Grantham Research Institute on
Climate Change and
the Environment

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

Decarbonising Britain

Dr David Kennedy

Chief Executive, Committee on Climate Change

Professor Michael Jacobs

Chair, LSE

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Suggested hashtag for Twitter users: #lsedecarbonise

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
- CO_2 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)

Structure

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

Atlantic hurricanes 70% more energetic since 1970's

European heatwaves common by 2040s. In 2003 35-52,000 people died

20-33% of all species at risk of extinction by 2100

Flooding – 17 m Bangladeshis at risk and globally 160-370 m could be affected by 2100

Peru's glaciers will melt by 2015 effecting 2/3rds of population

Conflict – 2.7 billion at risk as a result of climate change e.g. Sudan

Drought –11 million effected in 2006 in Africa

Maldives – 90% of coral destroyed

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 $GtCO_2e$ emissions in 2050
- 8-10 $GtCO_2e$ 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 $GtCO_2e$ total at global level in 2050
  - Implies 2.1-2.6 tCO_2e per capita

2.1-2.6 CO_2e per capita gives a UK reduction of at least 80% in 2050

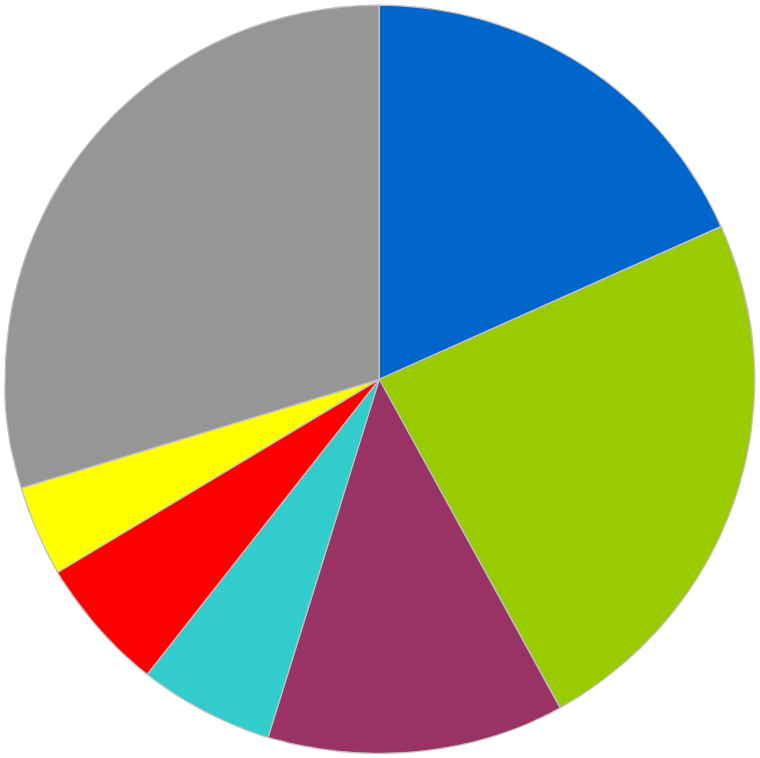
All GHGs

Aviation and shipping included

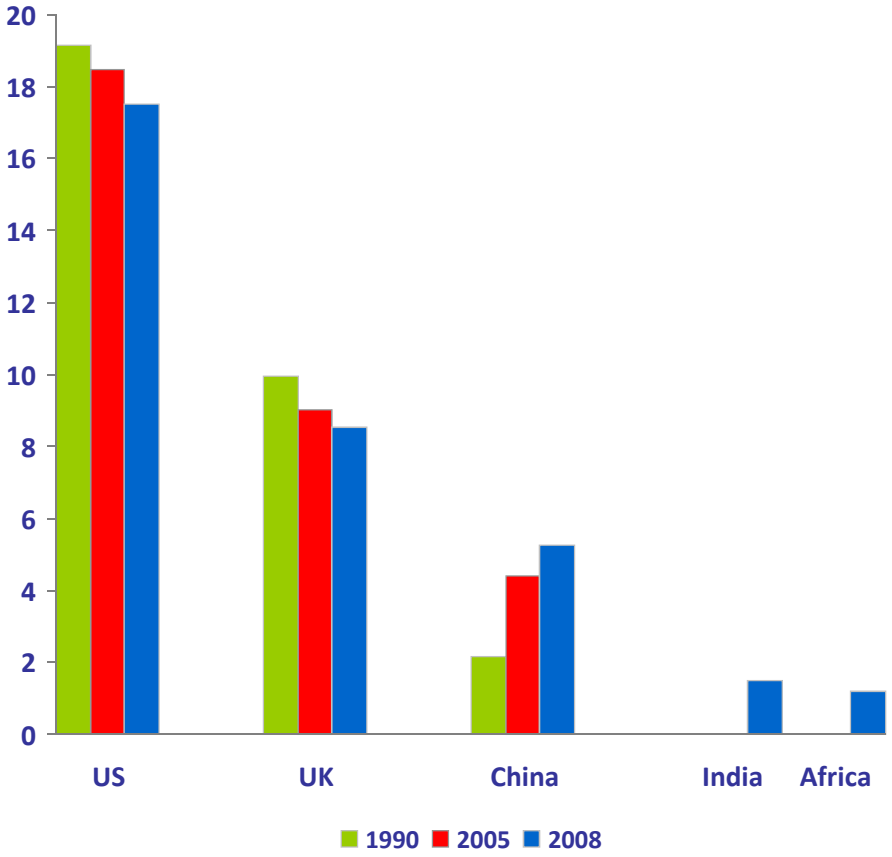
Emissions by country

Total Emissions 2008

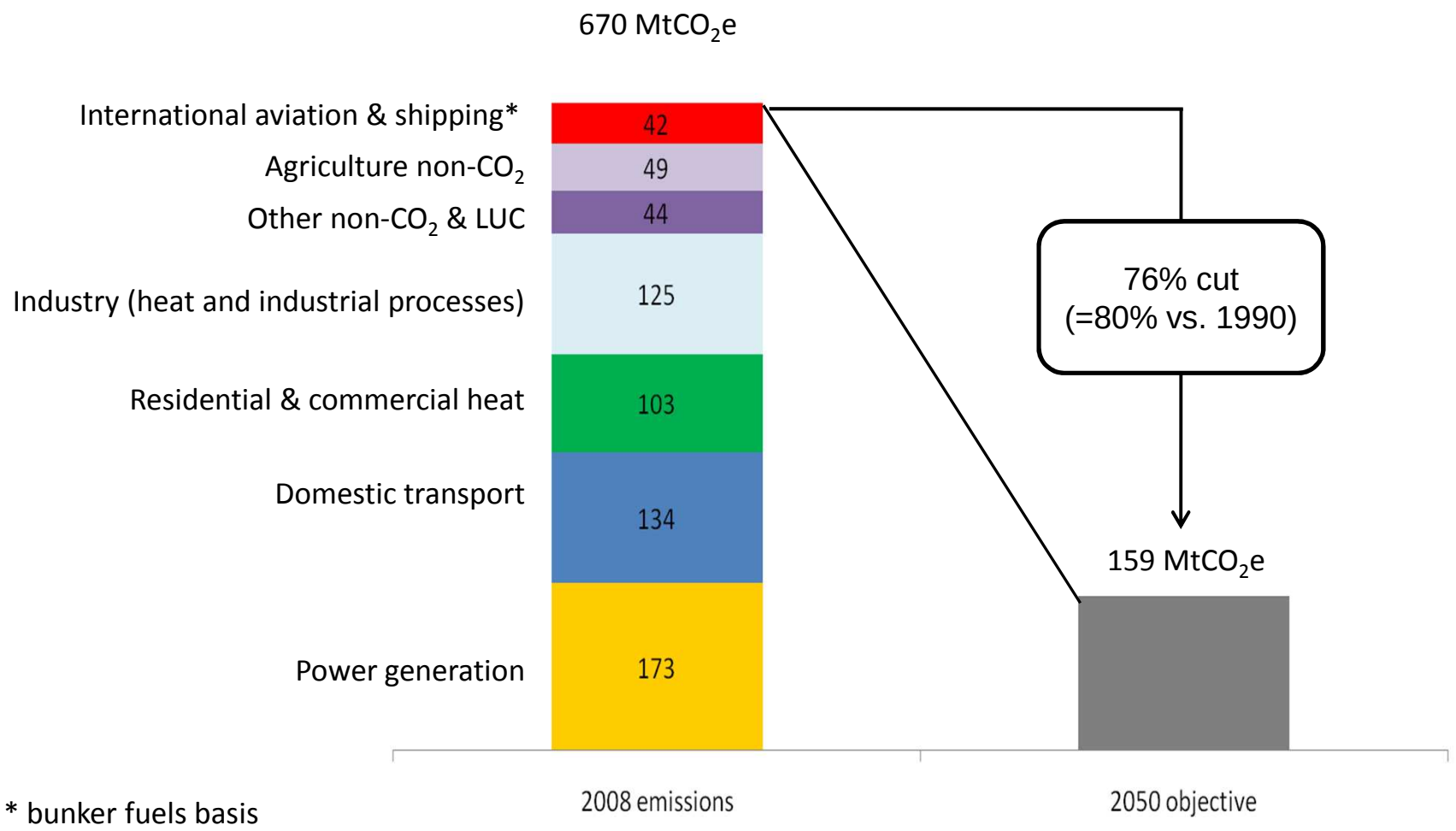
100% = 29862261.0 tonnes $C0_2$



Metric tons CO2 Per Person

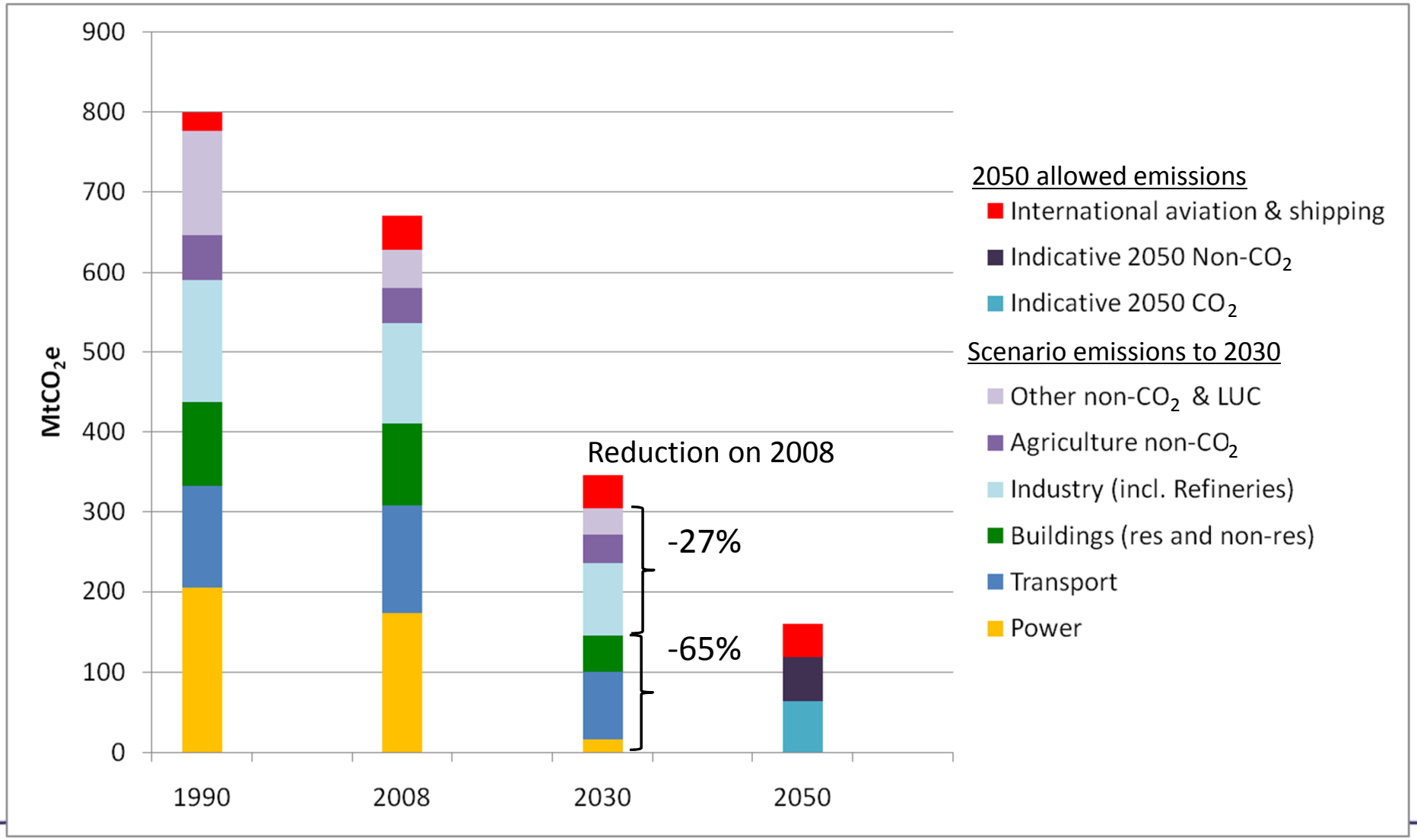


The UK's 2050 target

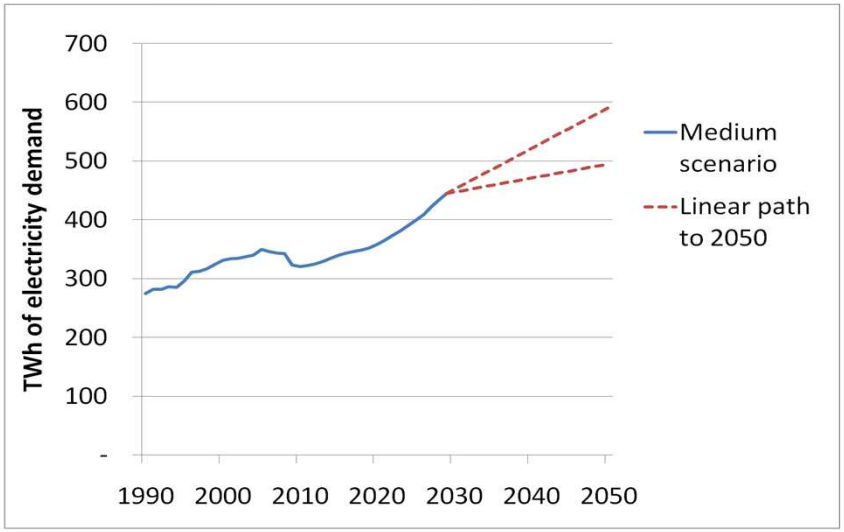


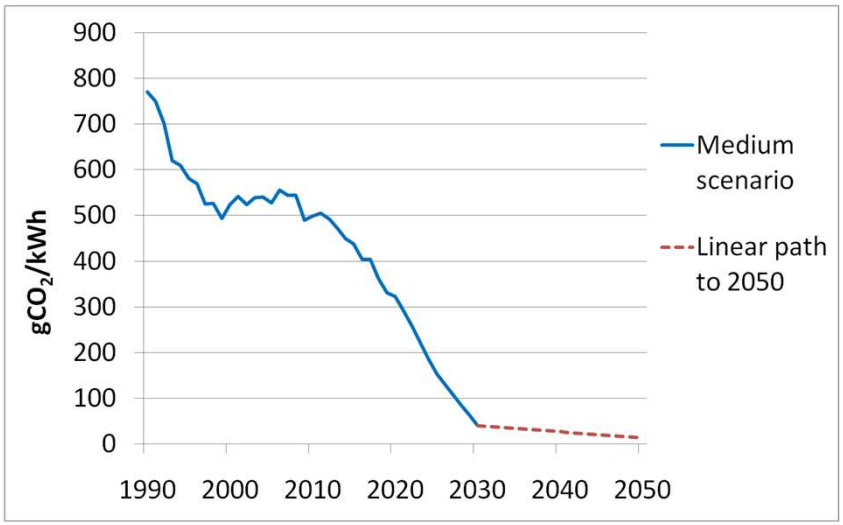
* bunker fuels basis

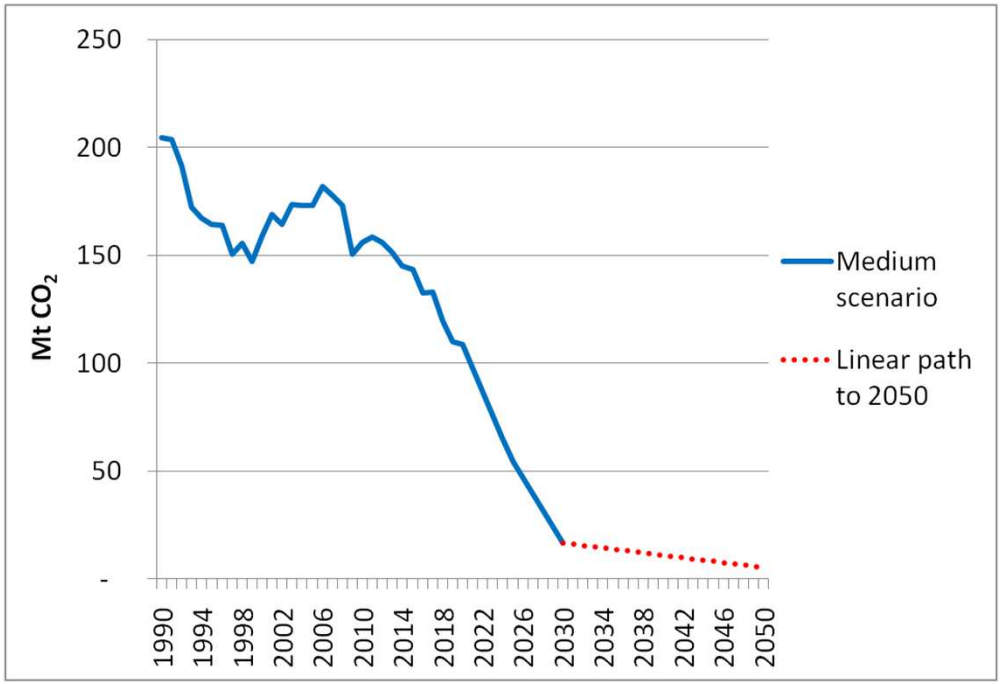
We have developed a feasible and cost-effective planning scenario for 2030 that is compatible with the 2050 target



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



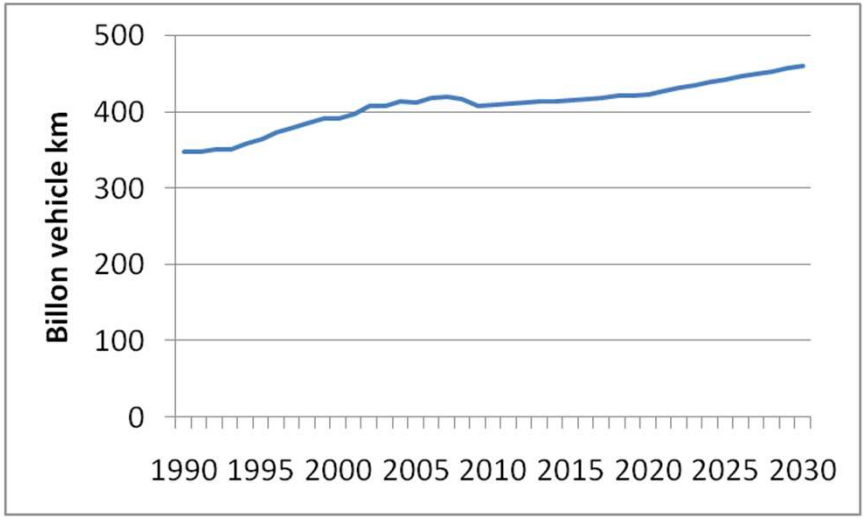




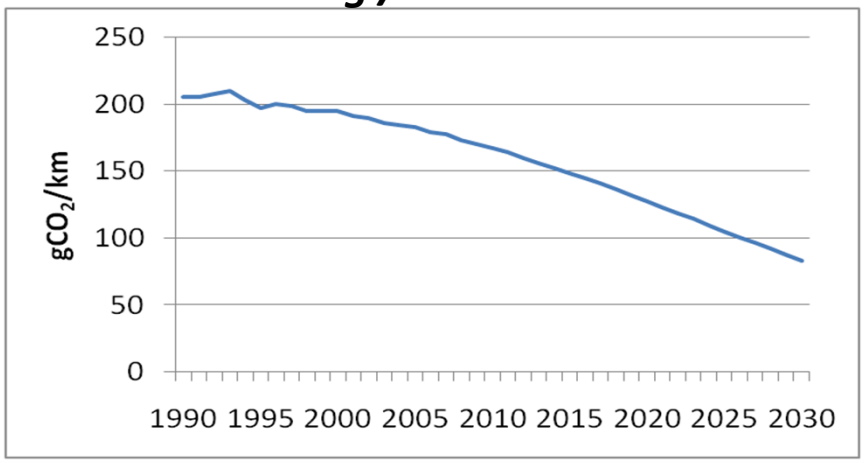
Source for 2050: range of MARKAL model runs for CCC (2010)

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

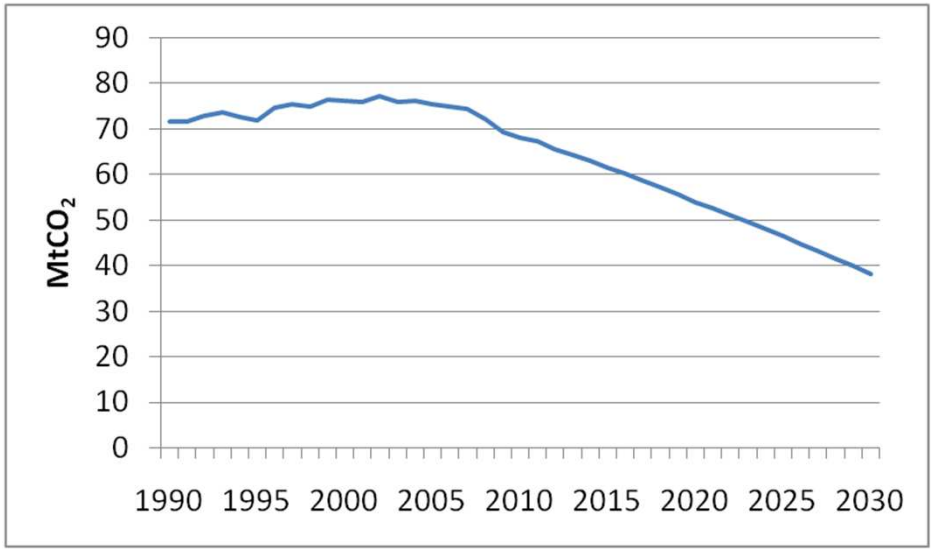
Car km



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

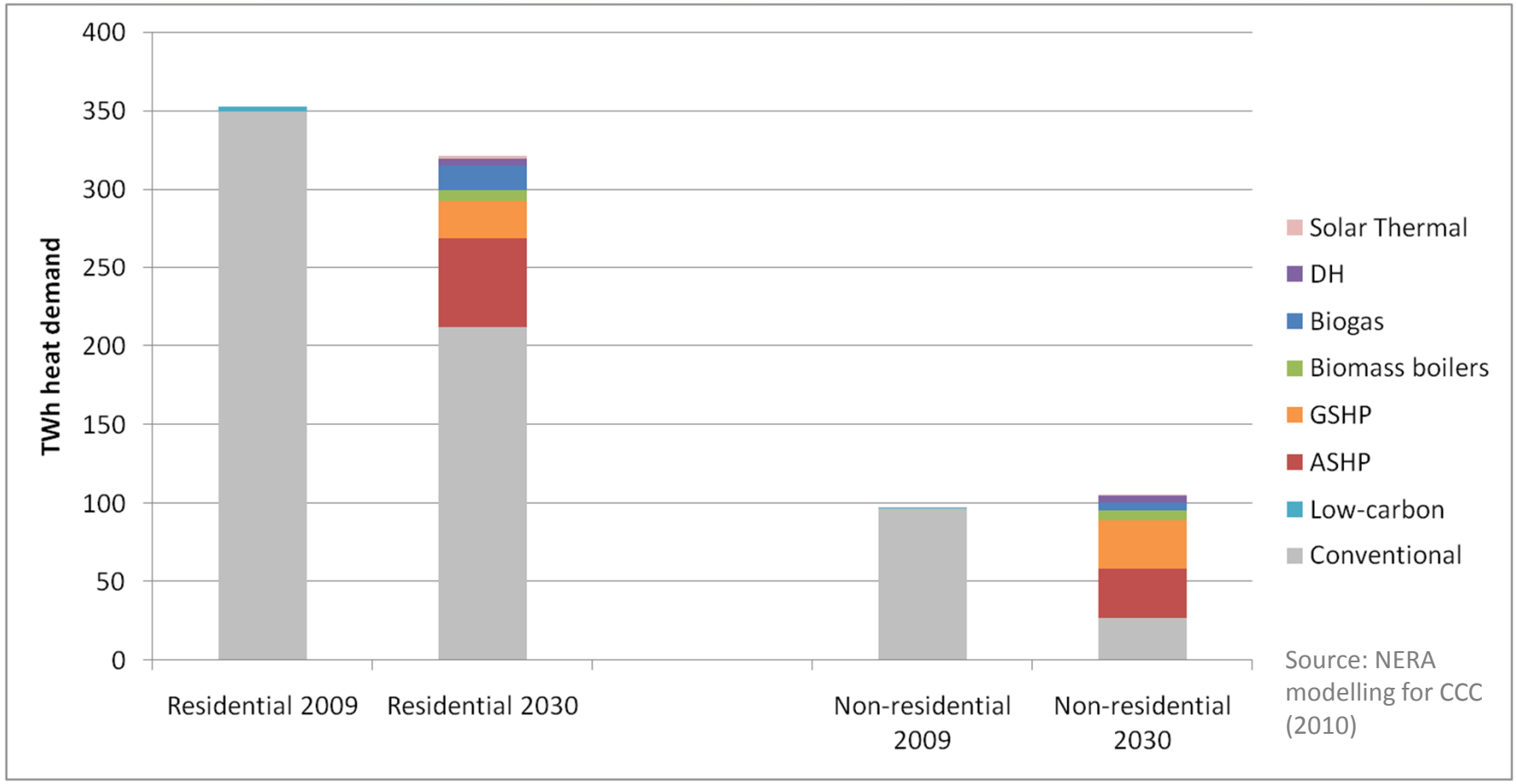
	2030		
	Share of new car sales	Share of miles	Emissions Intensity
Conventional cars	40%	70%	80-125 g/km
Plug-in hybrids	40%	20%	50 g/km
Pure electric vehicles	20%	10%	0 g/km

Average emissions intensity in 2030

New cars purchased: 52g/km (versus 150g/km today)

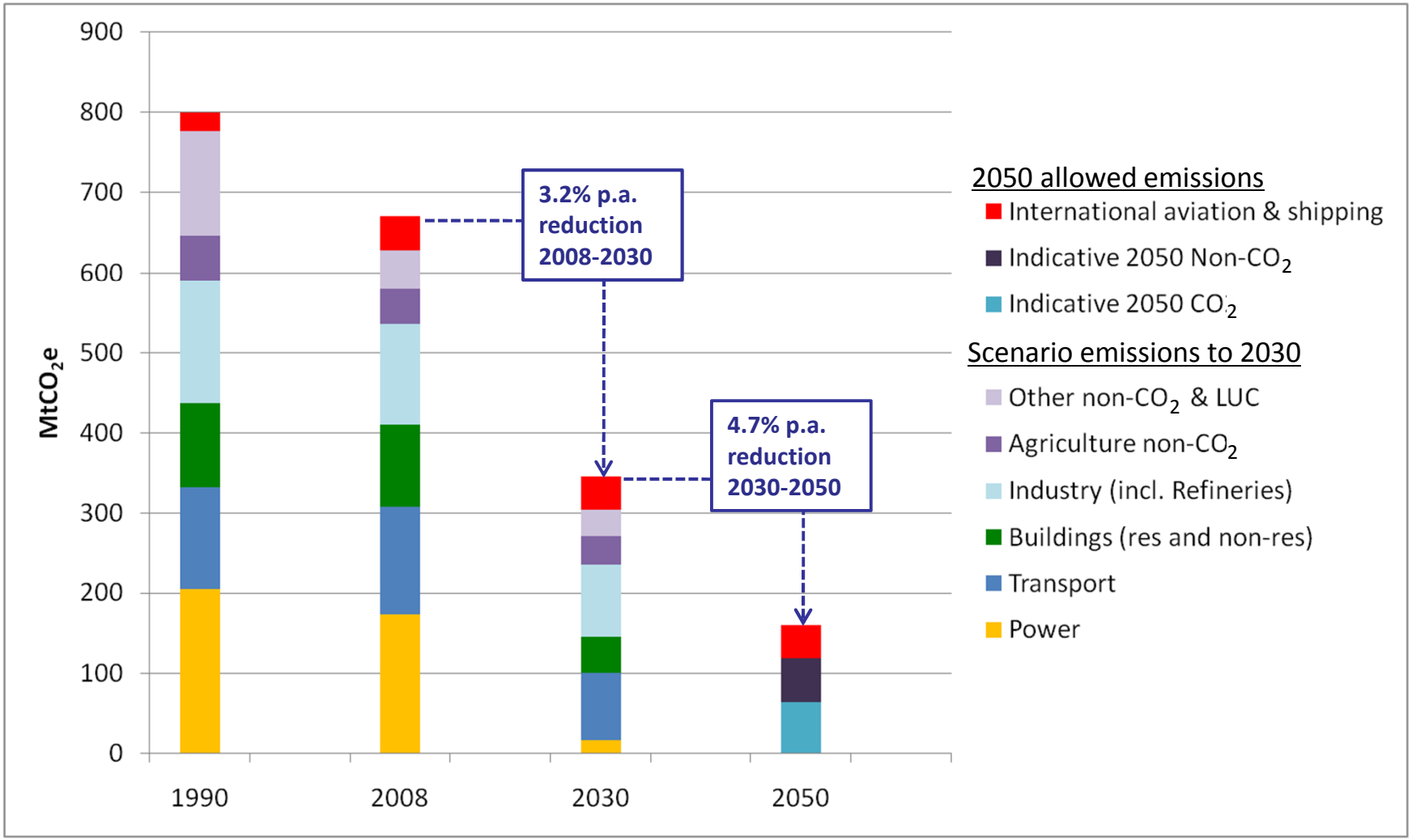
All cars on road: 81 g/km (versus 173 g/km today)

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

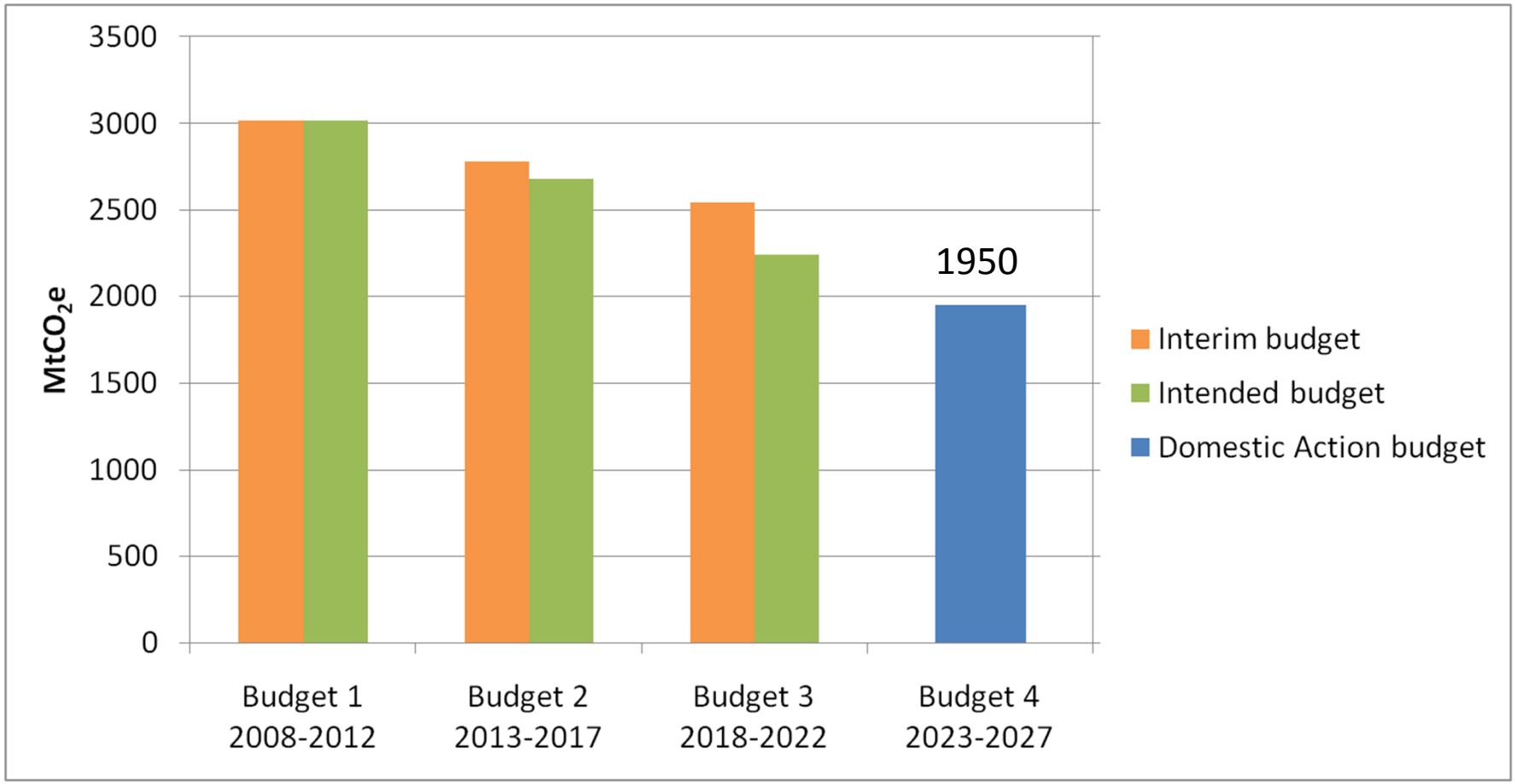


- Demand reductions from efficiency improvements, including 3.5 million solid walls by 2030 in residential buildings
- Low-carbon sources reach 33% of residential heat demand and 74% of non-residential heat demand in 2030

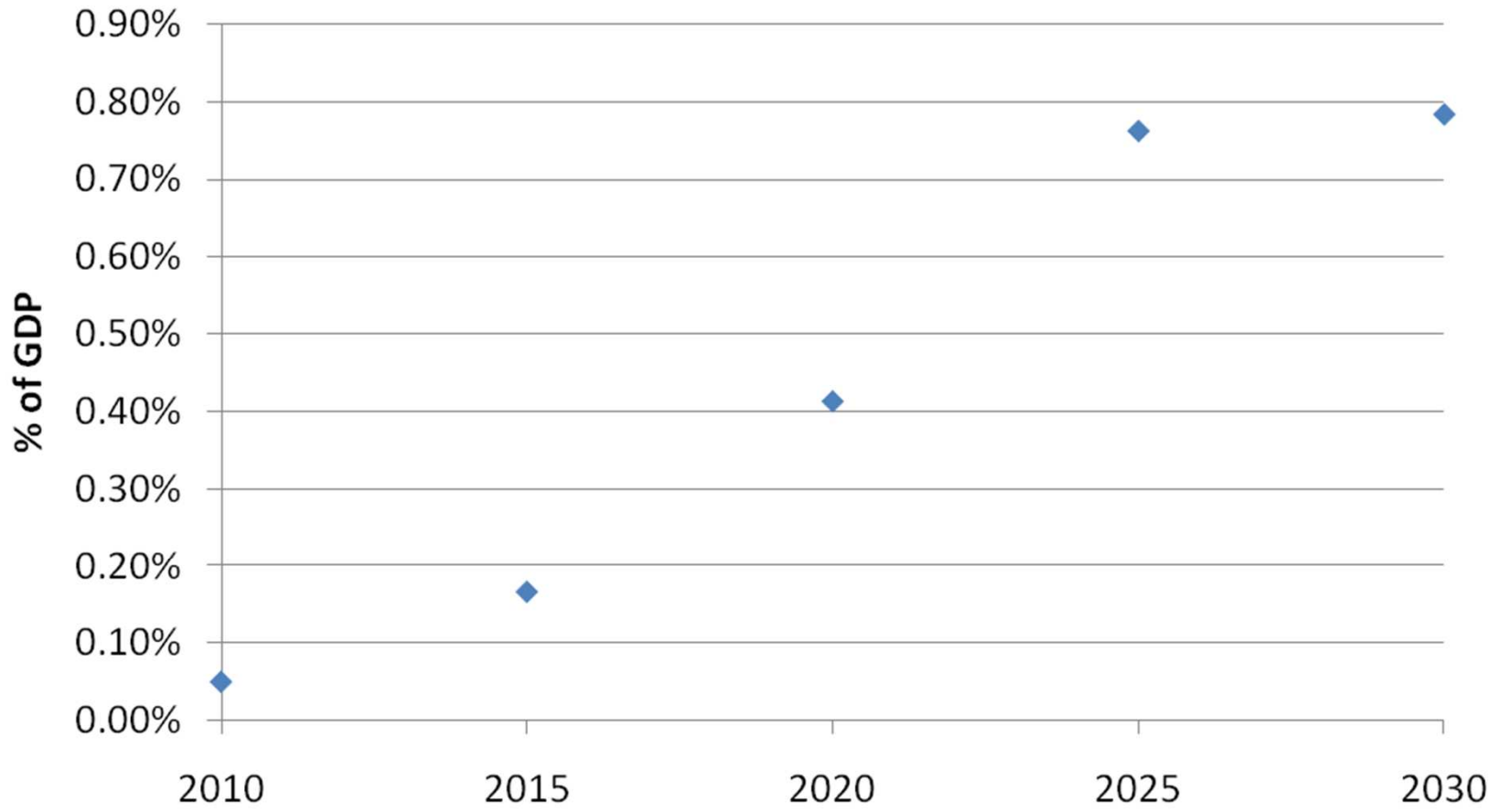
Emissions reductions will have to accelerate again from 2030 to 2050



Interim, Intended and Domestic Action budgets

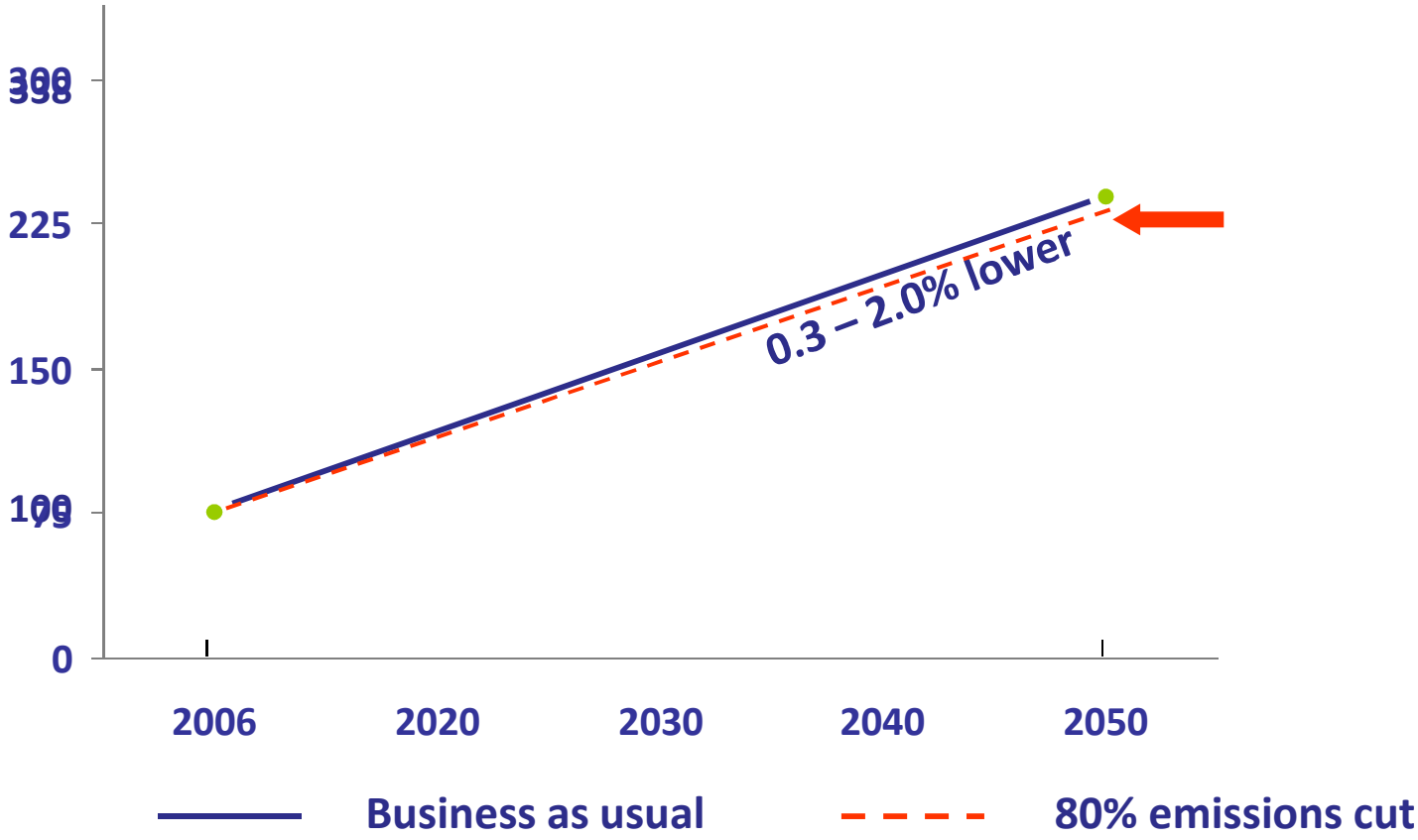


Cost of meeting carbon budgets

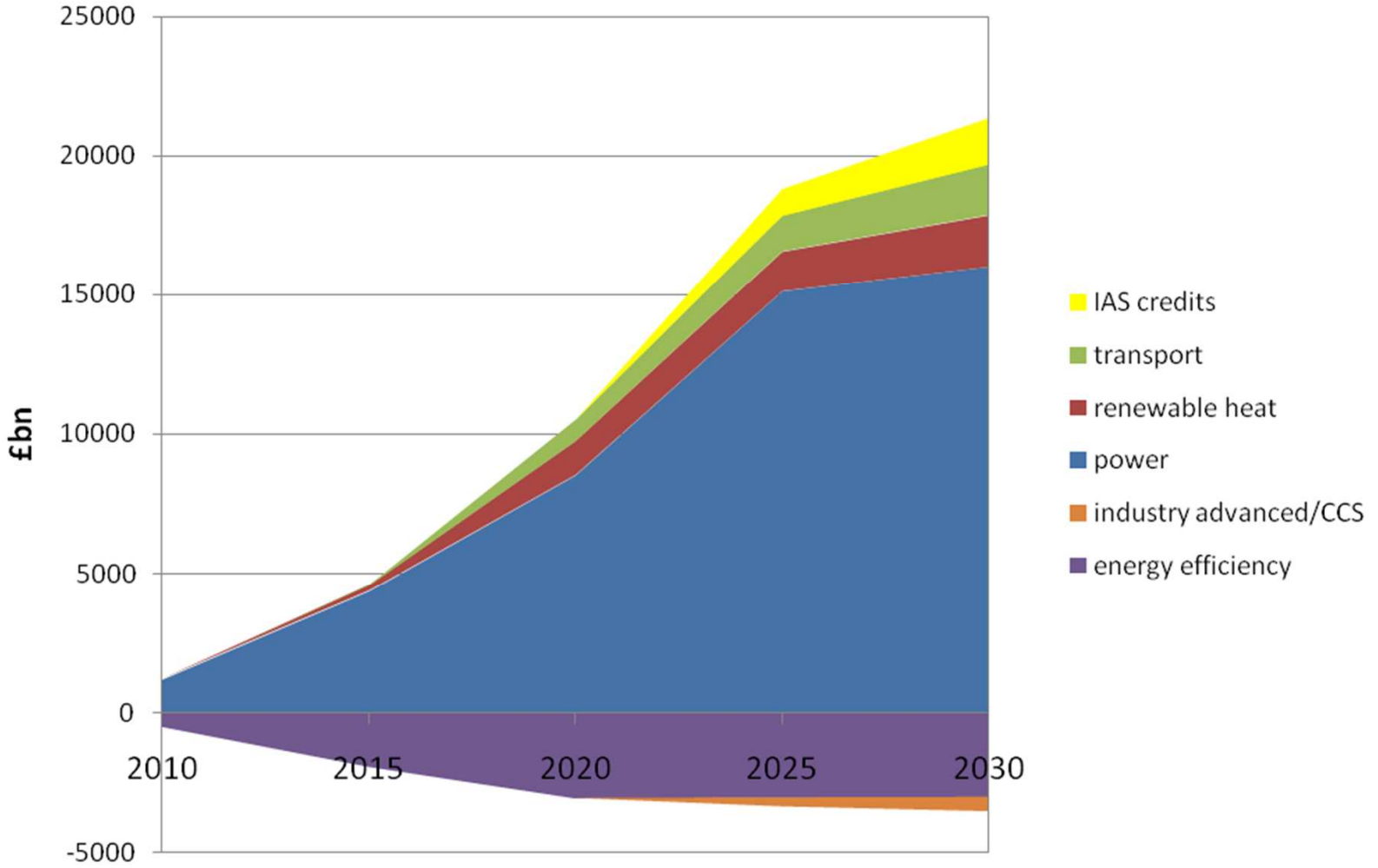


Growth in UK living standards with 80% emissions cut

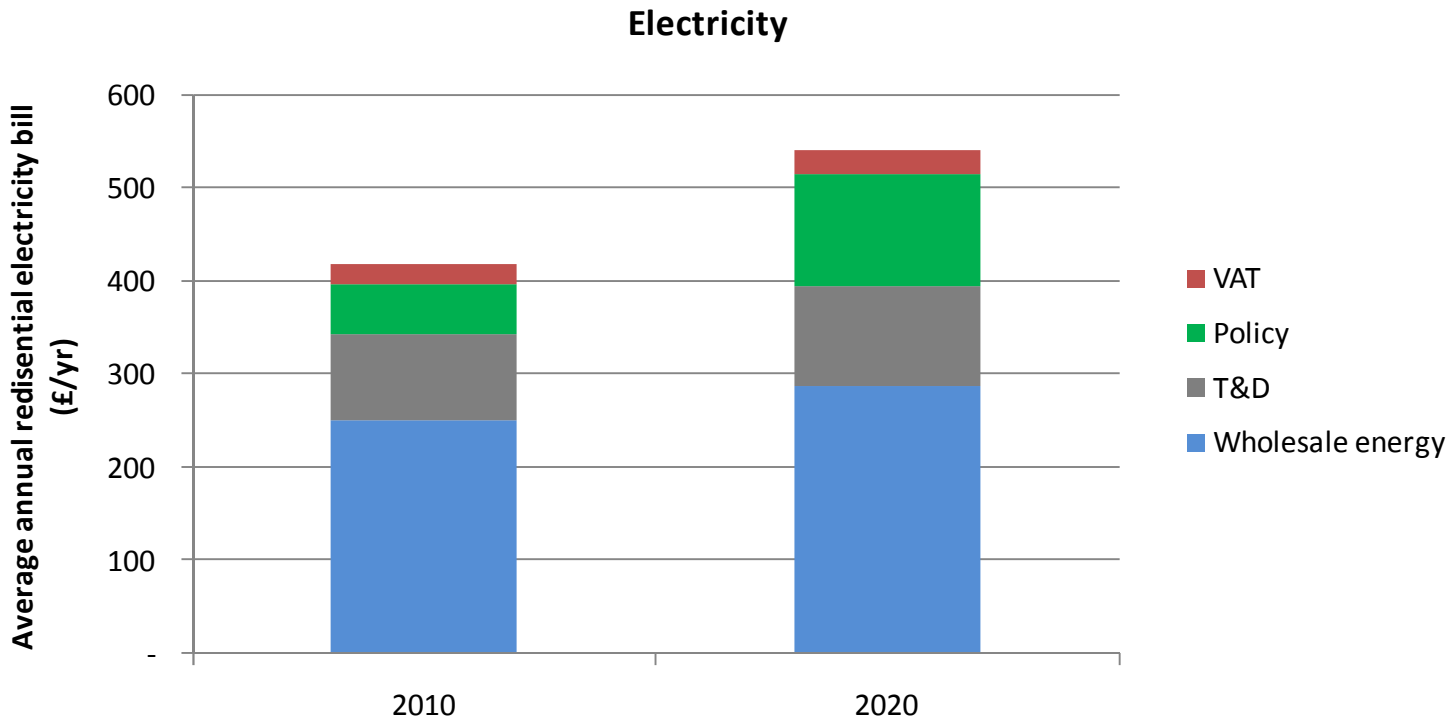
GDP per capita 2006=100



Sectoral breakdown of costs

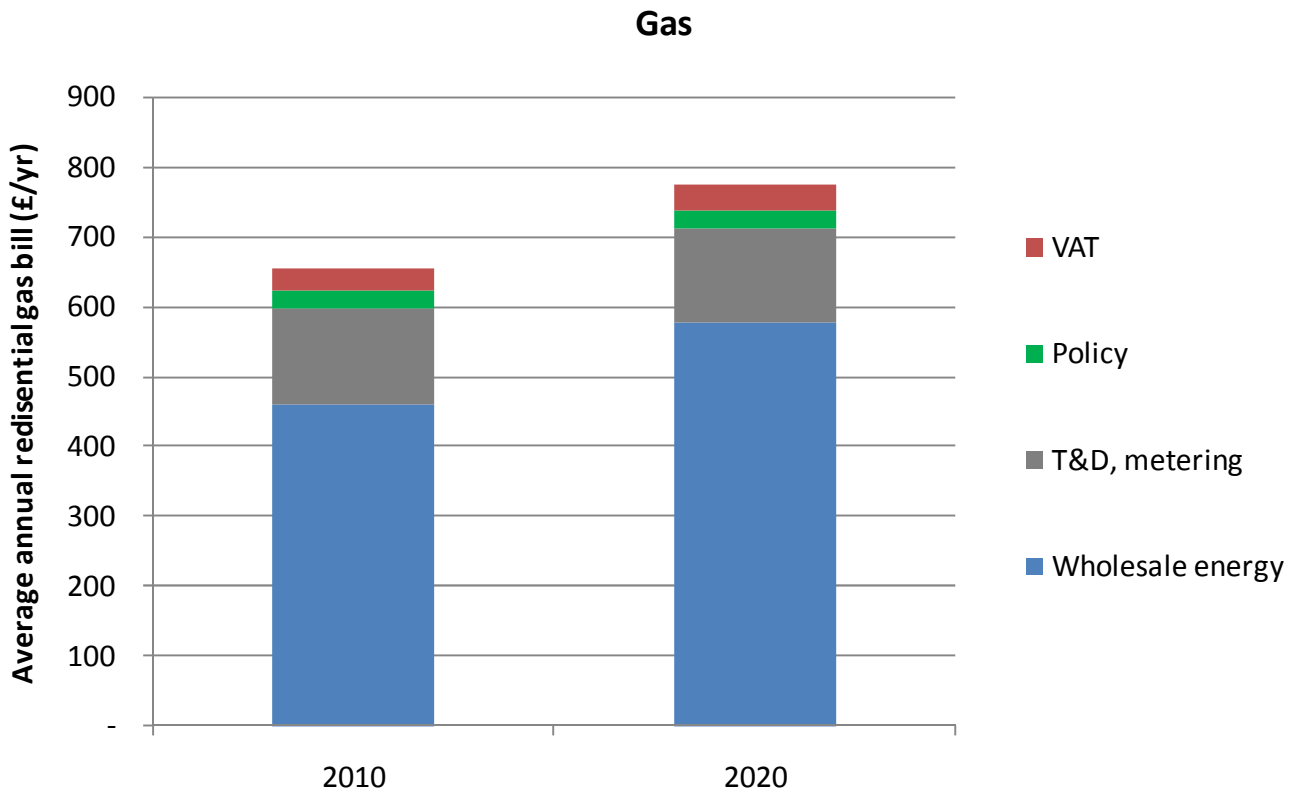


Residential electricity bill today and impact of price changes (2020)



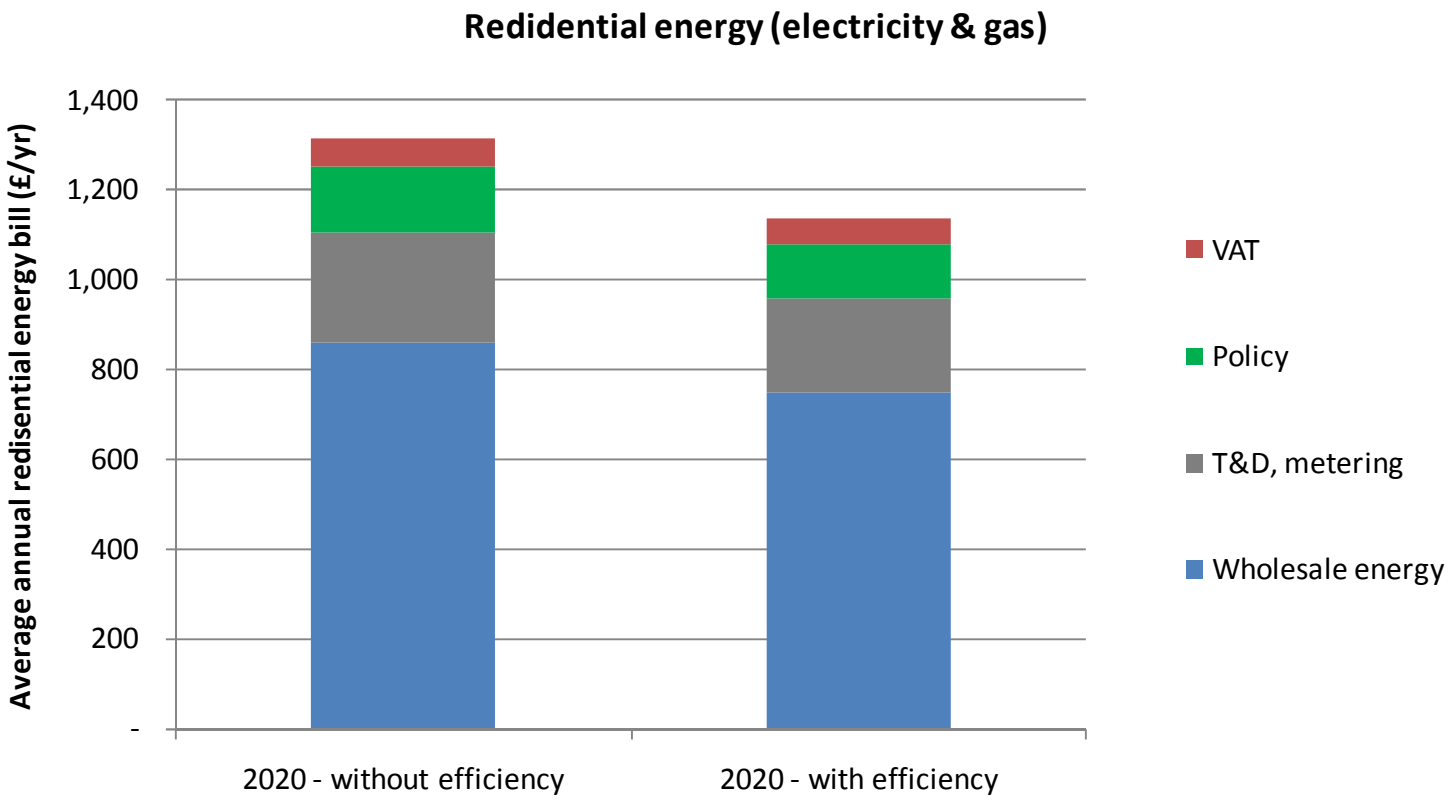
Notes: Assumes average annual consumption of 3,300 kWh p.a.

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



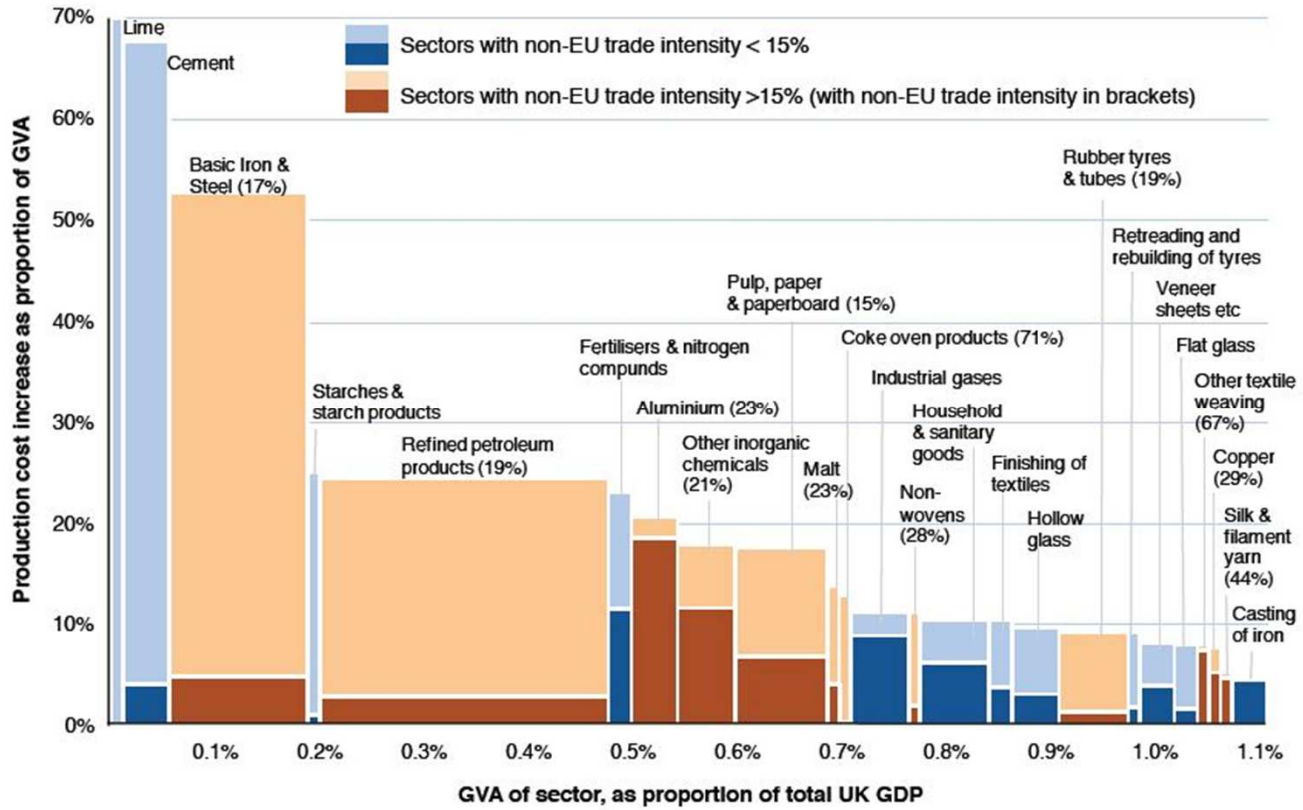
Notes: assumes average annual consumption of 18,000 kWh p.a.

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



Economic benefits of early action

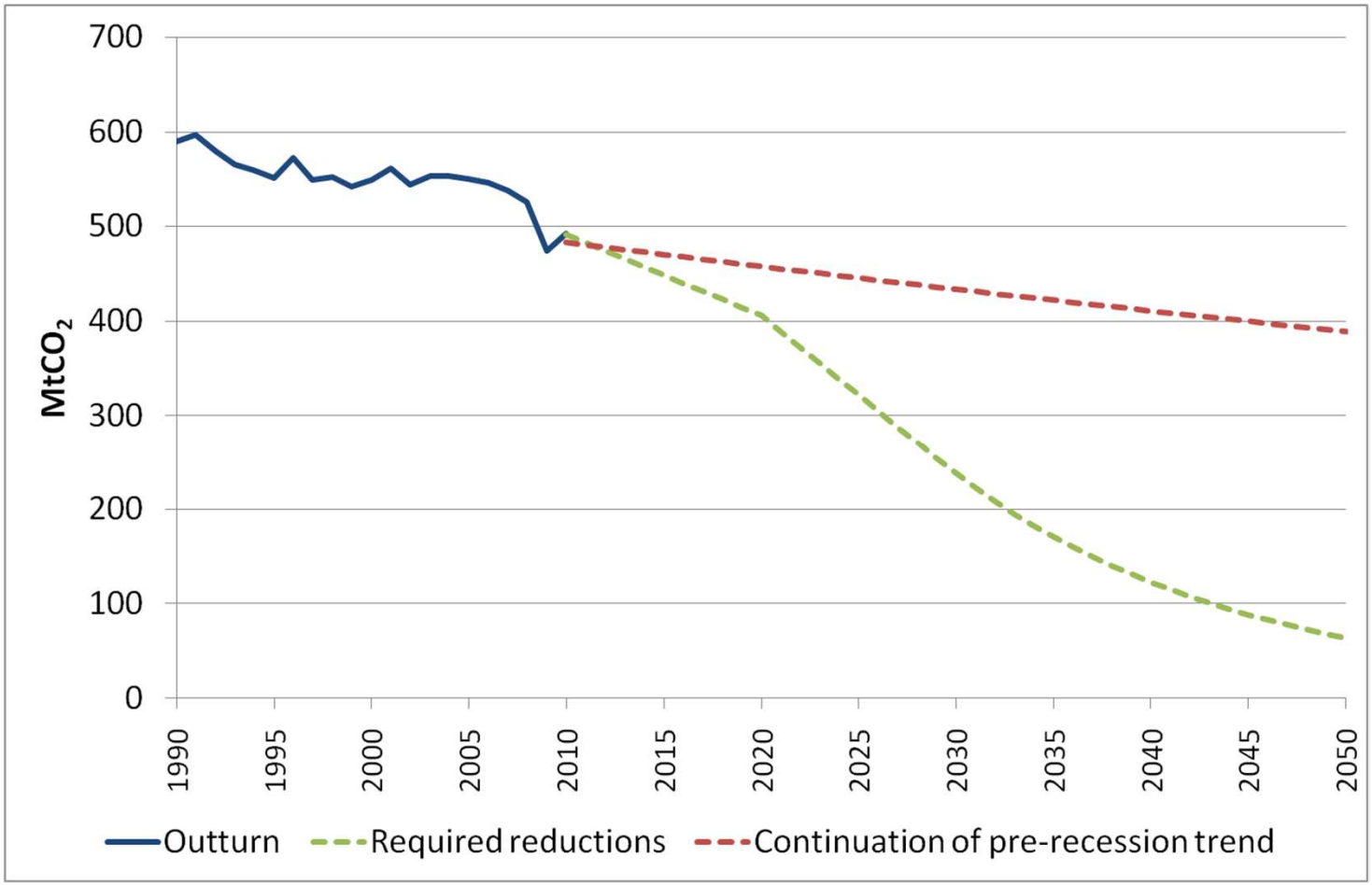
Benefits of action

- Build a sustainable economy
- Build a resilient economy

Benefits of *early* action

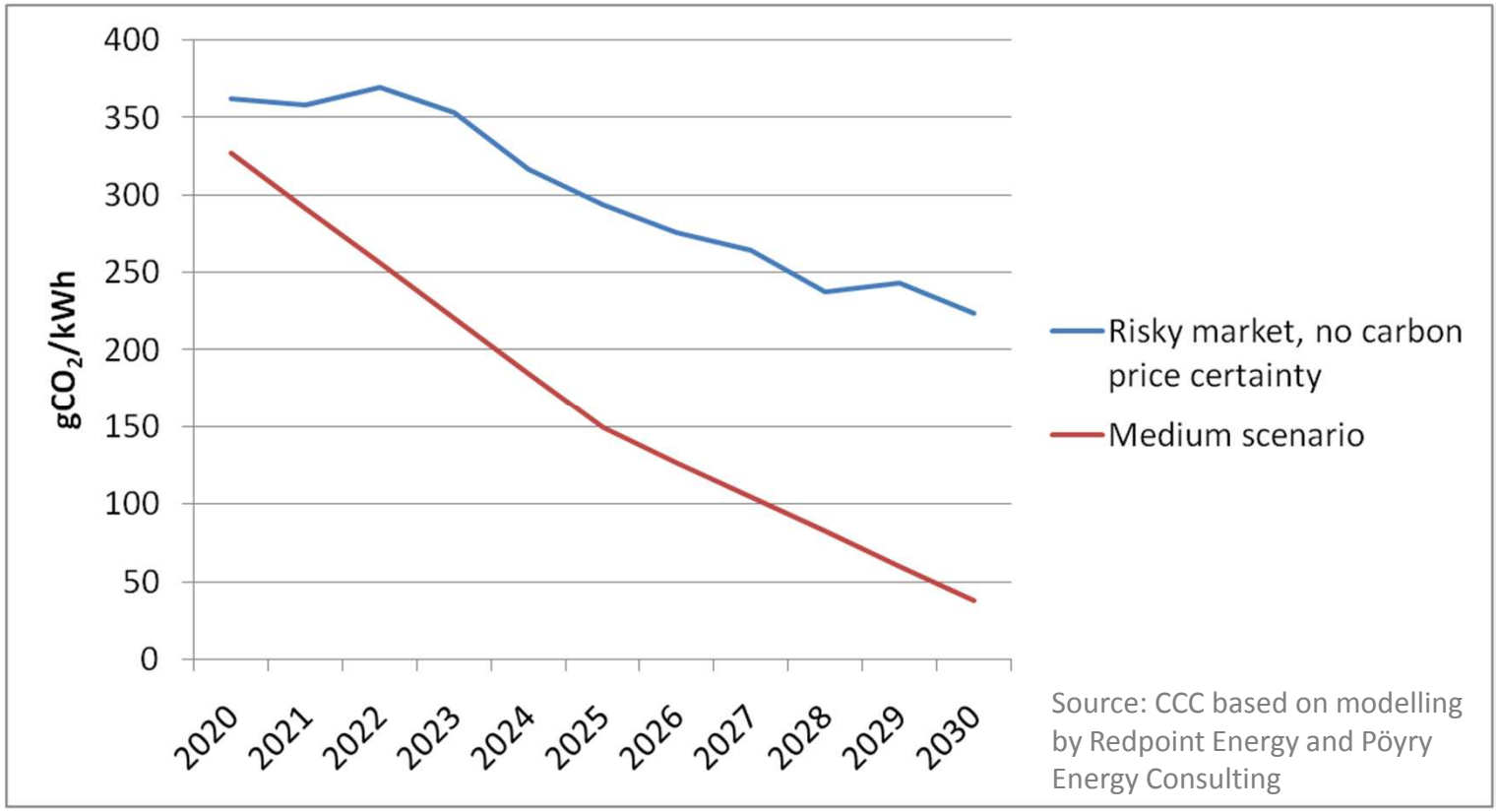
- Free up resources during recession
- Create near and longer term jobs
- Minimise costs of economy decarbonisation

CO_2 emissions – historic and future required



Power: Current market arrangements won't deliver decarbonisation

Emissions intensity trajectory under current market arrangements compared to required path

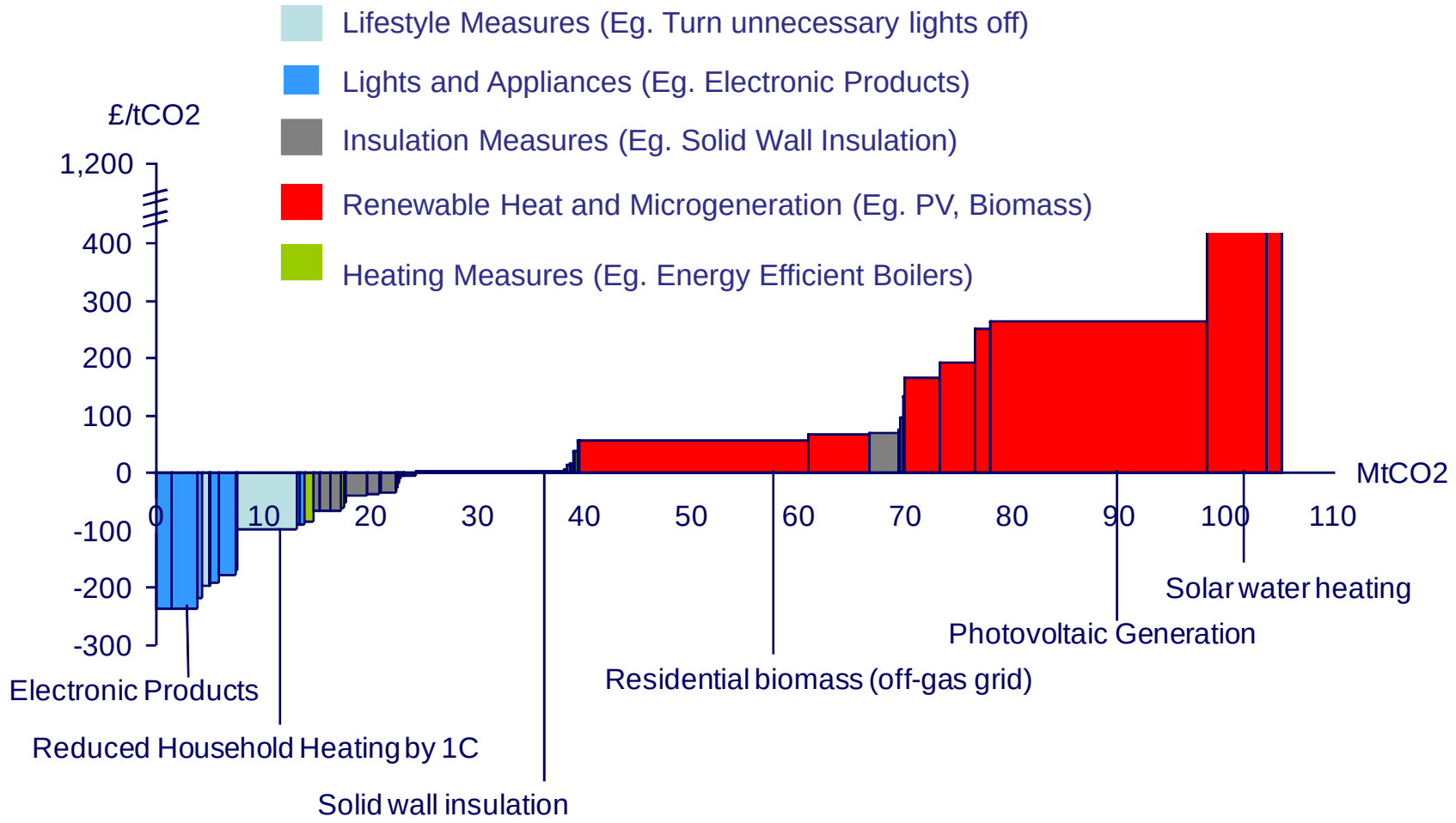


Source: CCC based on modelling by Redpoint Energy and Pöyry Energy Consulting

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.

Conclusion – low-carbon living in 2020

Committee on Climate Change

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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