



Grantham Research Institute on
Climate Change and
the Environment

Grantham Research Institute and Centre for Climate Change Economics and Policy lecture

Decarbonising Britain

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Suggested hashtag for Twitter users: #lседecarbonise





Committee on
Climate Change

The UK's Climate Change Act: opportunities and challenges in building a low carbon economy

www.theccc.org.uk

1. Committee on Climate Change Duties



Recommend

- 2050 target:
 - 60%, 80%, or other
- First 4 budgets:
 - Where in 2023-27
 - Trajectory from today
- How much buy-in of credits allowed
- Should international aviation & shipping be included
- CO₂ budgets or all GHGs

Identify implications of proposed budgets for

- Competitiveness
- Security of supply
- Fuel poverty
- Fiscal revenues
- Scotland, Wales and N. Ireland
- Ancillary environmental effects

Annual reports on

- Progress against budgets
- On request (e.g. aviation review, energy efficiency review, innovation review, renewable energy review)

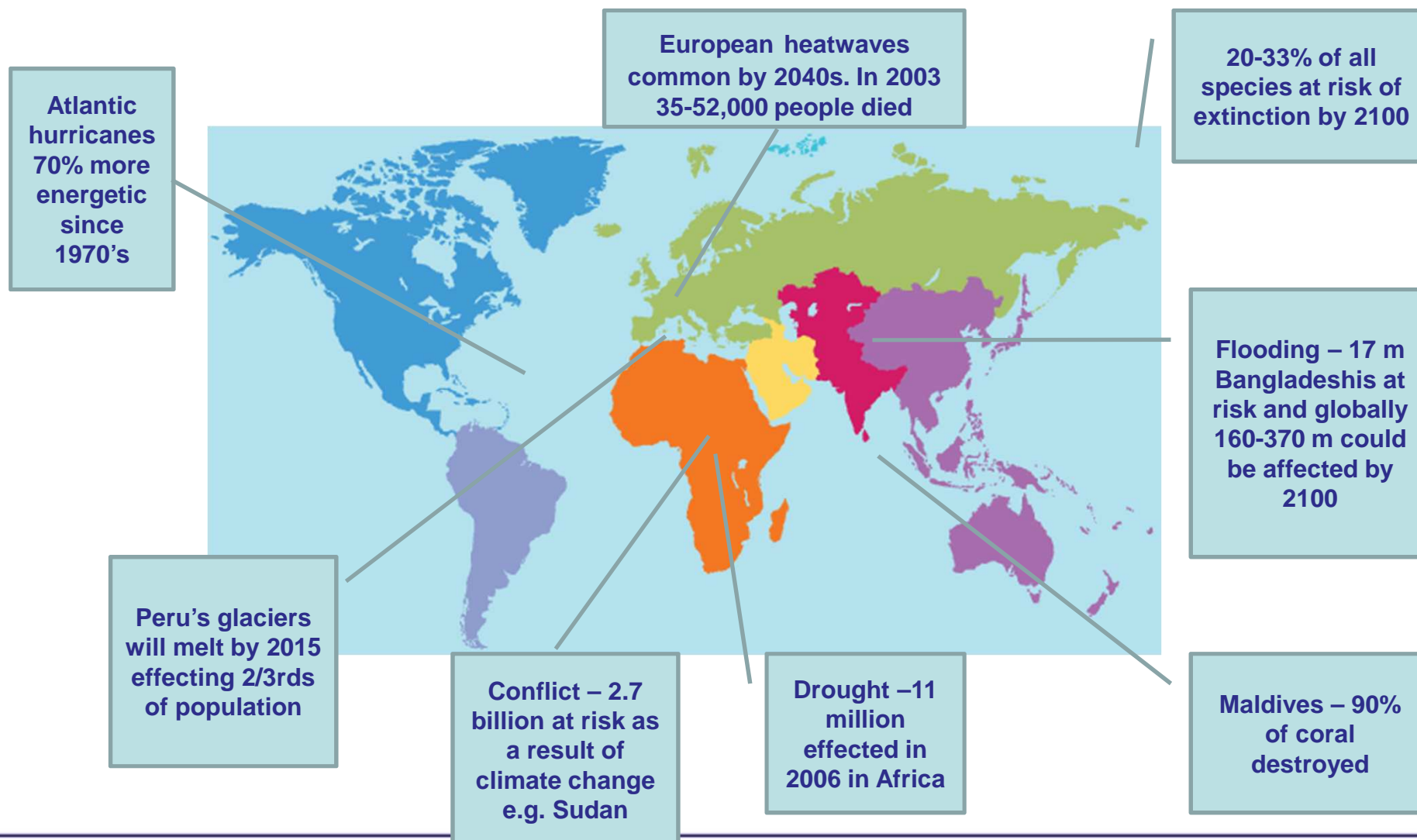
1. The 2050 target
2. An indicative 2030 target
3. Legislated carbon budgets
4. Budget costs and benefits
5. Policies to drive the step change

Fundamentals of climate science



- Global climate change is already happening
- There is a high degree of confidence that this is largely a result of human activity
- Without action, there is a high risk of warming well beyond 2 degrees
- This would have significant consequences for human welfare and ecological systems

(i) Required global emissions reduction: climate change damage



Required global emissions reduction: avoiding dangerous climate change



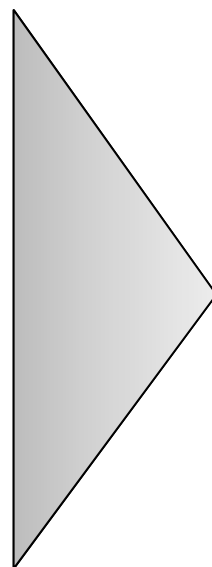
Assessment of damage

Decision rule

- keep temperature change close to 2°C
- and probability of 4°C increase at very low level (less than 1%)

Global trajectories considered

- Early or later peak (2015 vs. 2030)
- 3%/4% annual emissions reduction



Required global emissions reduction of 50%

- 20-24 GtCO₂e emissions in 2050
- 8-10 GtCO₂e in 2100

(ii) Appropriate UK contribution

50% global reduction

Burden share

- Alternative methodologies (contract and converge, intensity convergence, triptych etc.)
- Equal per capita emissions:
 - 20-24 GtCO₂e total at global level in 2050
 - Implies 2.1-2.6 tCO₂e per capita

All GHGs

2.1-2.6 CO₂e per
capita gives a UK
reduction of at least
80% in 2050

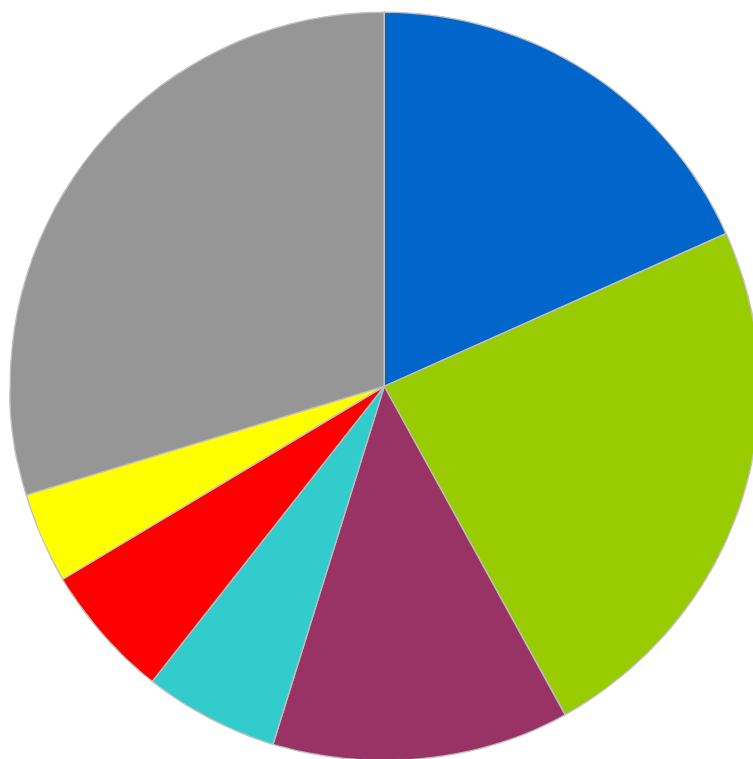
Aviation and
shipping included

Emissions by country

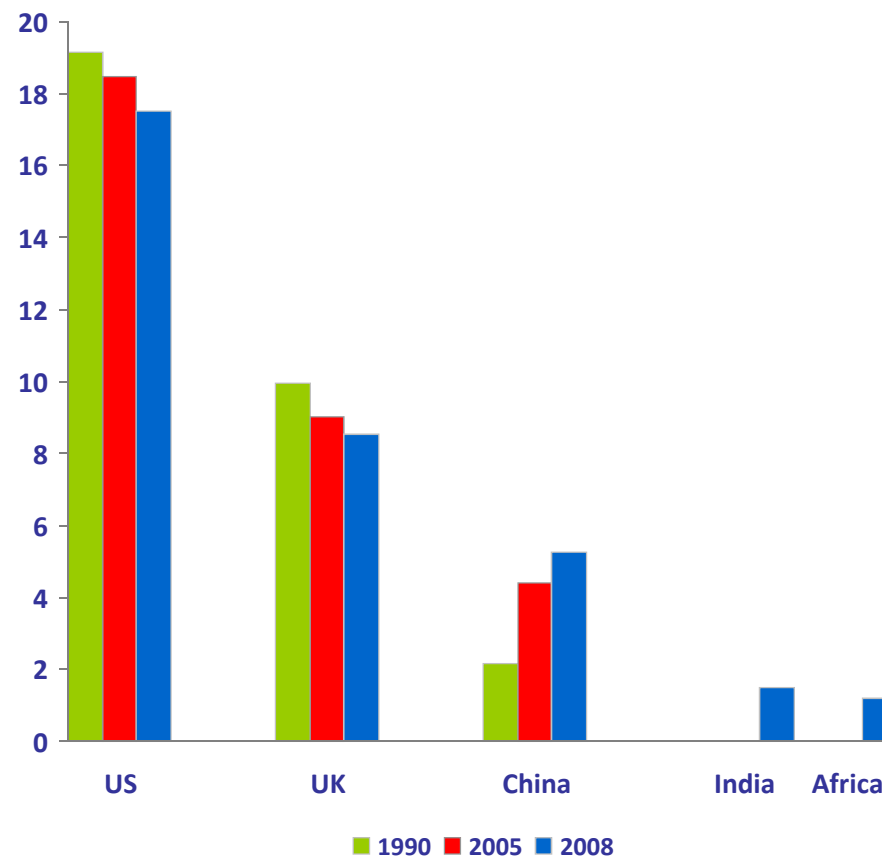


Total Emissions 2008

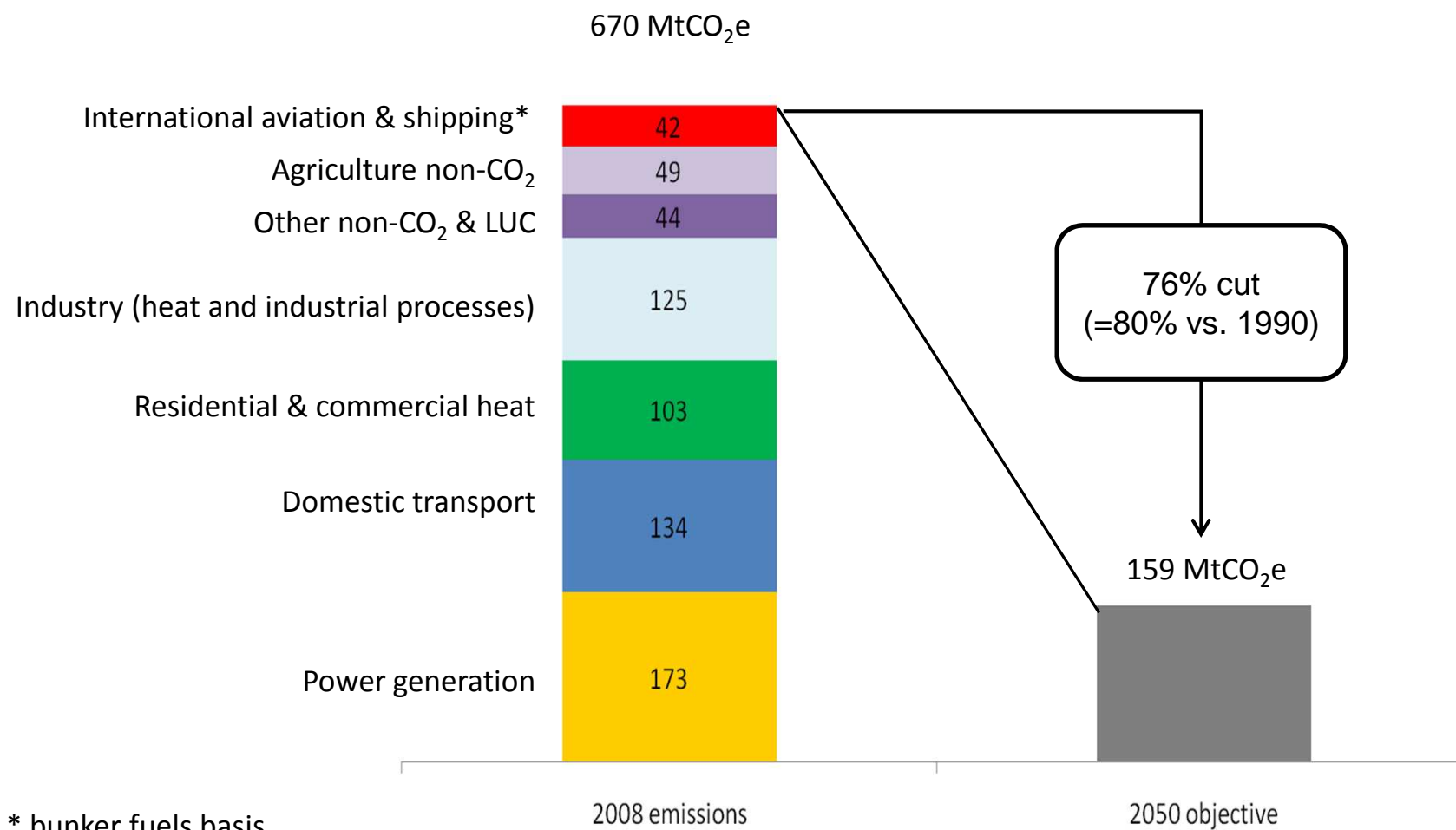
100% = 29862261.0 tonnes CO₂



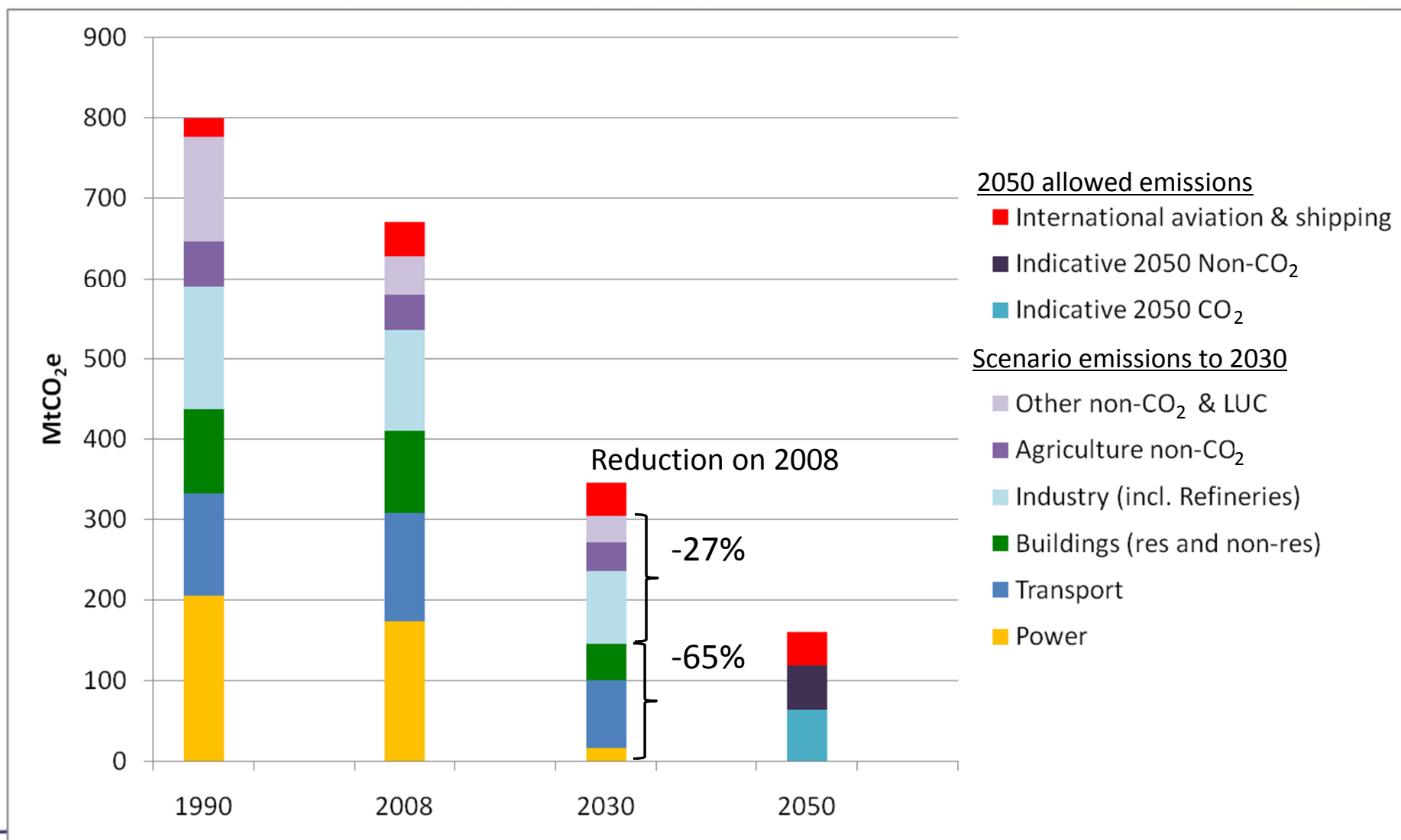
Metric tons CO₂ Per Person



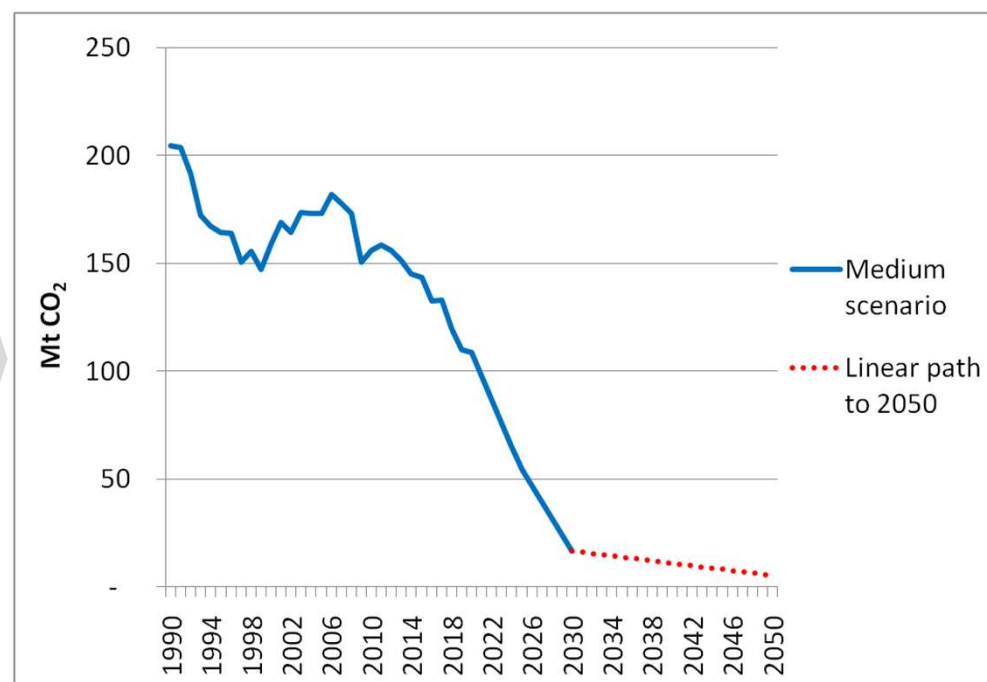
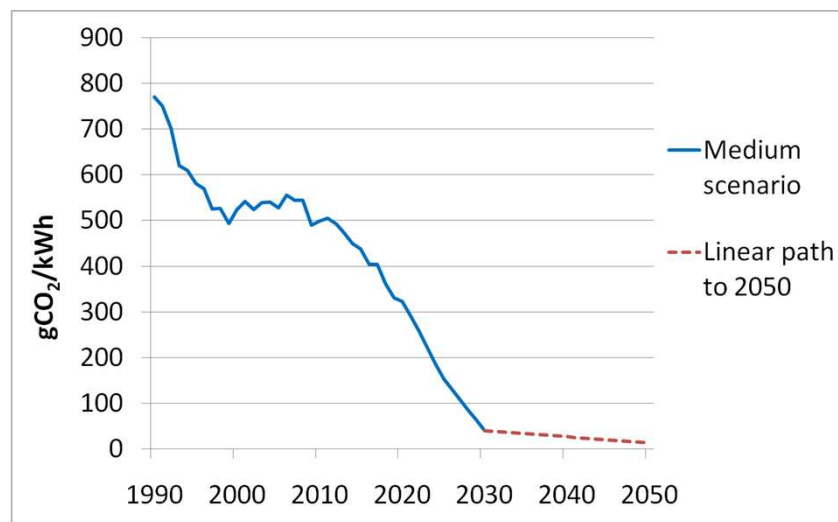
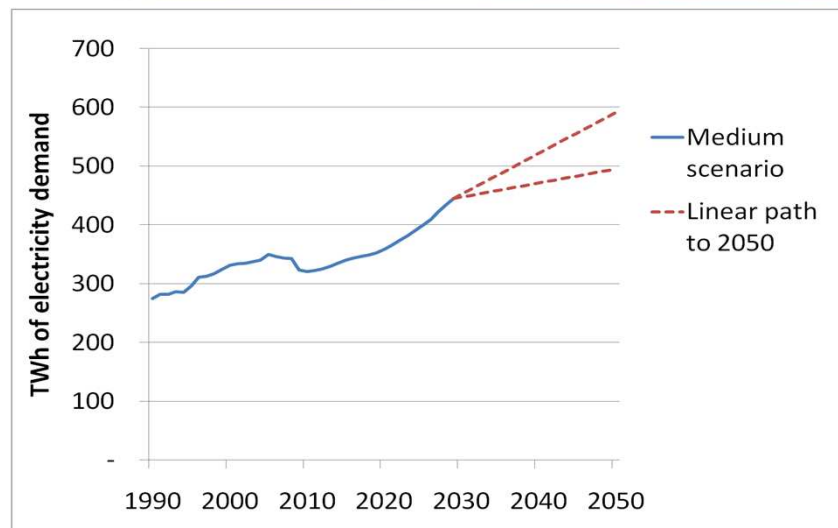
The UK's 2050 target



We have developed a feasible and cost-effective planning scenario for 2030 that is compatible with the 2050 target



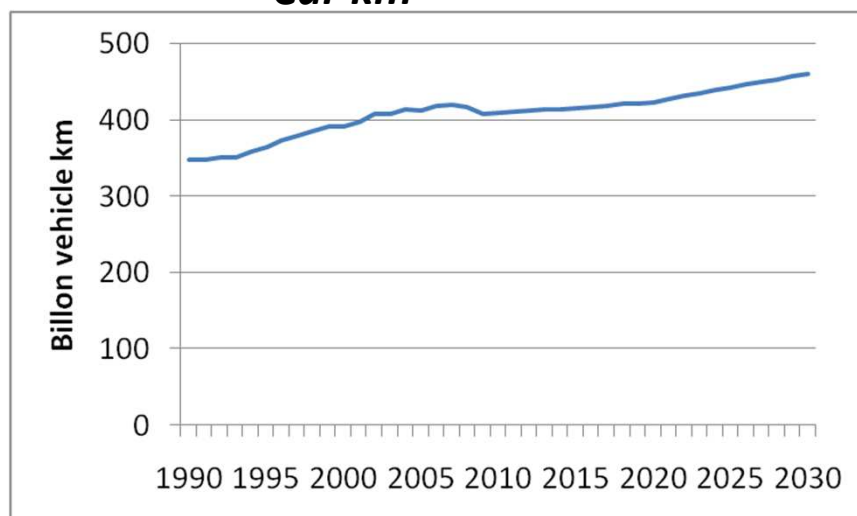
Power sector: Emissions intensity will have to decrease, whilst demand is likely to increase...



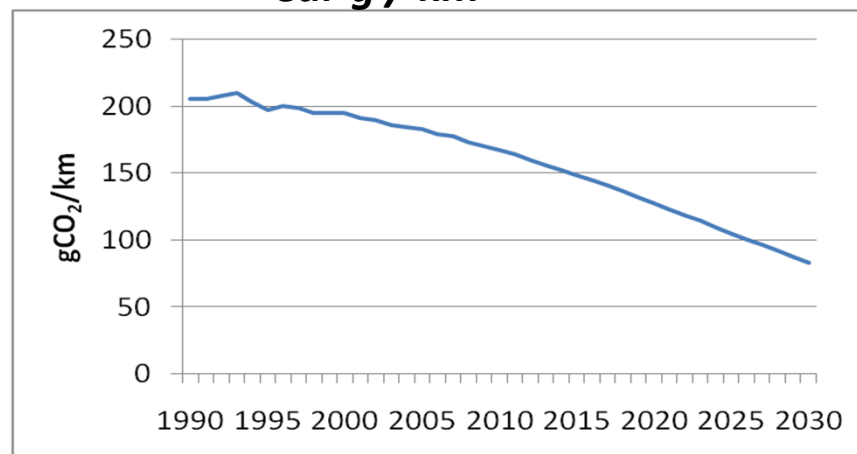
Source for 2050: range of MARKAL model runs for CCC (2010)

Transport: Emissions reduction will come from reducing g/km, while km likely to increase

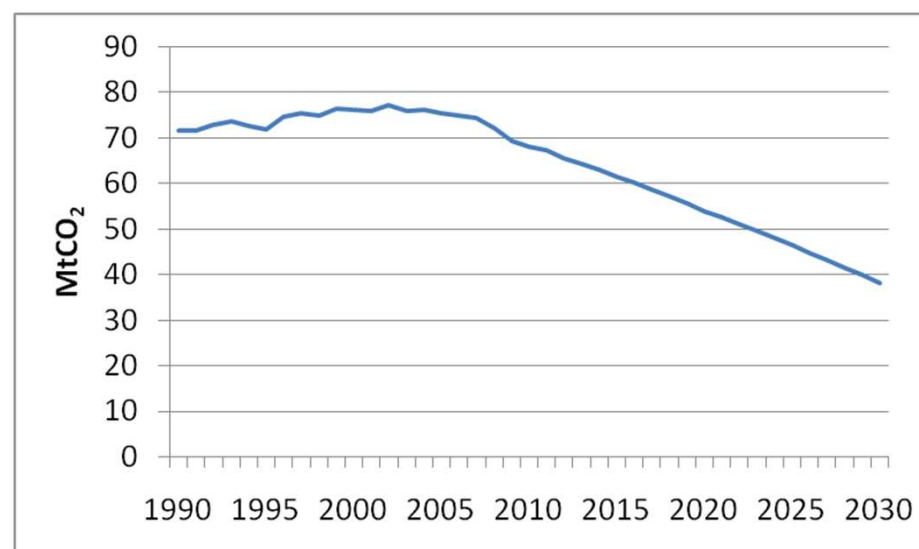
Car km



Car g / km



Car emissions



Vans: 17% emissions reduction to 2030

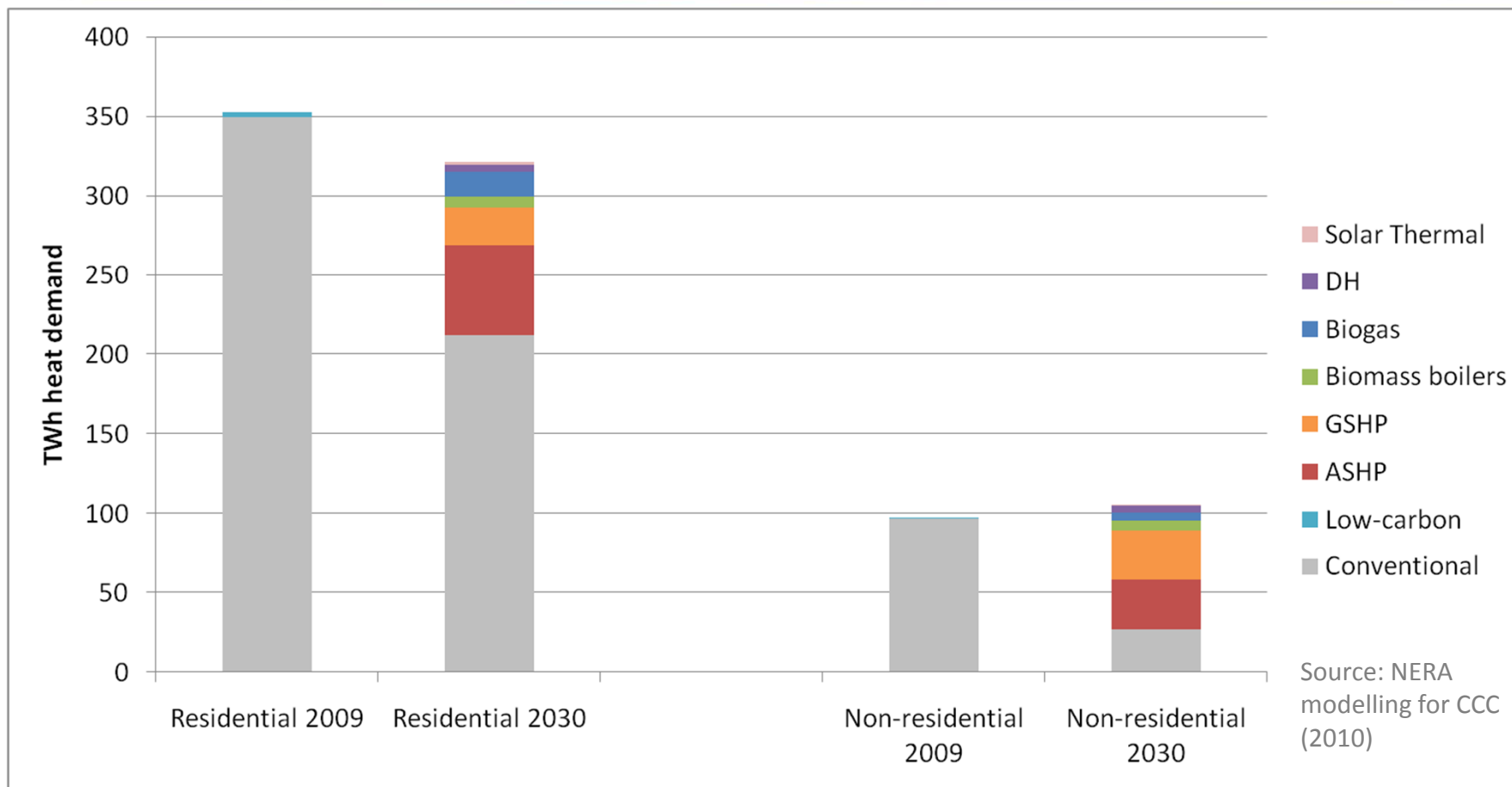
HGVs: 33% emissions reduction to 2030

Transport: Low-carbon vehicles need to be 60% of new sales in 2030



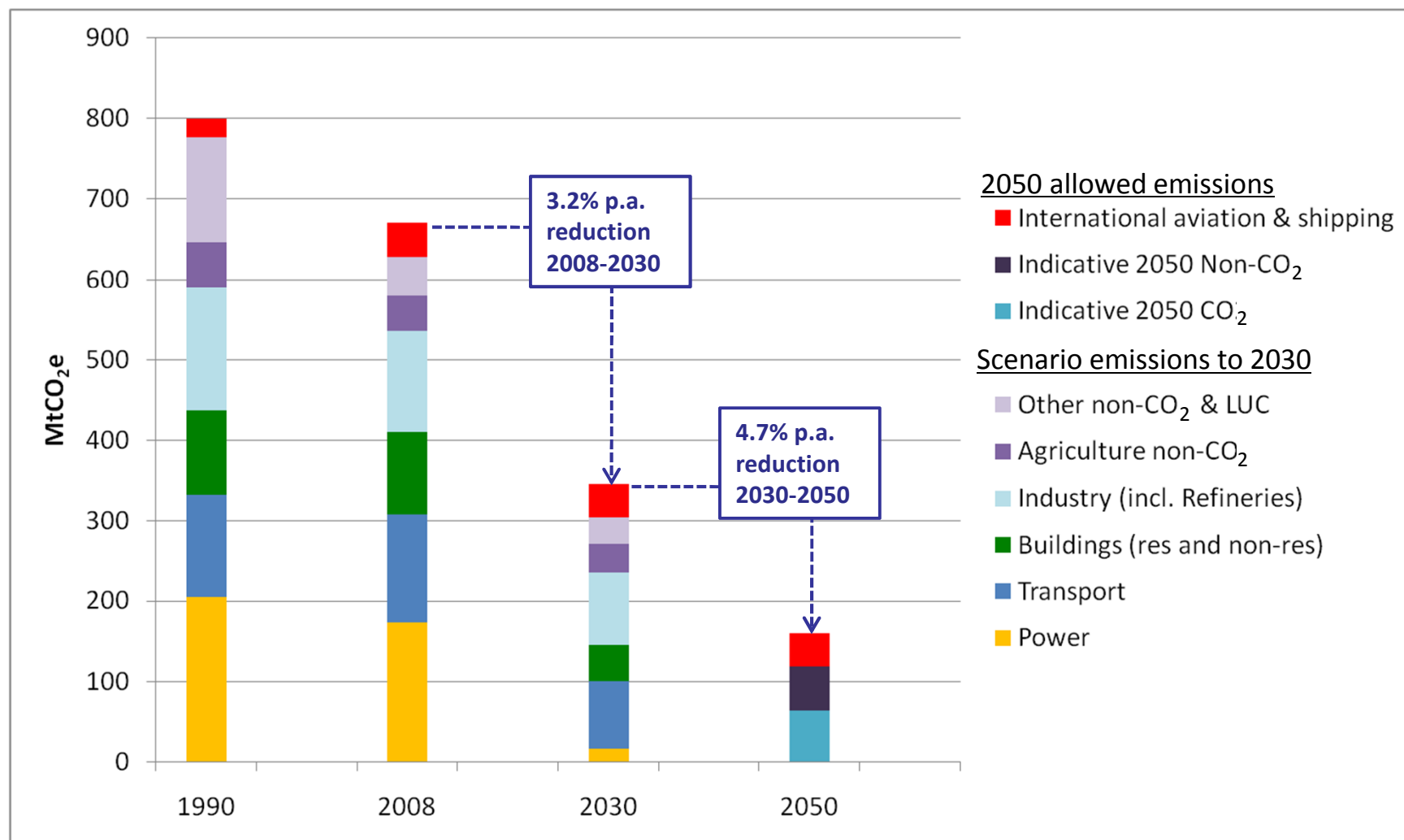
	<u>2030</u>			
	<u>Share of new car sales</u>	<u>Share of miles</u>	<u>Emissions Intensity</u>	
Conventional cars	40% →	70% ✗	80-125 g/km	<p><u>Average emissions intensity in 2030</u></p> <p>New cars purchased: 52g/km (versus 150g/km today)</p> <p>All cars on road: 81 g/km (versus 173 g/km today)</p>
Plug-in hybrids	40% →	20% ✗	50 g/km	
Pure electric vehicles	20% →	10% ✗	0 g/km	

Heat in buildings: Significant opportunity to reduce emissions to 2030 with a major role for heat pumps

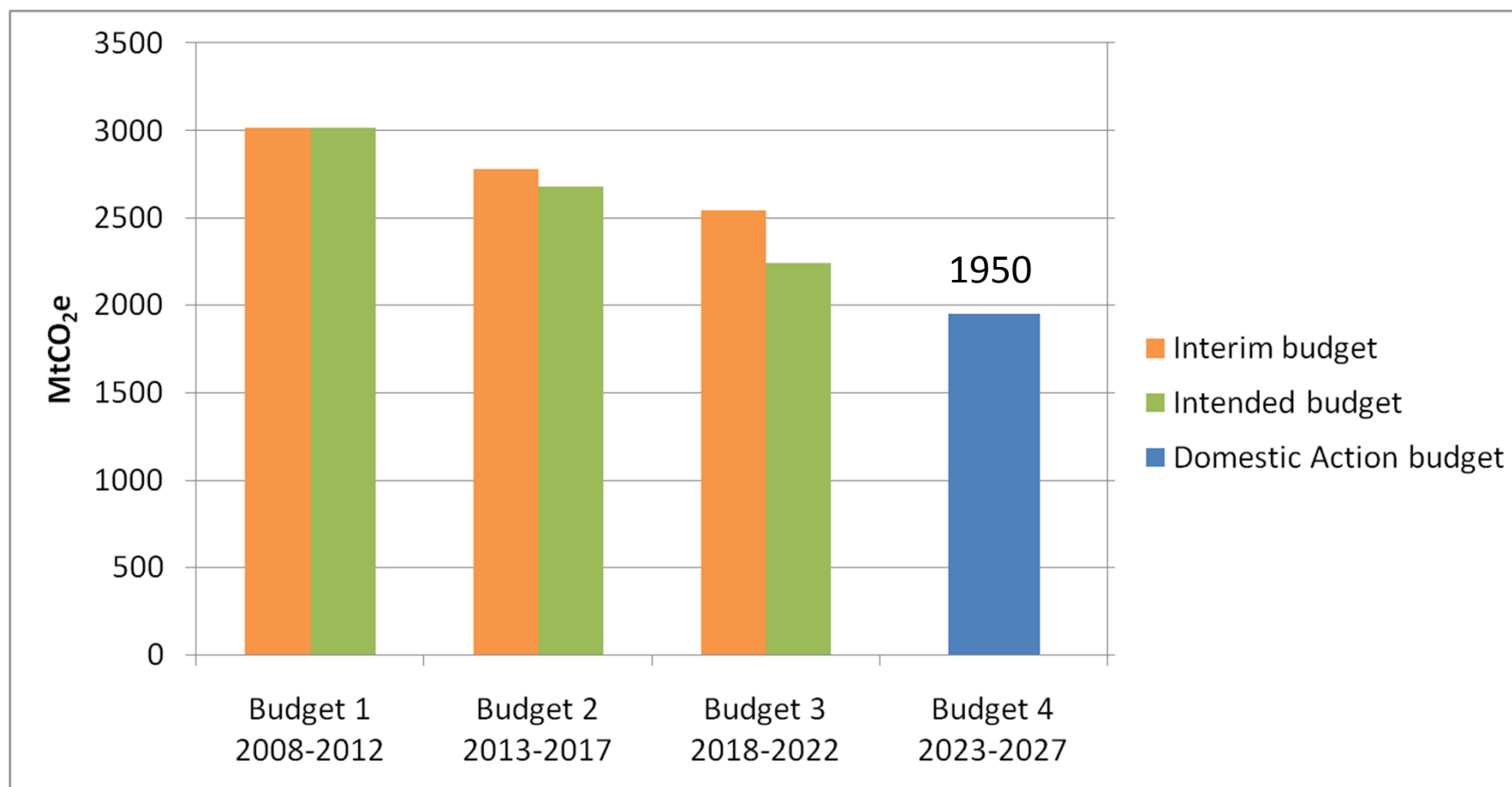


- Demand reductions from efficiency improvements, including 3.5 million solid walls by 2030 in residential buildings
- Low-carbon sources reach 33% of residential heat demand and 74% of non-residential heat demand in 2030

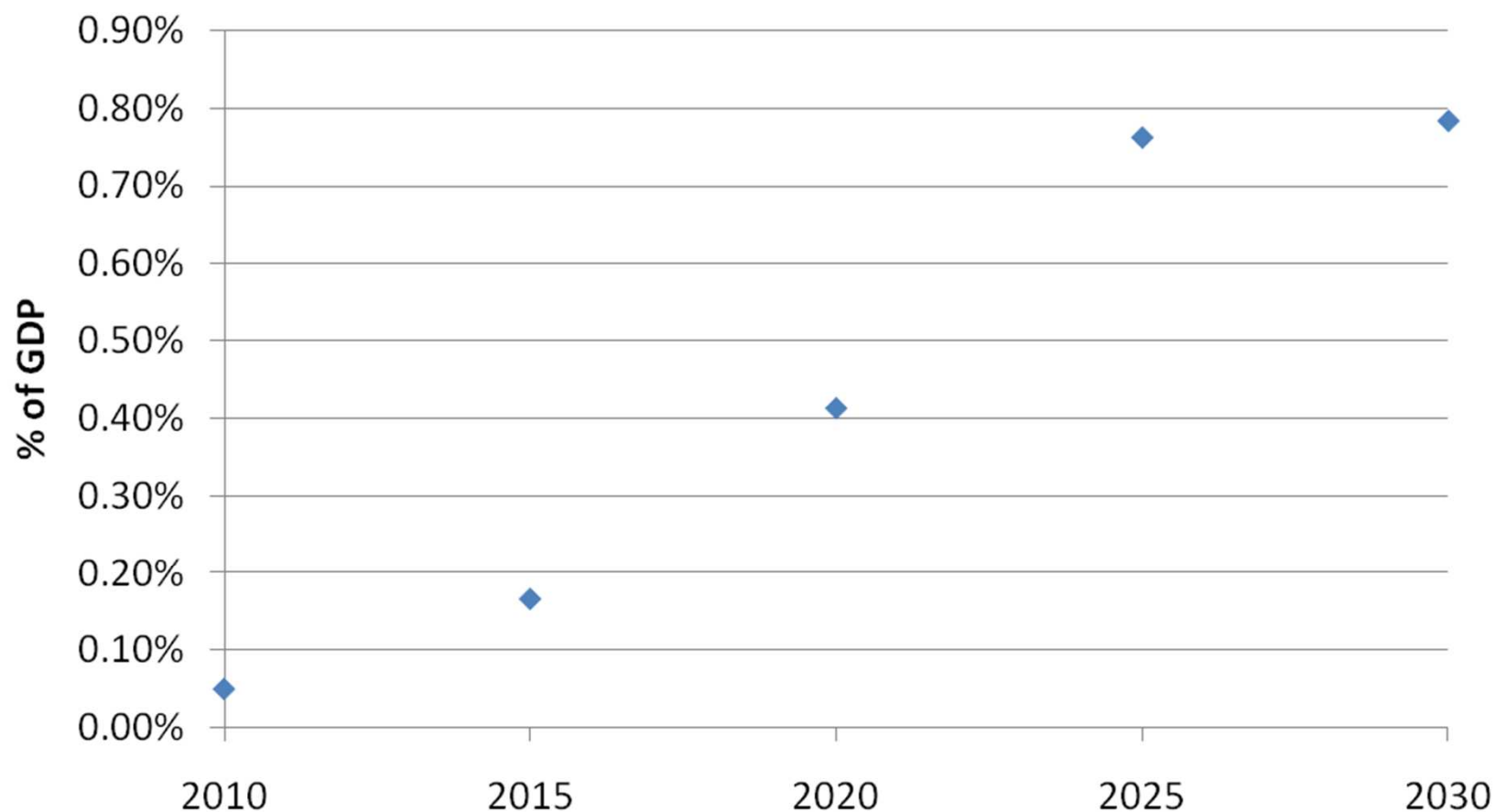
Emissions reductions will have to accelerate again from 2030 to 2050



Interim, Intended and Domestic Action budgets



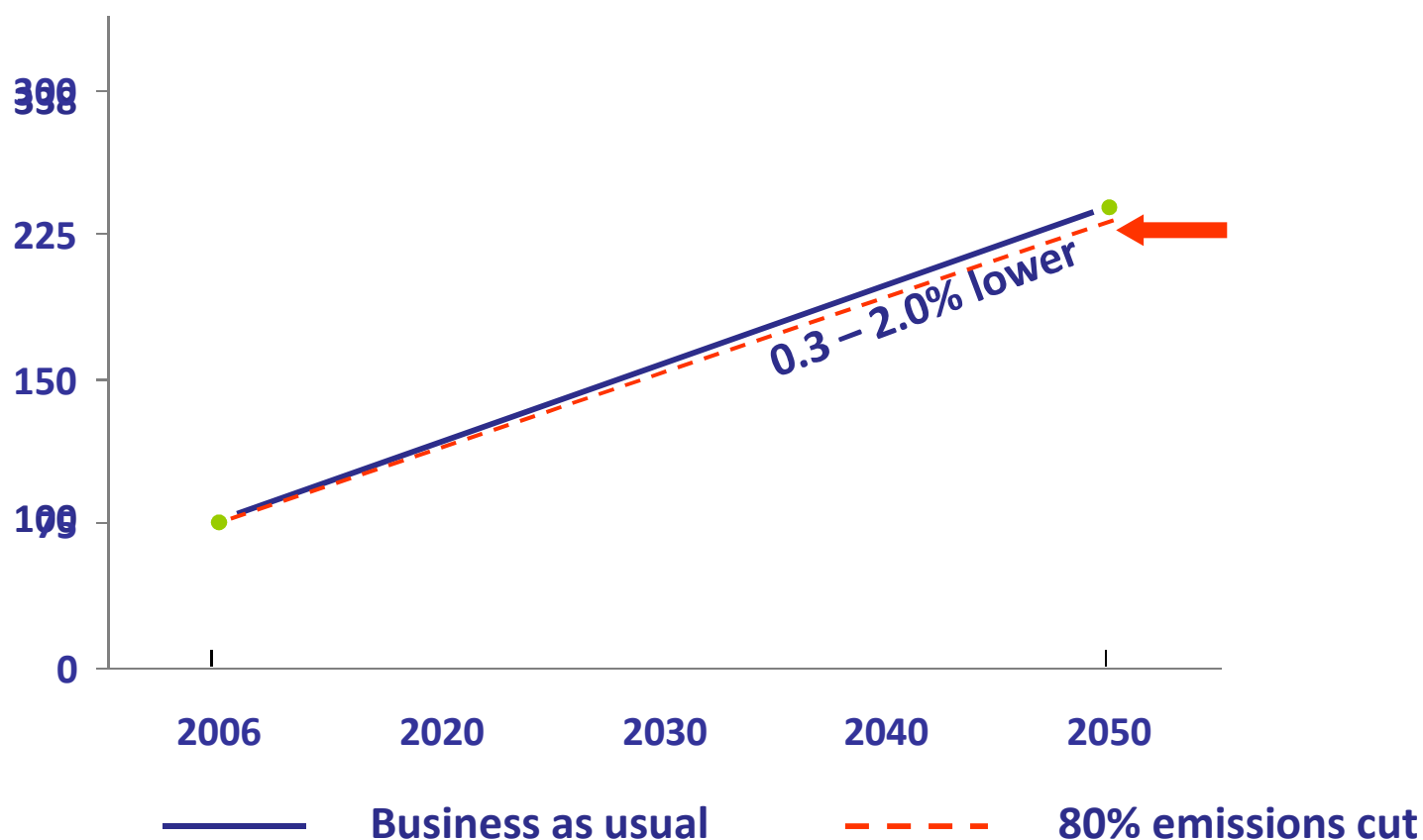
Cost of meeting carbon budgets



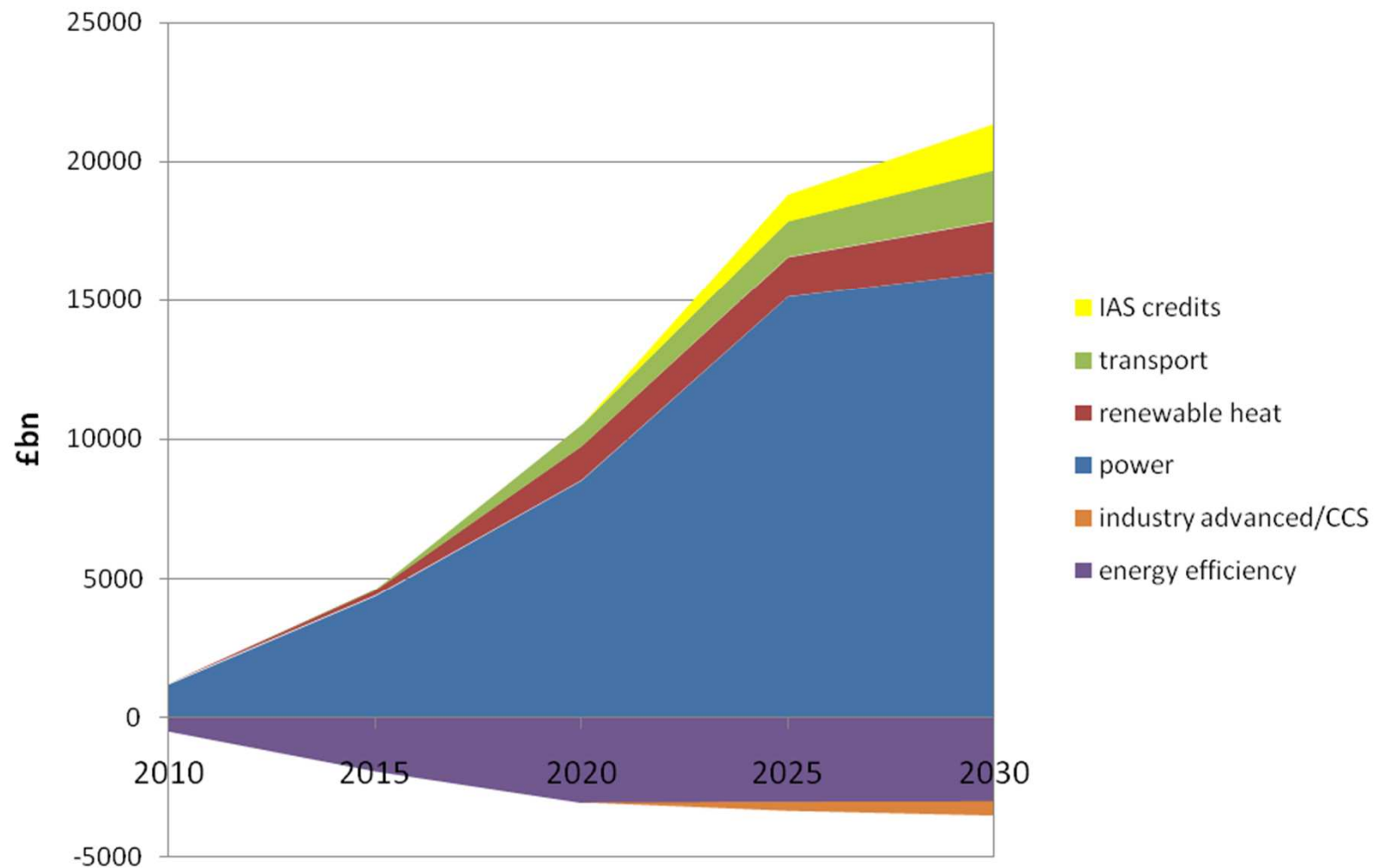
Growth in UK living standards with 80% emissions cut



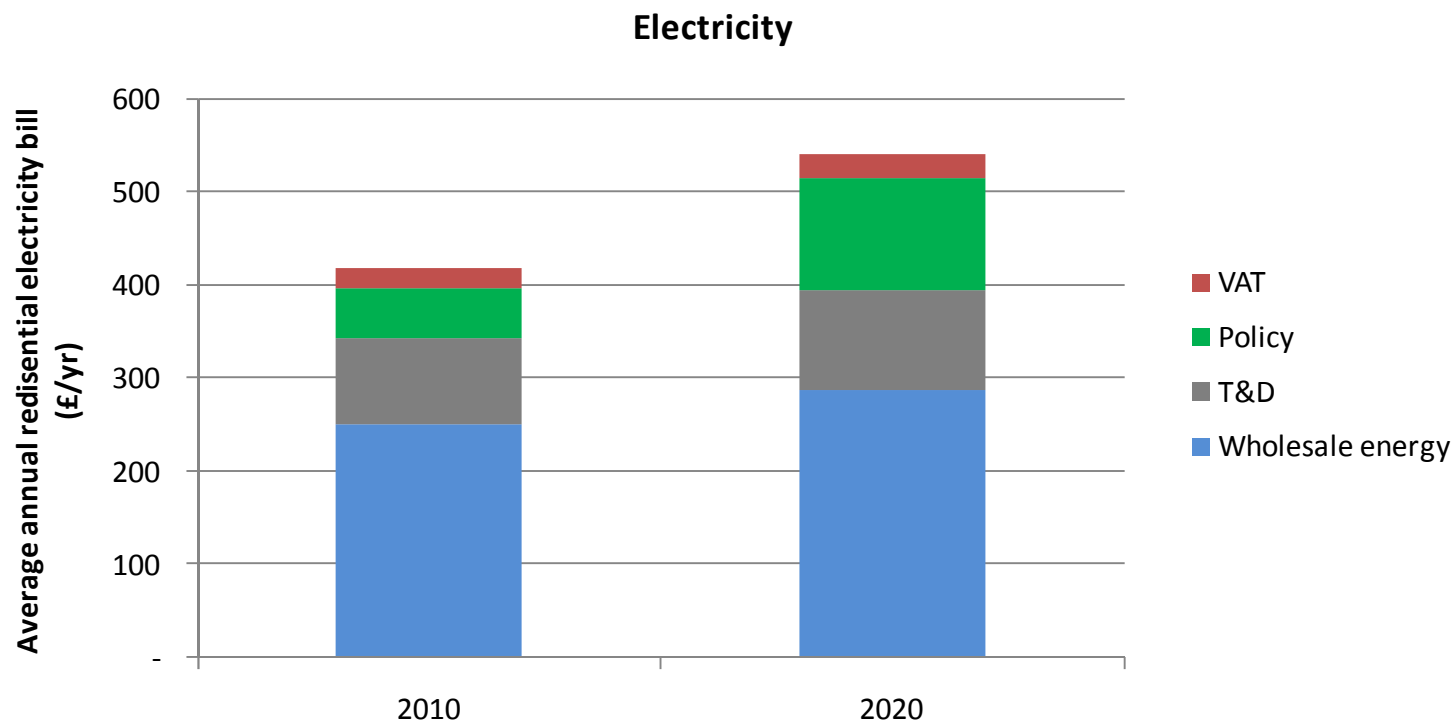
GDP per capita 2006=100



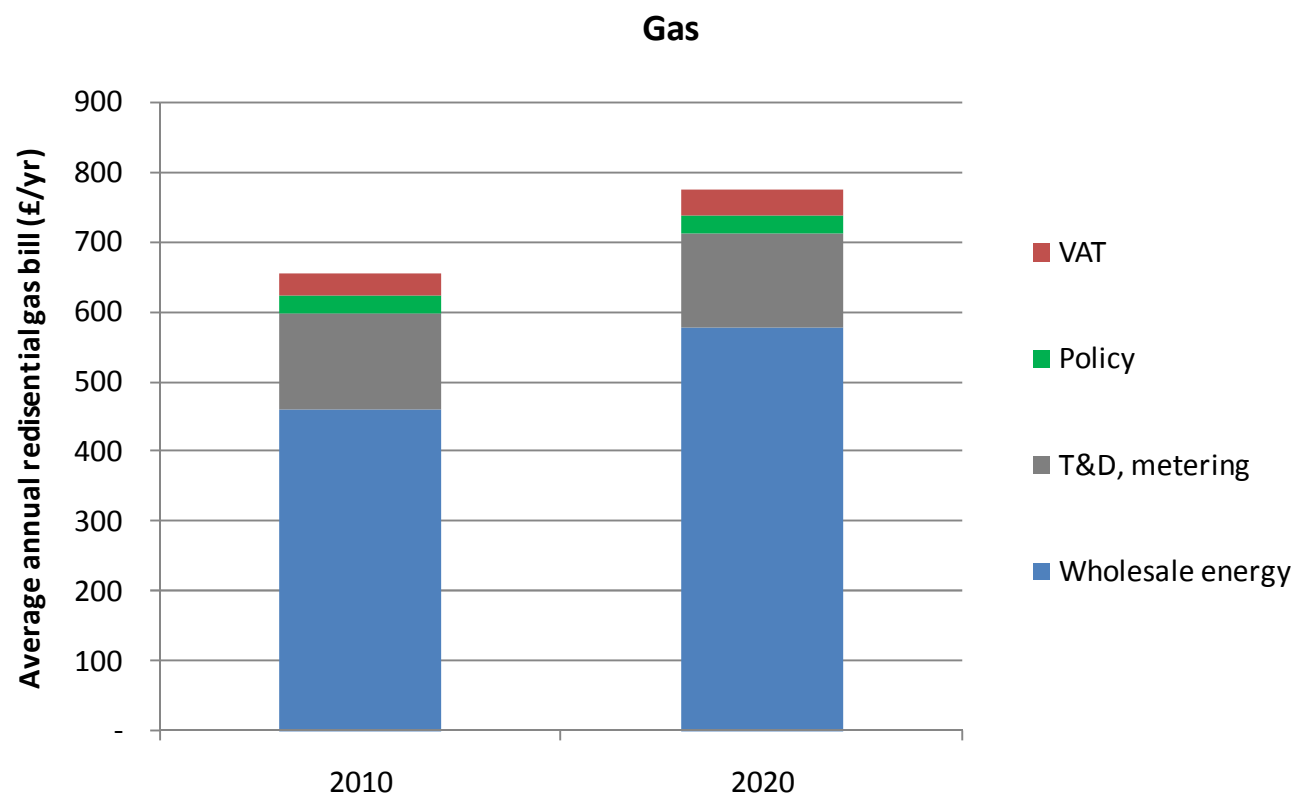
Sectoral breakdown of costs



Residential electricity bill today and impact of price changes (2020)

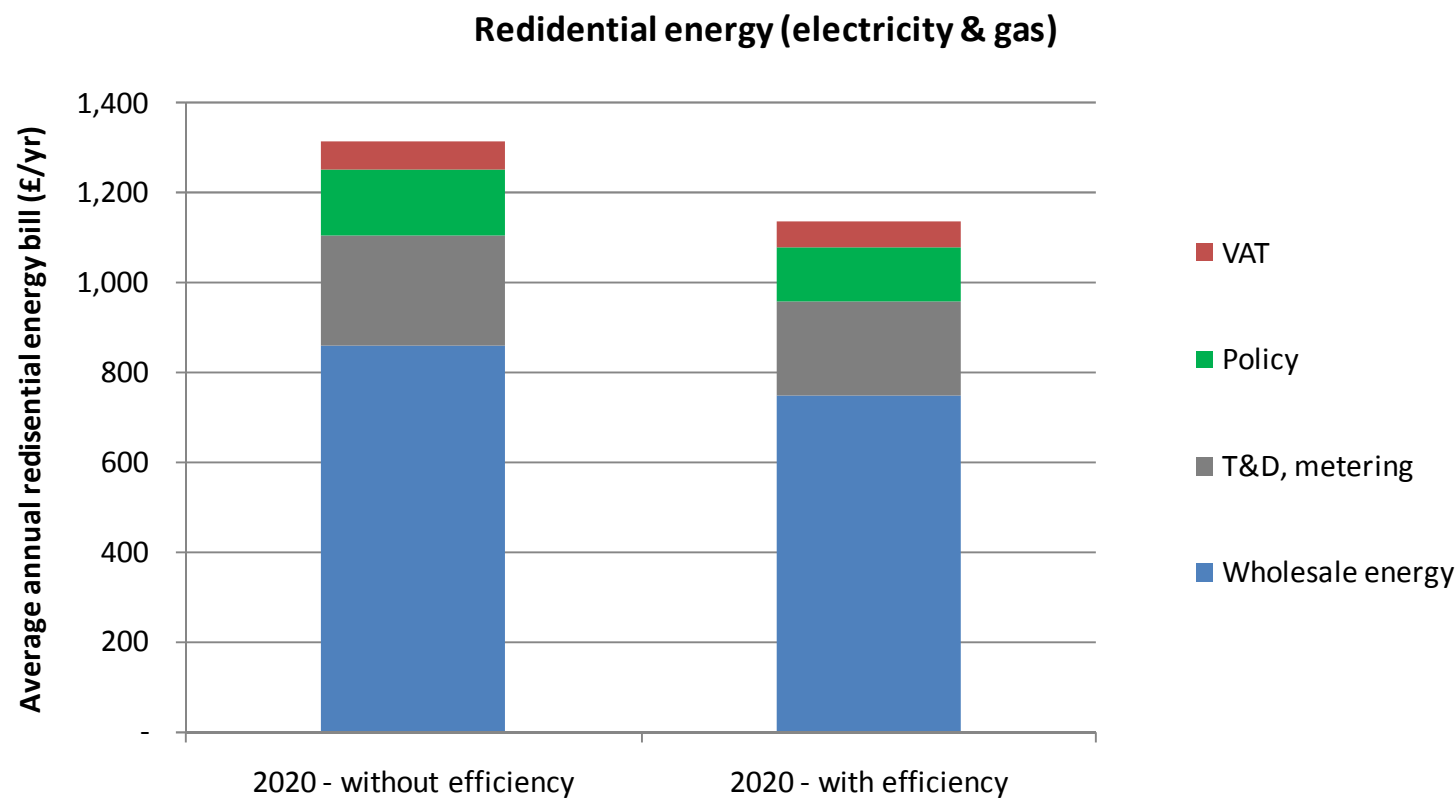


Residential gas bills today and impact of price changes (2020)



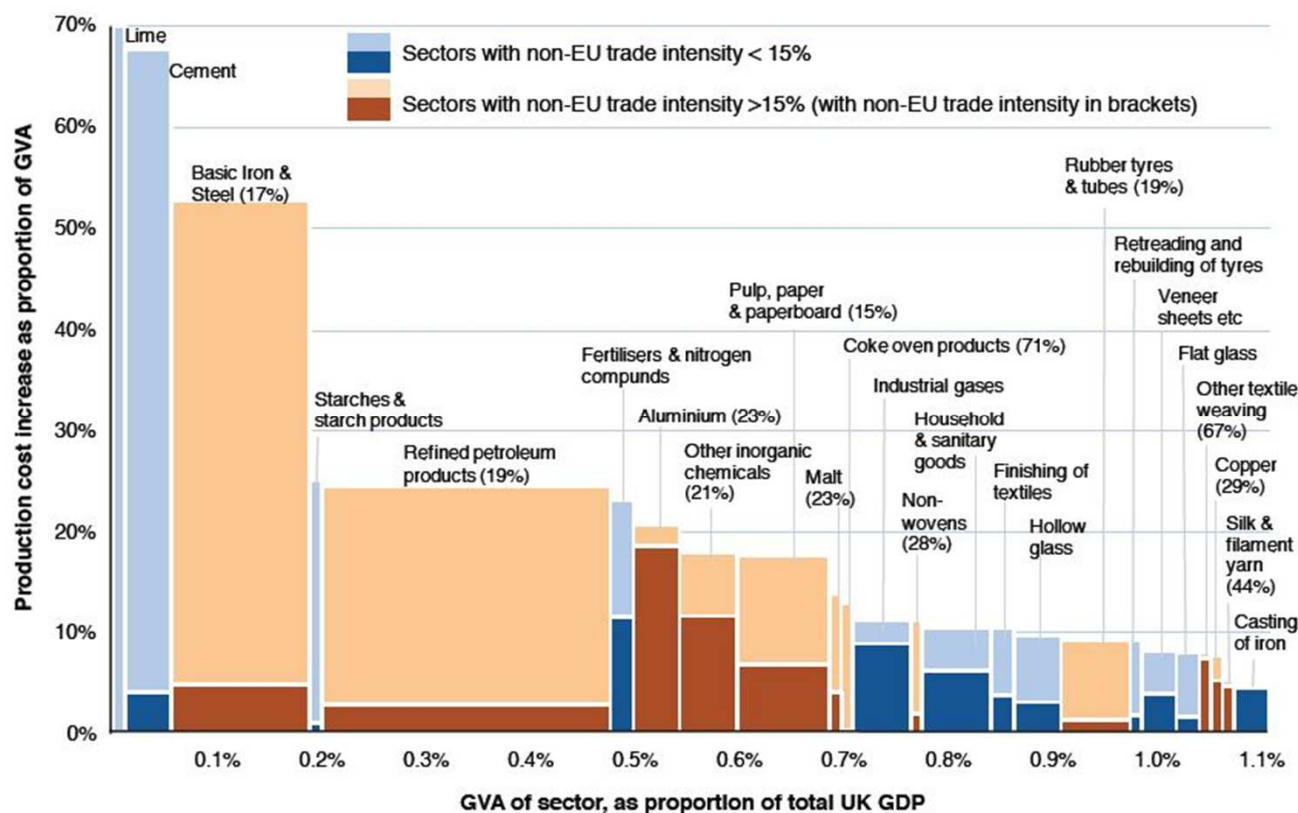
Notes: assumes average annual consumption of 18,000 kWh p.a.

Residential energy – price impacts including energy efficiency opportunity



Notes: assumes average electricity demand falls by 17%, gas 11% (overall 12% energy saving)

Competitiveness impacts – relevant for some energy intensive industries



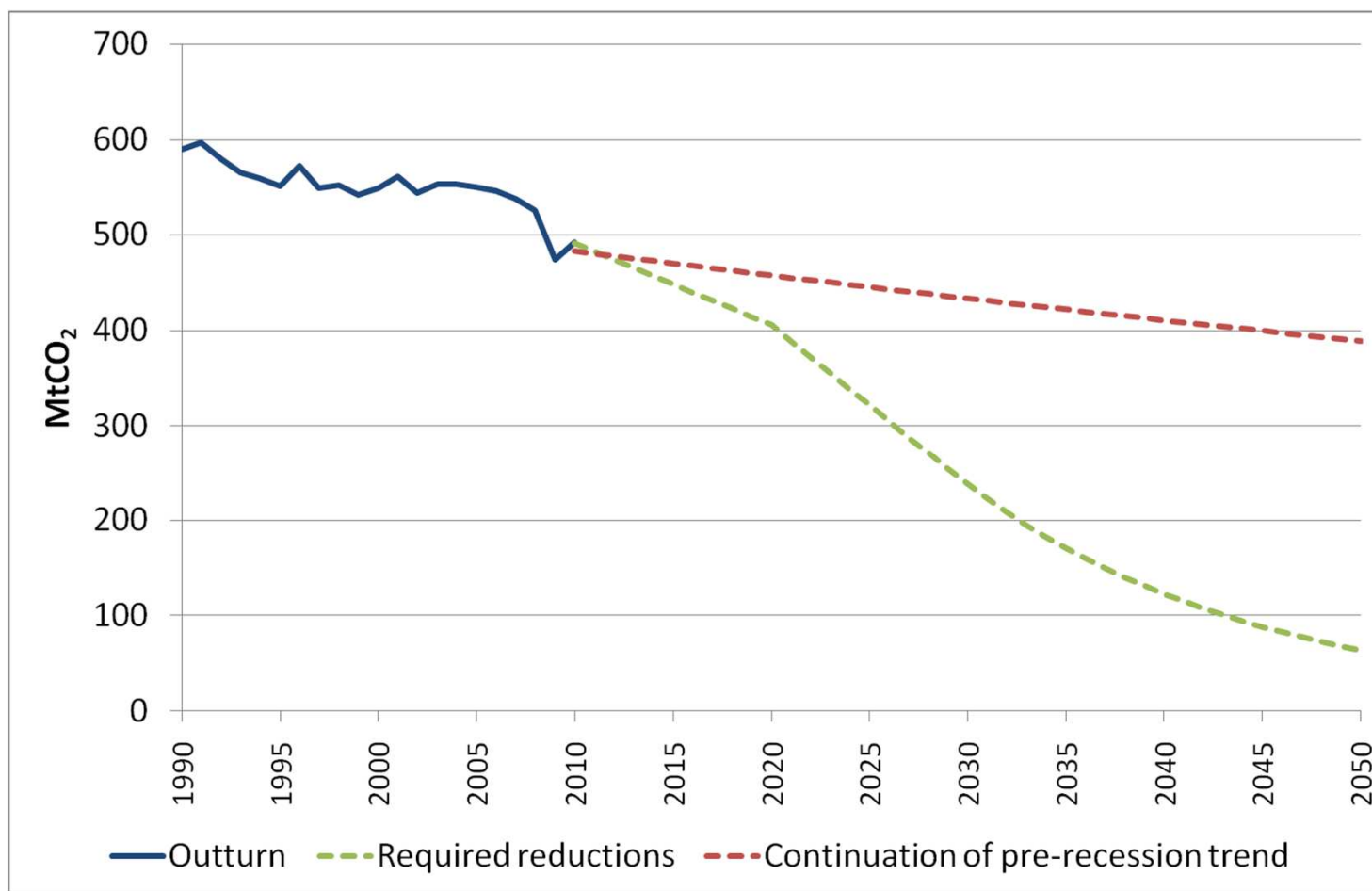
Benefits of action

- Build a sustainable economy
- Build a resilient economy

Benefits of *early* action

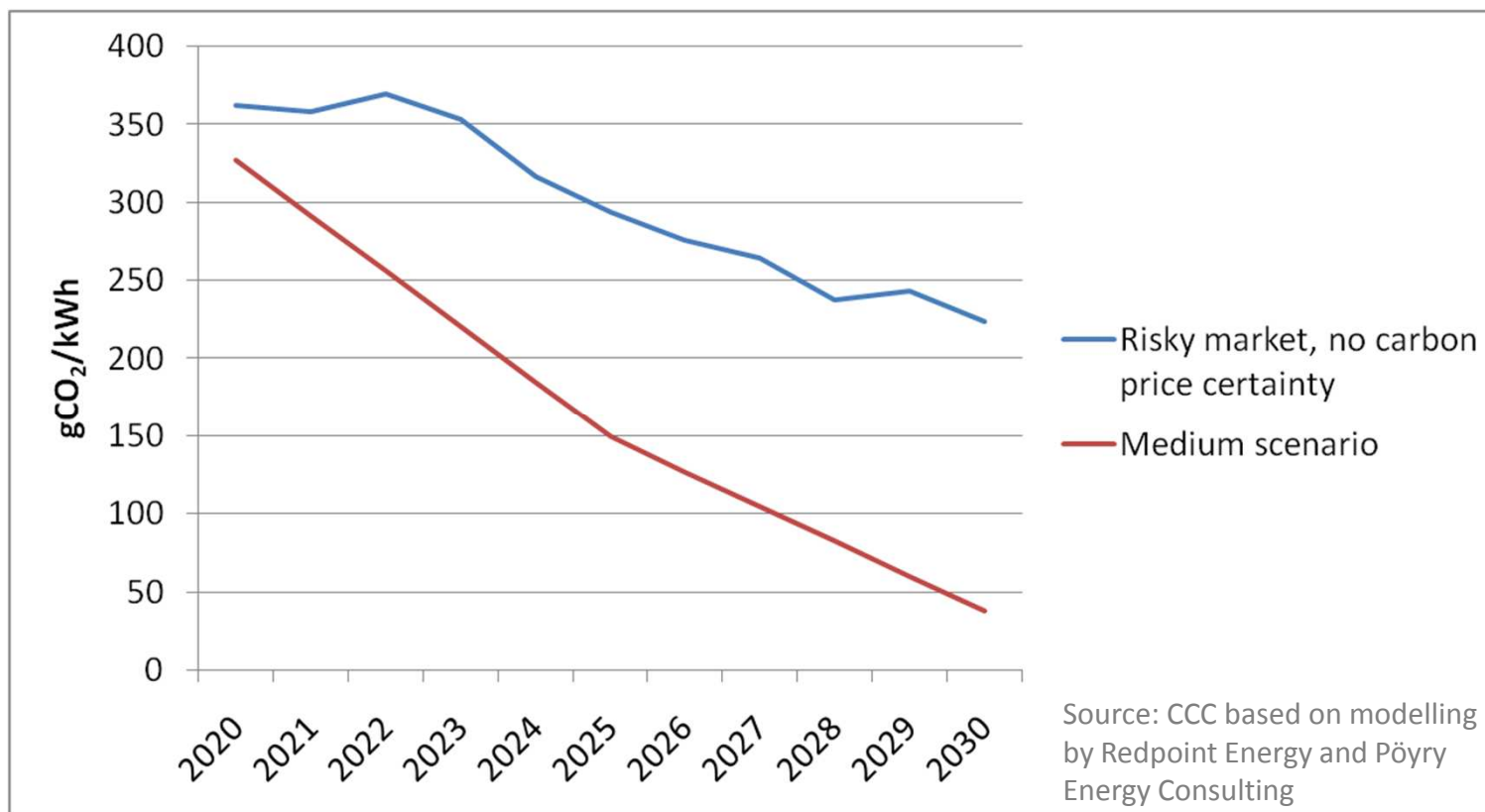
- Free up resources during recession
- Create near and longer term jobs
- Minimise costs of economy decarbonisation

CO₂ emissions – historic and future required



Power: Current market arrangements won't deliver decarbonisation

Emissions intensity trajectory under current market arrangements compared to required path

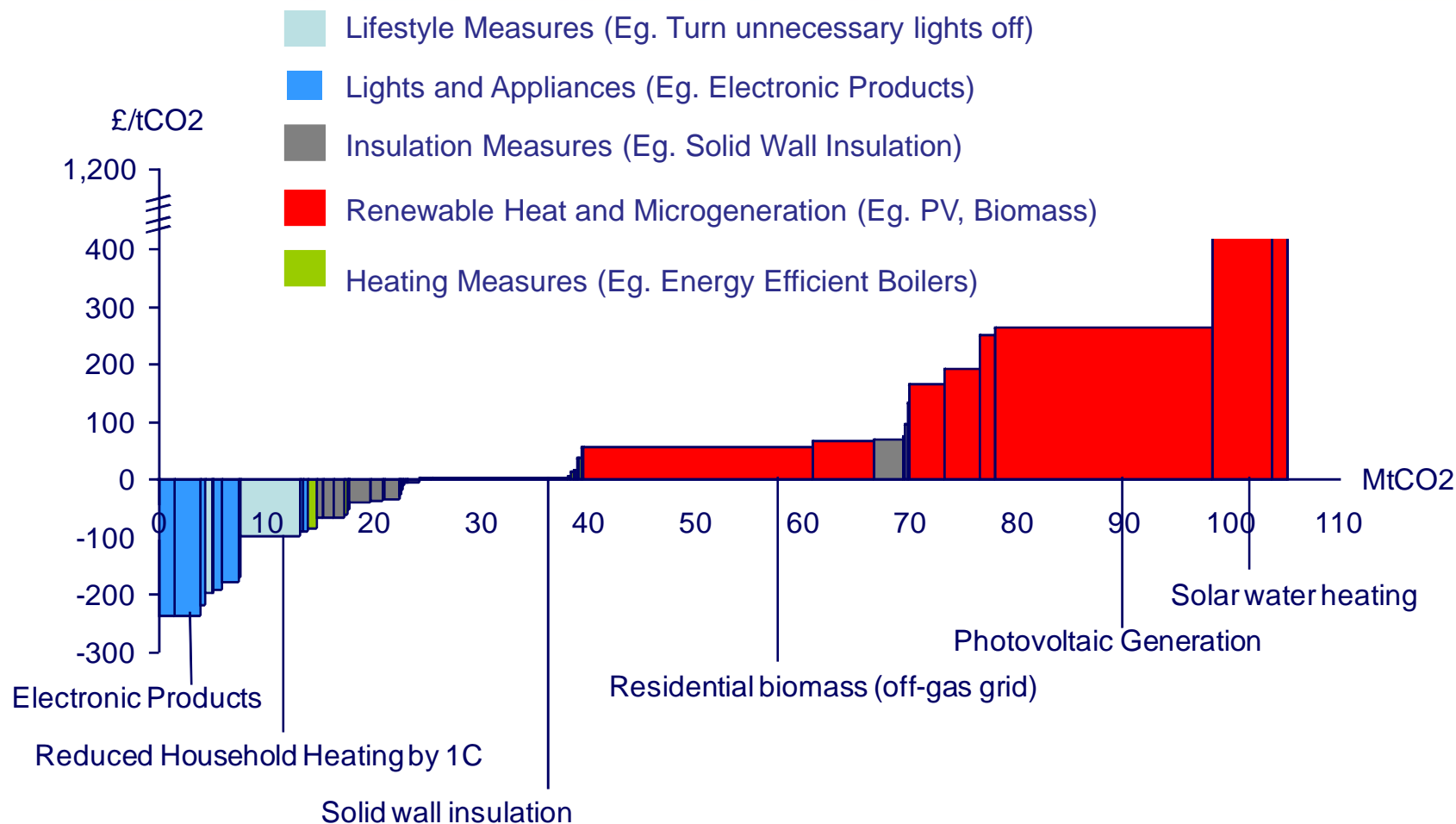


Power: Market reform is needed – tendering of long-term contracts the preferred mechanism



- ☉ Carbon price, gas price and demand risks will **limit investment** in low-carbon generation.
- ☉ Lowest cost strategy seeks to **reallocate risk**, not subsidise.
- ☉ Tendering of **long-term contracts** for low-carbon generation would:
 - allocate risks appropriately
 - provide price competition discipline
 - allow new entrants.
- ☉ Options include **Contracts for Differences** or **Power Purchase Agreements**.

Residential sector MACC – technical potential in 2020



Summary of recommendations



- The UK's **2050 target** of an 80% emissions reduction remains appropriate.
- By **2030** the UK should aim for a 60% reduction on 1990, and a 37% reduction by 2020; this is a back ended path to 2050.
- Cost of meeting budget is **1% of GDP**; rising energy prices – but impacts manageable (e.g. through energy efficiency improvement in the residential sector)
- Benefits: sustainable and resilient economy, short term cost savings and stimulus, long term cost minimisation and jobs
- **Policy implications:** need new policies across key areas to drive step change in pace of underlying emissions reduction.

Small cost but quality of life unchanged

- Significant clean power generation - nuclear, CCS & renewables.
- Energy efficient homes and offices, building fabric and appliances
- More carbon friendly practice e.g. turning down air conditioning
- Change in balance of public / private transport and diet
- More efficient cars, plug in hybrids / full electric vehicles
- New jobs in green economy e.g. wind generation, electric cars.
- Cost is a price worth paying to secure brighter future



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