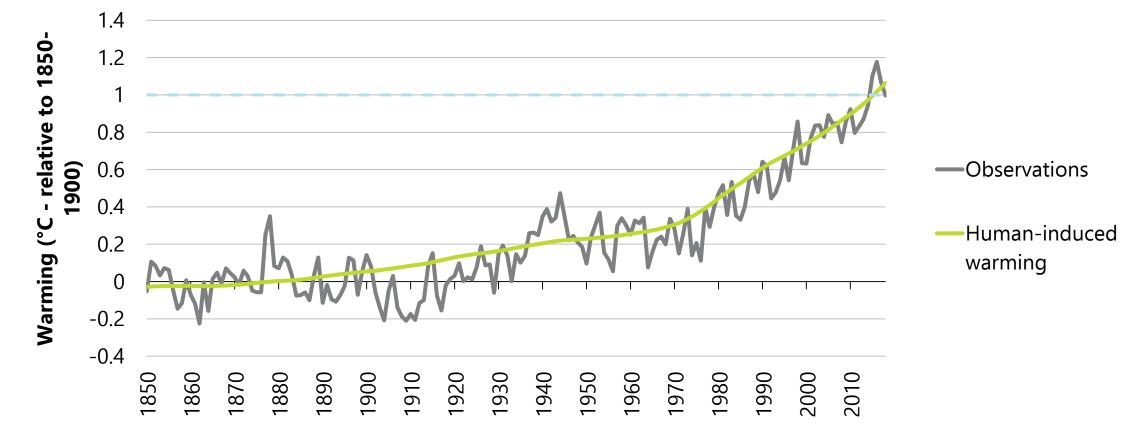
 $CO_2$  Concentration – 800,000 years







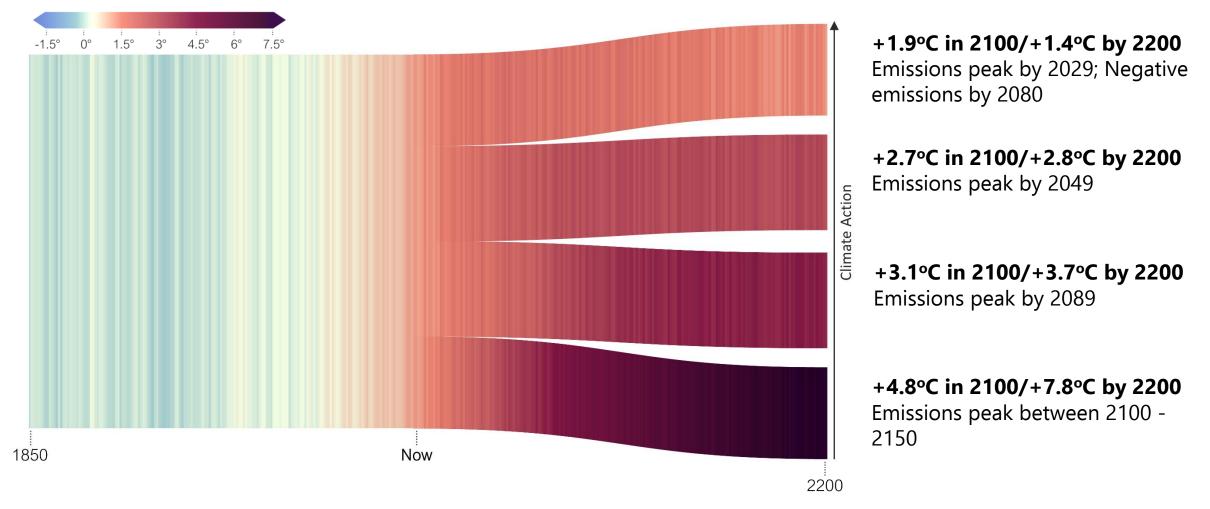




**Source**: HadCRUT4, NOAA, NASA and Cowtan & Way datasets; IPCC (2018) Chapter 1 - Framing and Context.



## The climate choice



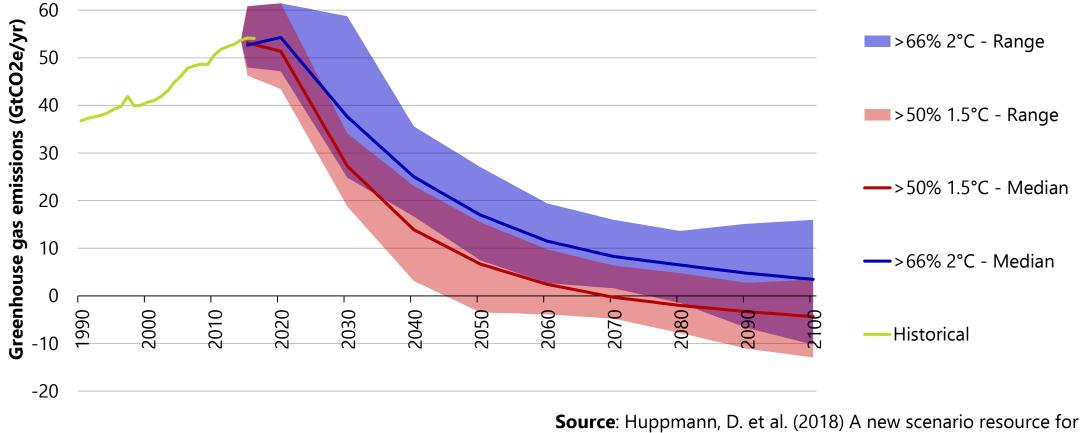
**Source**: Projections based on CMIP5 RCP scenarios, from warningstripes.com



## What do we do about this?

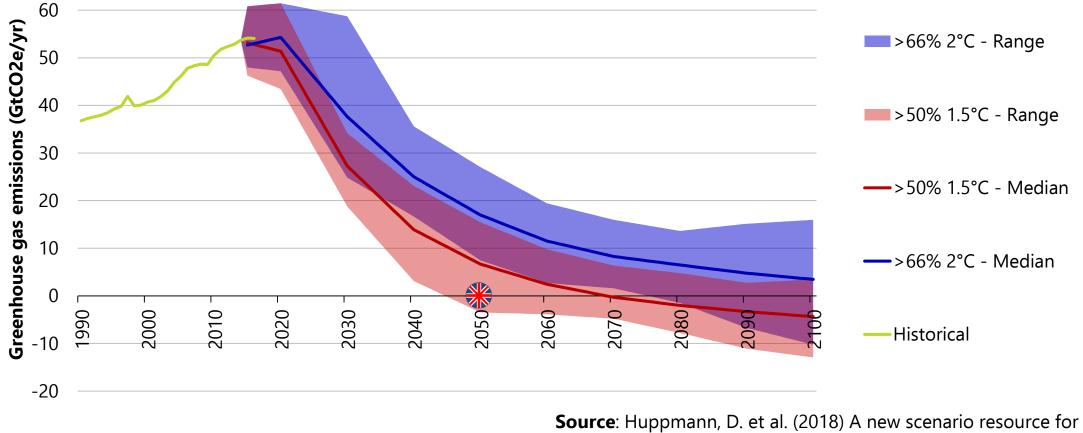


**Global emissions pathways – the need for net zero** 

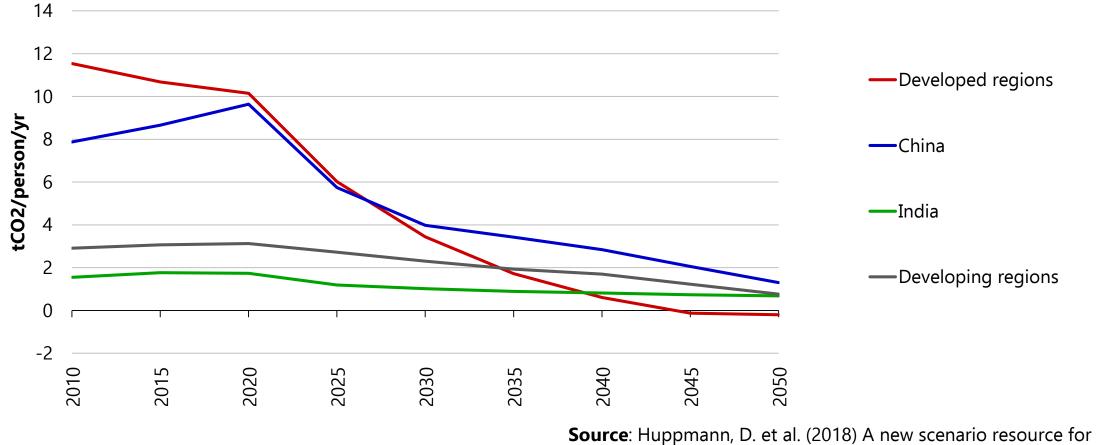




**Global emissions pathways – the need for net zero** 



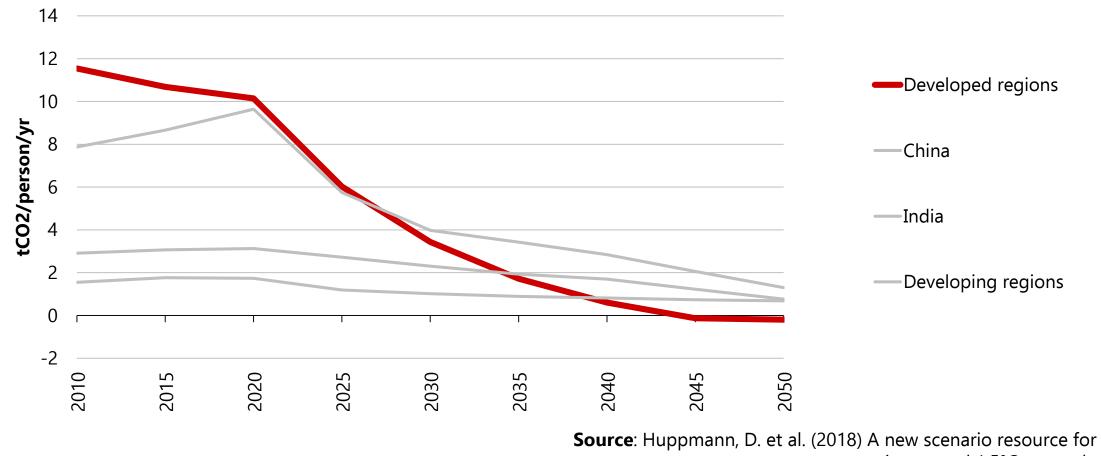




#### **Global emissions pathways – role of each regions**

**ce**: Huppmann, D. et al. (2018) A new scenario resource for integrated 1.5°C research.



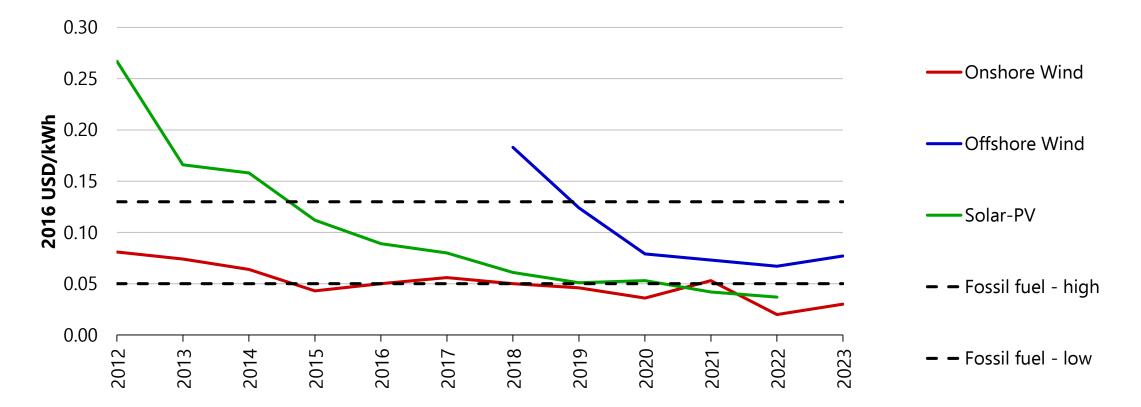


#### **Global emissions pathways – role of each regions**

integrated 1.5°C research.



#### Alternatives to fossil fuels – Global average auction prices by commissioning date



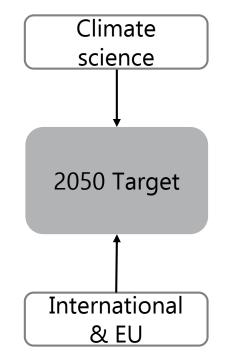
**Source**: IEA (2019) Renewable Energy 2018



# Reducing emissions in the UK

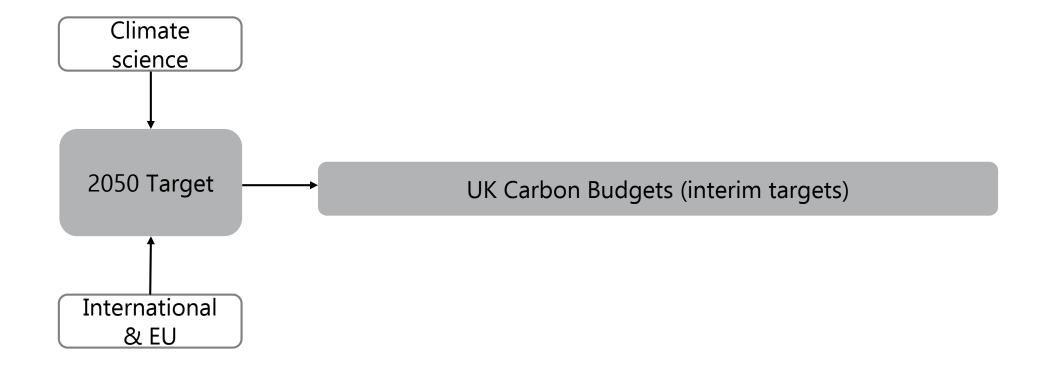


## Our approach to forecasting



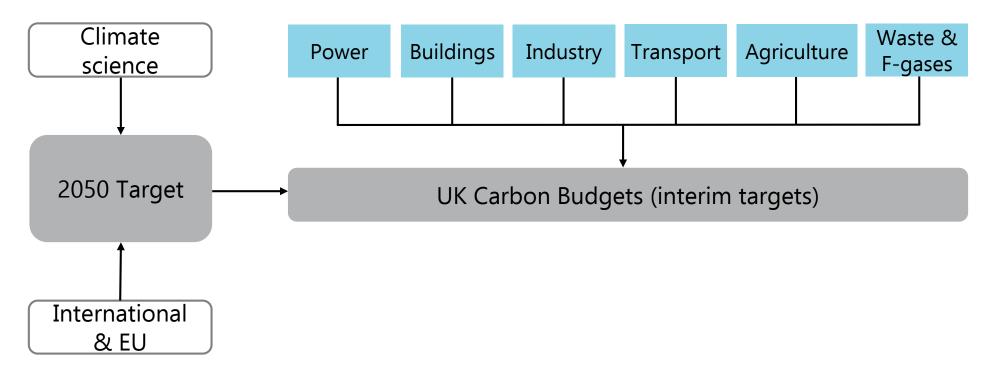


## Our approach to forecasting



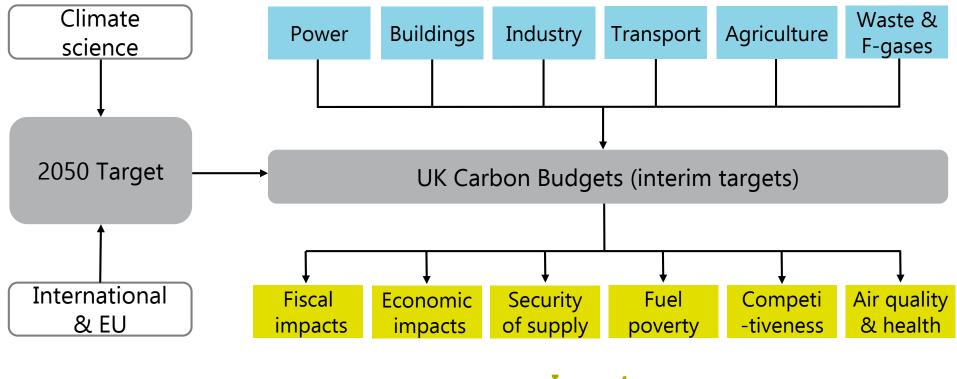


#### Sectors: scenarios, costs, required policy



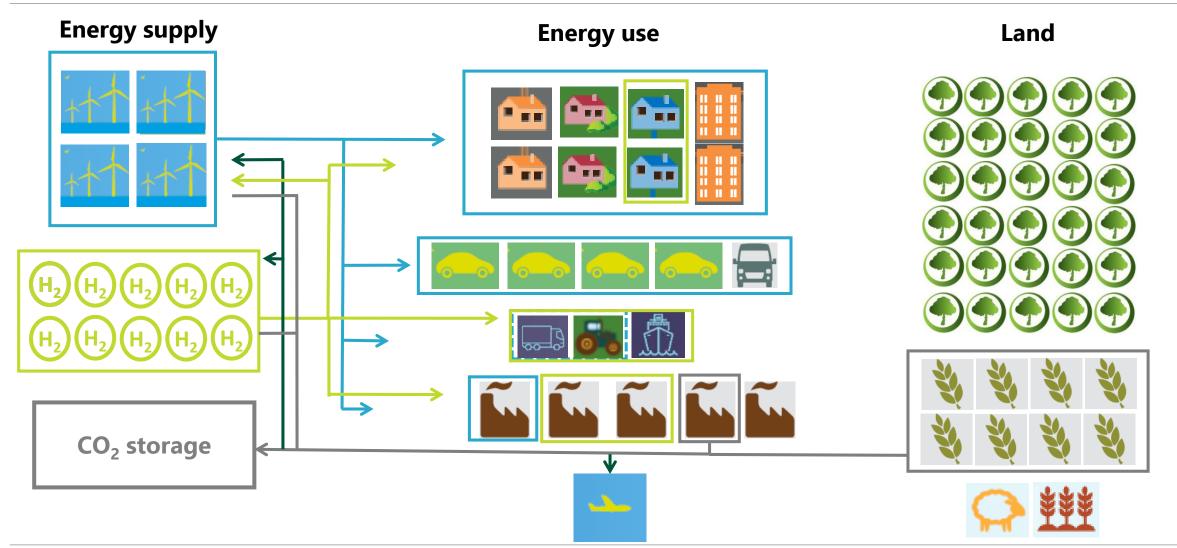


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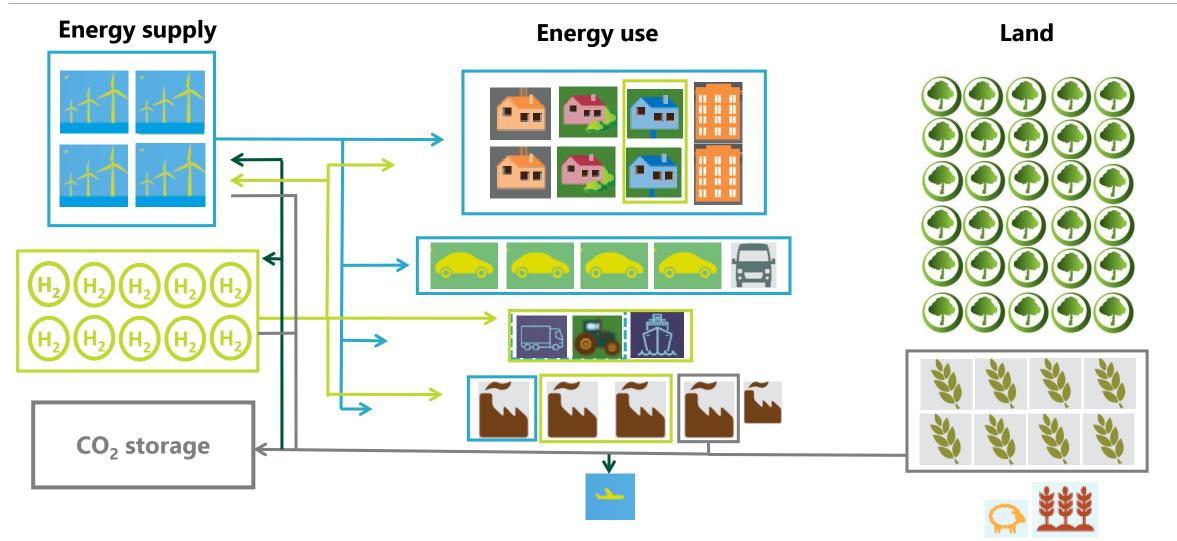
Impacts





@ChiefExecCCC





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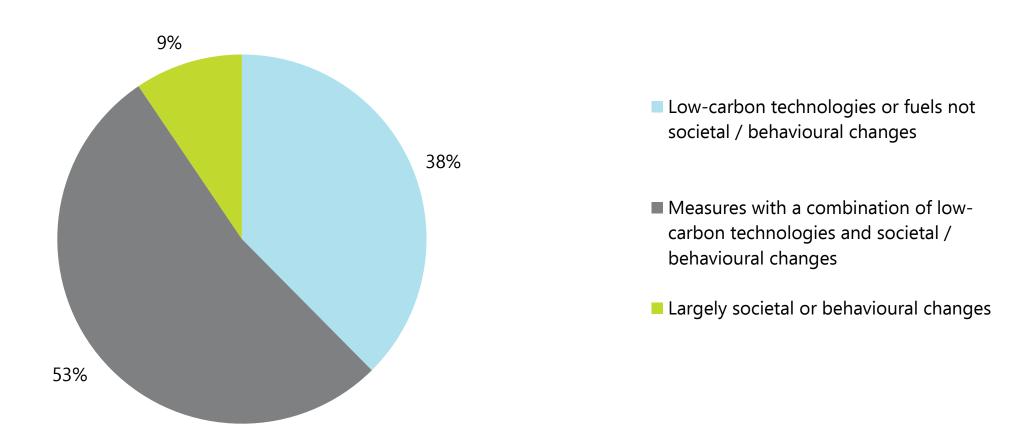
Electricity Hydrogen Buildings	Largely decarbonise electricity: renewables, flexibility, coal phase-out Start large-scale hydrogen production with CCS	Expand electricity system, deo generation (e.g. using hydrogen) Widespread deployment in industry, us heavier vehicles (e.g. HGVs, trains) and po	), deploy bioenergy with CCS se in back-up electricity generation,
	production with CCS		
Buildings	Efficiency best potworks best		
	Efficiency, heat networks, heat pumps (new-build, off-gas, hybrids)	Widespread electrification, gas grids potentially s	· · · · ·
Road Transport	Ramp up EV market, decisions on HGVs	Turn over fleets to zero-emission ve	ehicles: cars & vans before HGVs
Industry	Initial CCS clusters, energy & resource efficiency	Further CCS, wide hydrogen, some	
Land Use		Afforestation, peatland restoration	
Agriculture	Healthier diets, reduced food waste, tree growing and low-carbon farming practices		



	2020s	2030s	2040s
Aviation	Operational measures, new pla	ane efficiency, constrained demand growth, lim	nited sustainable biofuels
Shipping	Operational measures, new ship fuel efficiency, use of ammonia		
Waste	Reduce waste, increase recycling rates, landfill ban for biodegradable waste	Limit emissions from co wastes (e.g. deploy measures to rec	
F-Gases	Move almost completely away from F-gases		
Removals	Develop options & policy framework	Deployment of BECCS in variou air capture of CO <sub>2</sub> , other remo	
Infra- structure	Industrial CCS clusters, decisions on gas grid & HGV infrastructure, expand vehicle charging & electricity grids	Hydrogen supply for industry & potentiall hydrogen/electric HGVs, more CCS infras	-
Co-benefits	Health benefits due to	o improved air quality, healthier diets and more w Clean growth and industrial opportunities	alking & cycling

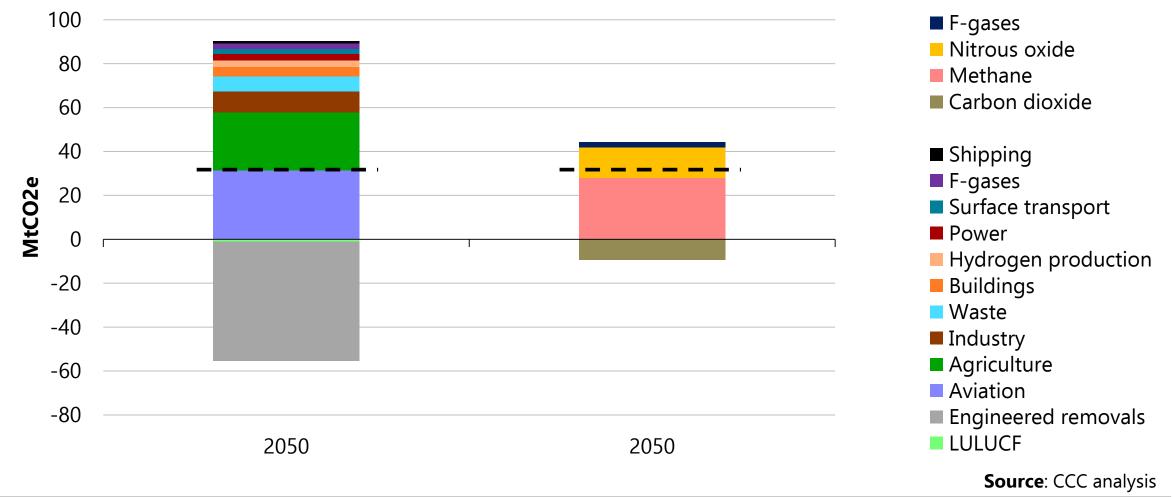


#### Role of societal and behavioural changes in the Further Ambition scenario





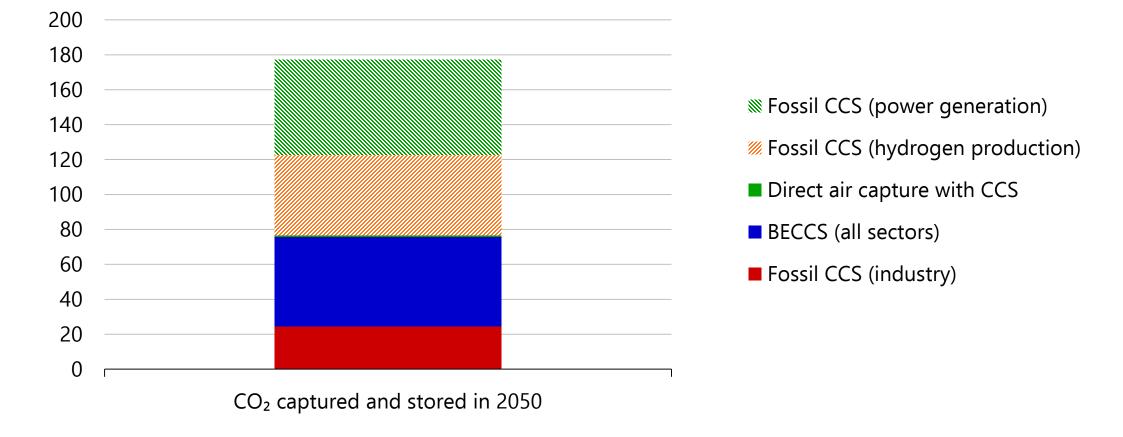






MtC02

#### **Total CO<sub>2</sub> captured and stored due to Further Ambition options in 2050**

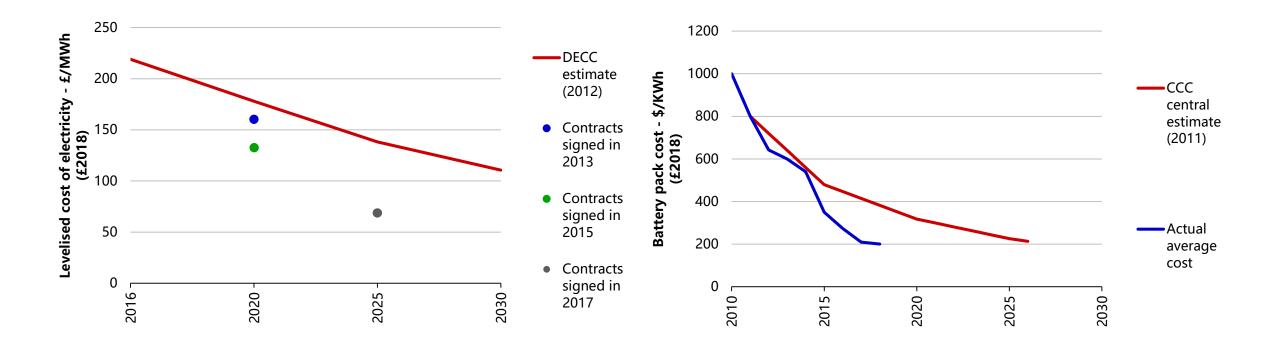


**Source**: CCC analysis

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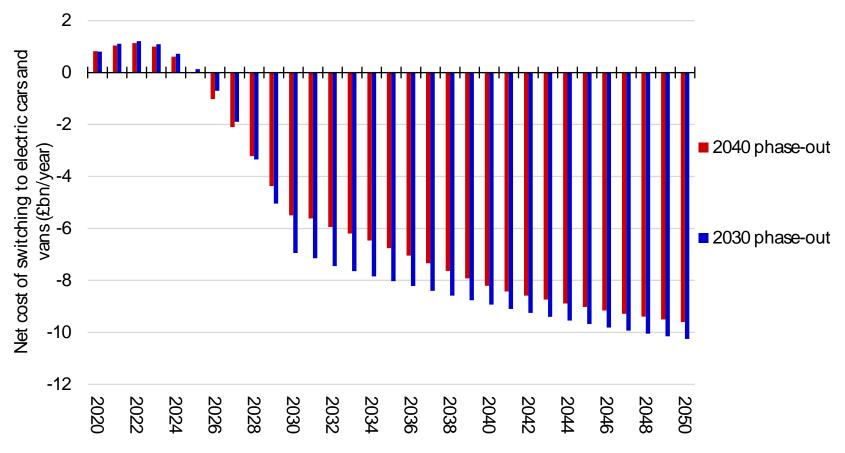
#### Costs of example low-carbon technologies compared to past projections Offshore wind (left) Battery packs (right)



**Source**: Offshore wind costs, CCC analysis based on DECC (2012) Electricity generation costs and LCCC (2019) CfD register. Battery forecasts, CCC (2015) Sectoral scenarios for the 5<sup>th</sup> Carbon Budget, outturn costs from BNEF (2018) Electric cars to reach price parity by 2022



#### A 2030 switchover to electric vehicles would save more money than a 2040 switchover



Source: CCC analysis



#### The impact of innovation on the costs of achieving carbon targets

 Overall, innovation and falling technology costs mean that we now estimate that the UK's 80% emissions target could be met at a lower cost than we estimated in 2008 – under 1% of GDP in 2050, rather than 1-2% of GDP.

Changes in cost estimates for long-term emissions goals				
GHG emissions reduction target (relative to 1990)	Year and report	Cost range estimated for 2050		
60% reduction in $CO_2$ (~55% reduction in GHG)	2003 - Energy White Paper	0.5-2.0% of GDP		
80% reduction in GHG	2008 - Building a low-carbon economy – the UK's contribution to tackling climate change	1-2% of GDP		
100% reduction in GHG	2019 - this report	1-2% of GDP		



# Thank you





### **Panel discussion**

Chris Stark	CEO, UK Committee on Climate Change
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**Lindsay McQuade** CEO, ScottishPower Renewables

**David Powell** Head of Environment & Green Transition, New Economics Foundation

**Julia Steinberger** Professor of Social Ecology & Ecological Economics, University of Leeds

Piers ForsterProfessor of Climate Physics, University of Leeds and member of the UK<br/>Committee on Climate Change

**Chair: Peter Taylor** Chair in Sustainable Energy Systems, University of Leeds





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