The Future of Road Transport in the UK

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Committee on Climate Change

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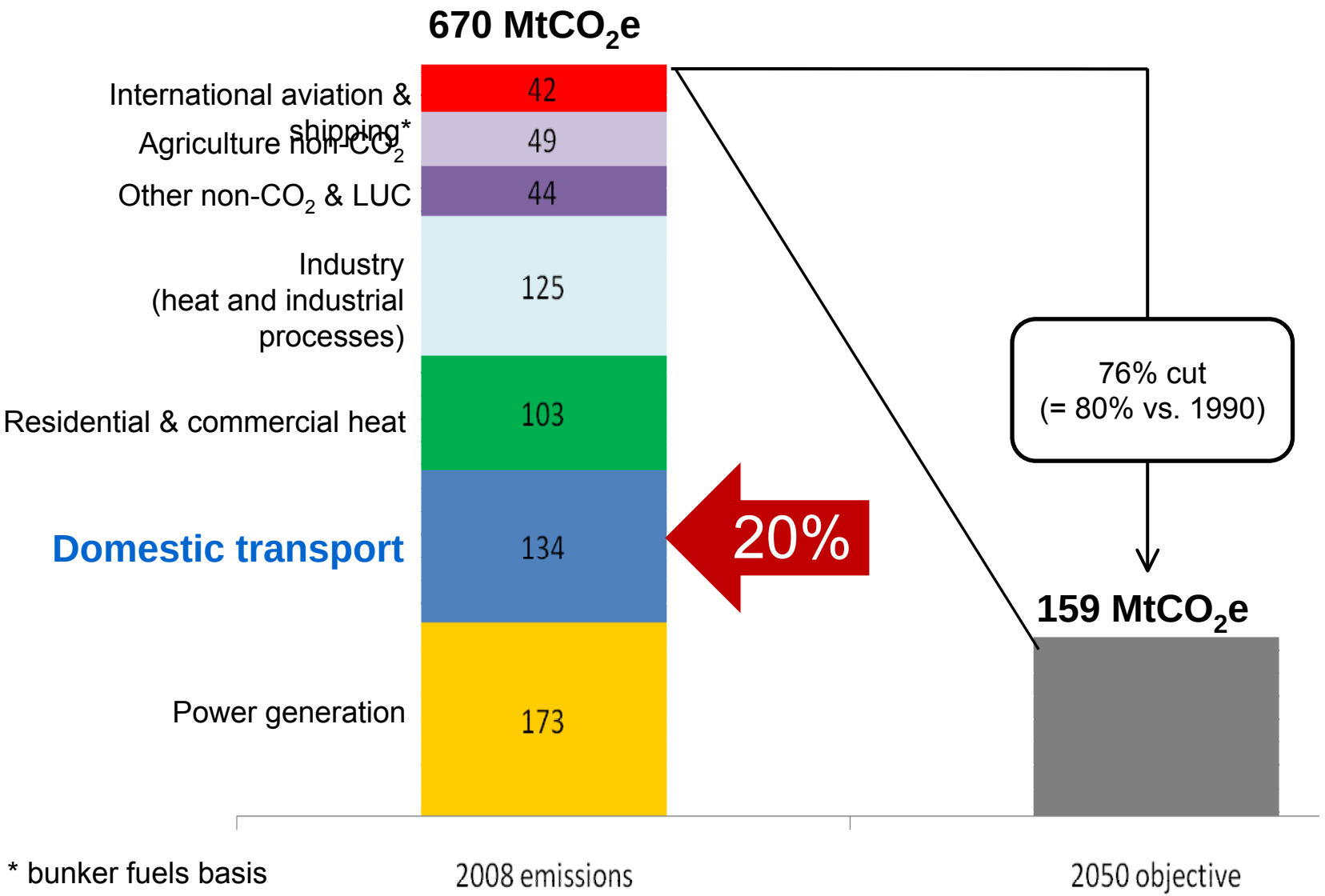
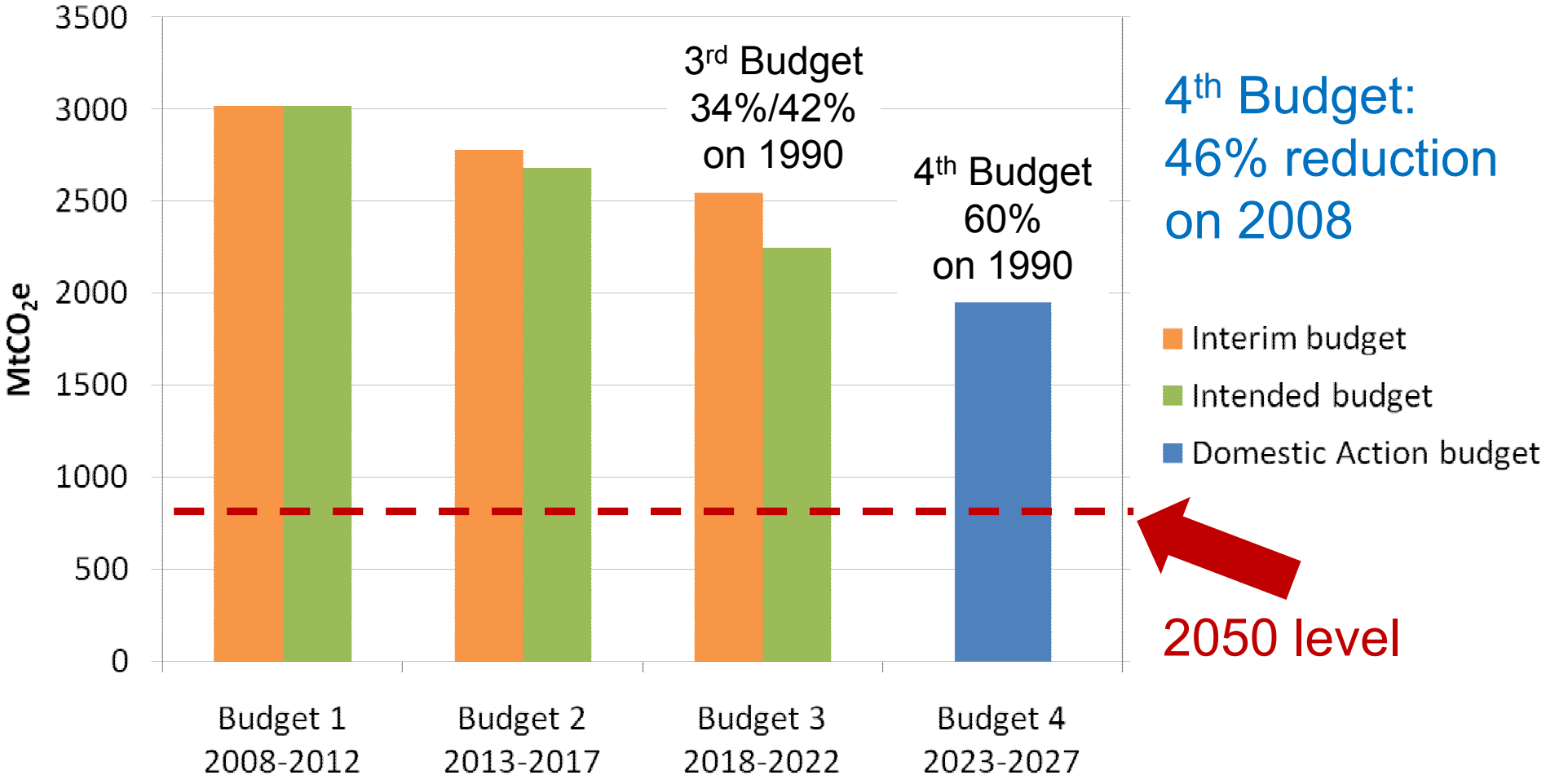
- UK's 2050 CO_2e reduction target and the carbon budgets
- The transport challenge in the UK
- Achieving transport emissions reduction
- The UK approach: 2030 scenario

The UK's 2050 target



* bunker fuels basis

The UK Parliament approved the 4th Budget in 2011



4th Budget:
46% reduction
on 2008

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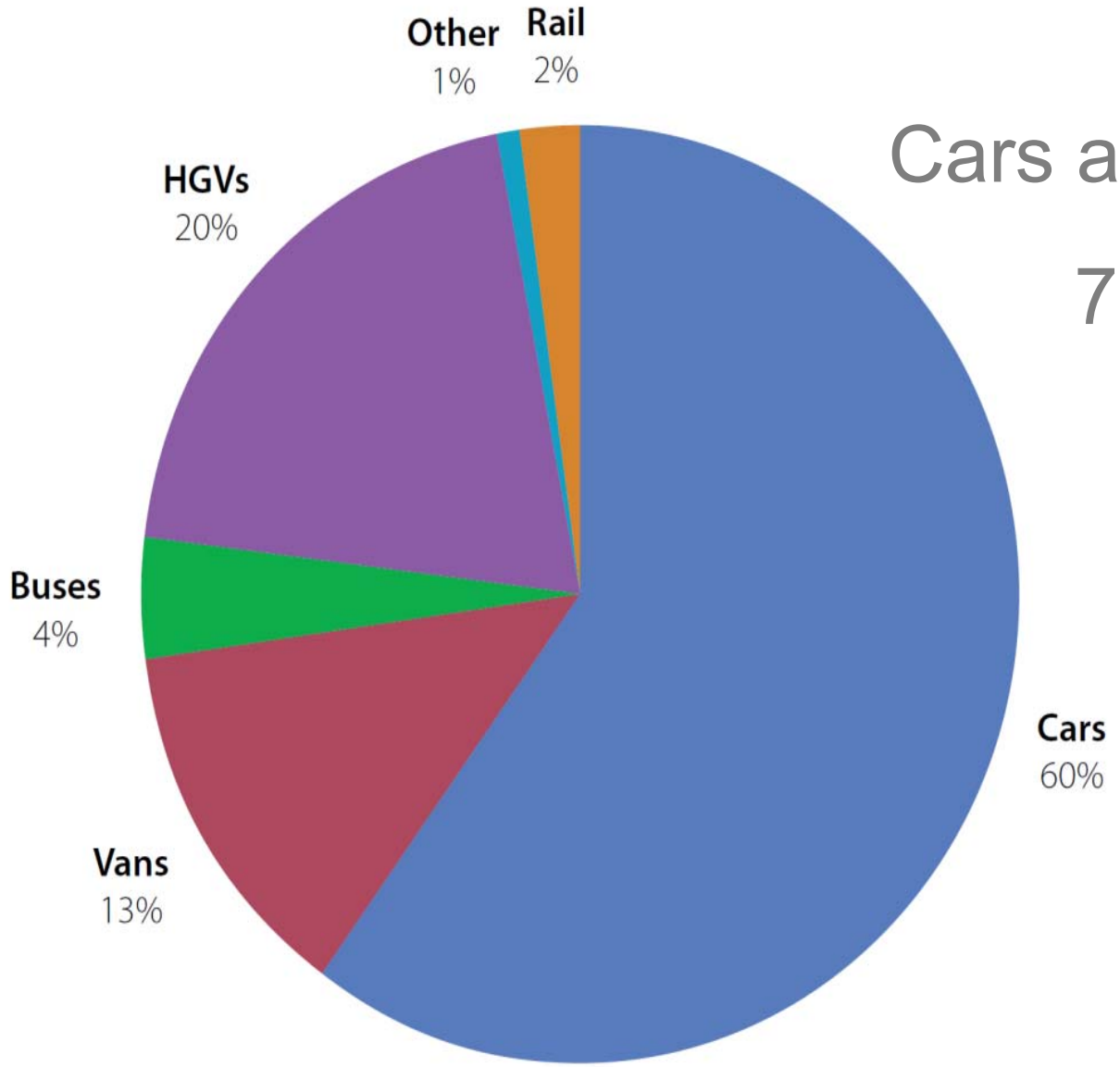
The UK surface transport emissions



Cars and vans:

73%

Source: DECC 2009, 2008 final UK greenhouse gas emissions: data tables

Cars: the scale of the challenge

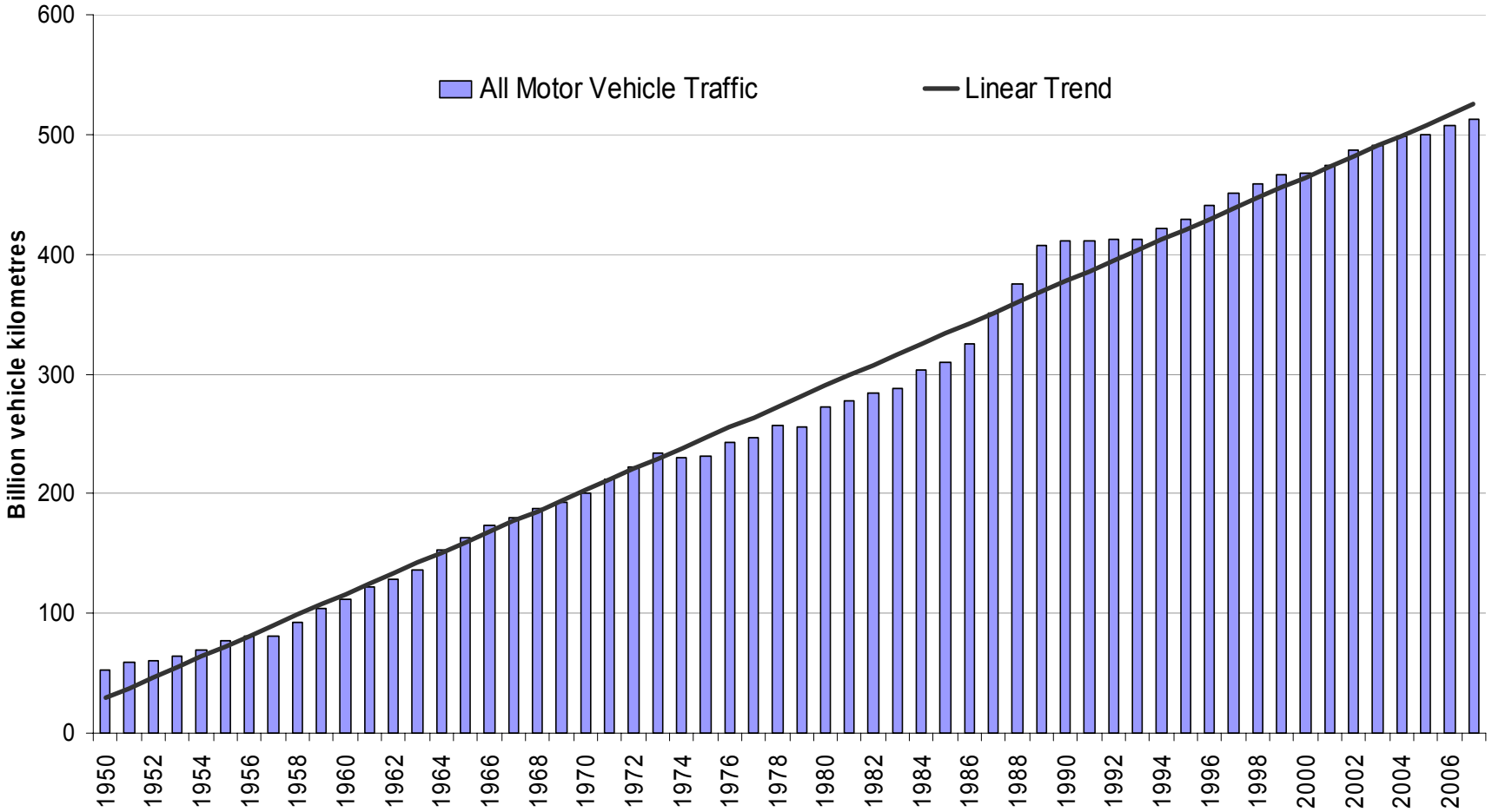
- In 2050 total CO_{2e} per head needs to be around

  2.1 – 2.4 tonnes per annum

- An average new car today in the UK (145g/km), driven 15,000km per year, emits

  2.2 tonnes per annum

Increasing distance driven and vehicle ownership



The impact of congestion

Efficiency: in congested urban areas, 30-40% of total fuel is used by cars looking for parking
The average search time is about 8 minutes *Source: MIT*

Urban transportation is approximately twice as energy intense as intercity transport *Source: Schafer et al MIT Press 2009*

Scale of the reduction in transport emissions in the UK

- 80% reduction across the economy needed by 2050
- Number of cars, journeys and mileage continue to increase
- Other sectors unlikely to achieve 80% reduction
  - Agriculture
  - Aviation
  - Some areas of industry
- Energy and Transport likely to have to over achieve…

- So around **90%** per km reduction in per km emissions

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Efficient people: smart behaviour

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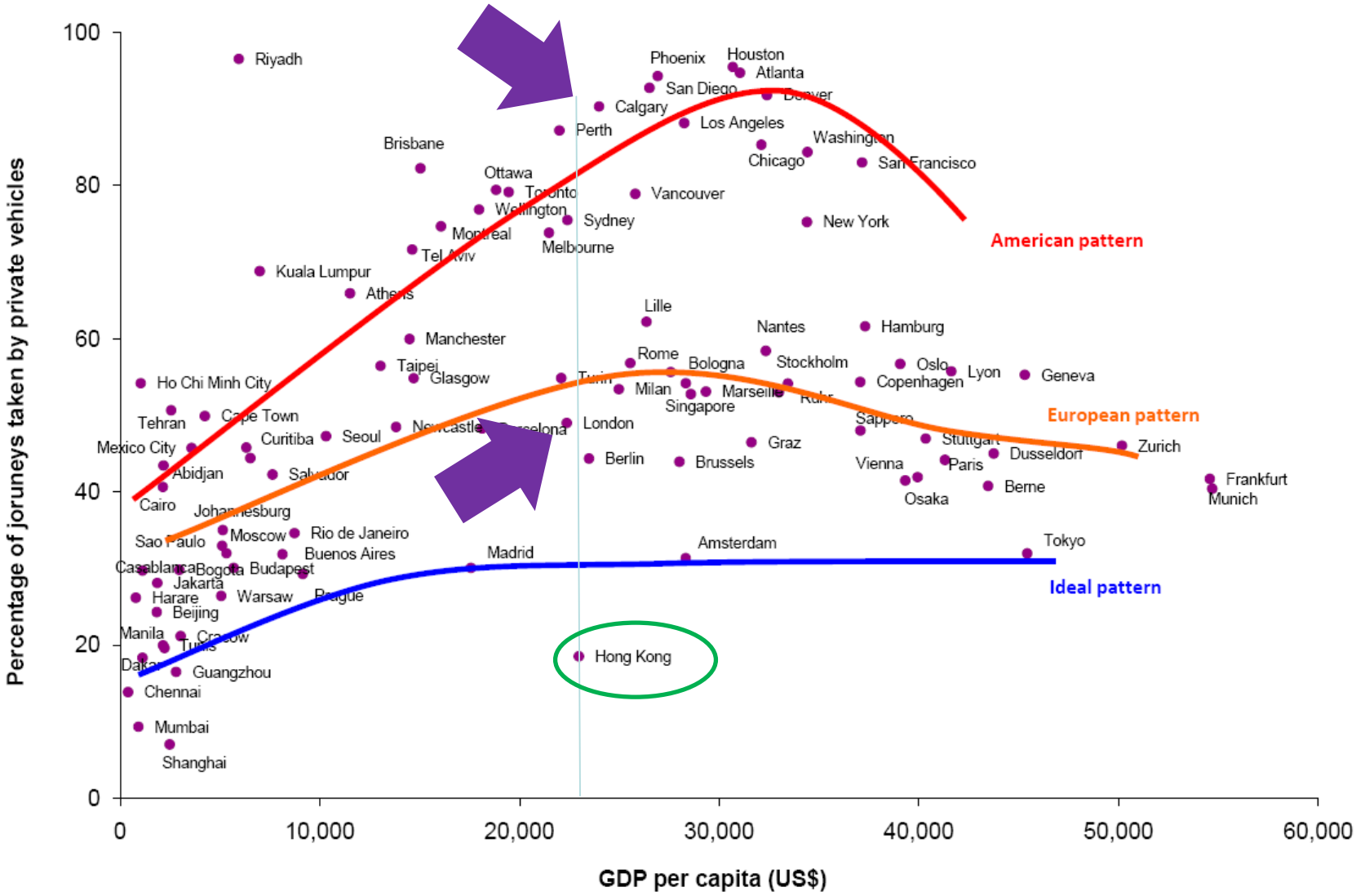
- Driver behaviour has a big effect on CO_2 from road transport
  - vehicle choice: best in class 25 - 40%
  - chose a smaller car
  - eco driving: up to 15%
  - reduce/enforce speed limits: 70mph → 50mph: 20% saving
  - reduced marginal car use
  - car clubs, car sharing, public transport…
- Behaviour change: potential **50%** reduction in CO_2?
- Rational, but hard to achieve…

Choosing best in class

Segment	Average	Lowest	Make/model	Low vs average
Mini	115.6	0*	smart fortwo EV	-
Supermini	131.9	98	Ford Fiesta/SEAT Ibiza	-25.7%
Lower Medium	147.4	99	VW Golf	-32.8%
Upper medium	154.4	89	Toyota Prius	-42.4%
Executive	177.1	127	Mercedes C Class	-28.3%
Luxury	250.3	178	BMW 7 series	-28.9%
Sports	201.1	0*	Tesla	-
Dual purpose	207.1	129	Toyota Urban Cruiser	-37.7%
MPV	169.7	119	Citroen Nemo Multispace	-29.9%

SMMT 2010

Efficient cities: public transport



Source: IEA (2008) and International Association of Public Transport (2006).

Efficient cars
available technology can improve ICE vehicle efficiency by 50%: to 70-80g/km

Source: King Review HMT 2007, 2008

Something more radical is needed: the options

- Biofuels
- Electricity
- Hydrogen
- Behaviour transformation

	Fuel Infrastructure			Vehicle Technology	
	Production	Distribution	Dispensing	Powertrain	On-board fuel
Biofuels					
Electric					
Hydrogen					

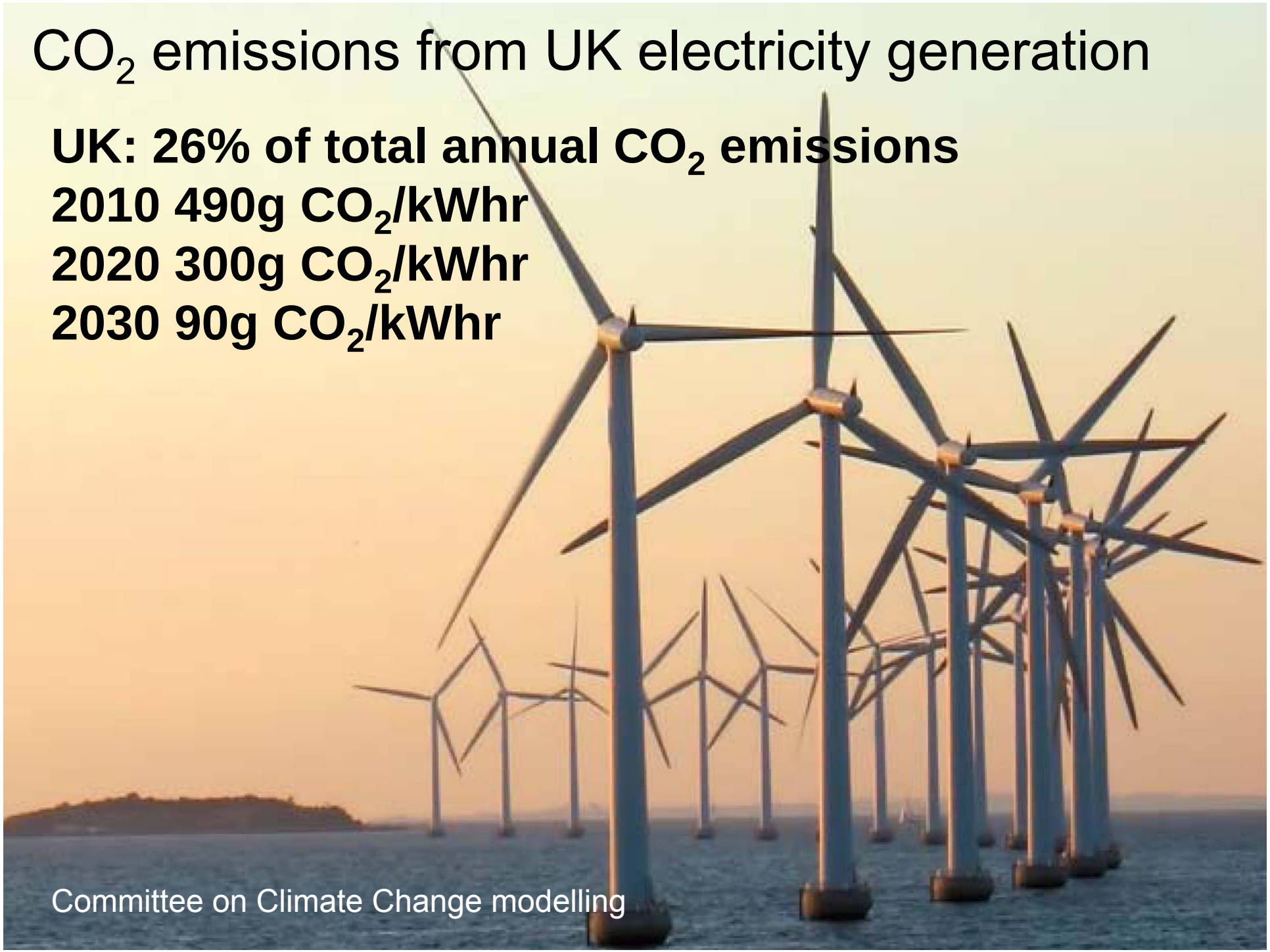
Easy/no change Modest/evolutionary Major/challenging/revolutionary

Potential challenges for electric vehicles

- Carbon intensity of electricity generation
- Range and charging time
- Impact on the electricity system
- Cost

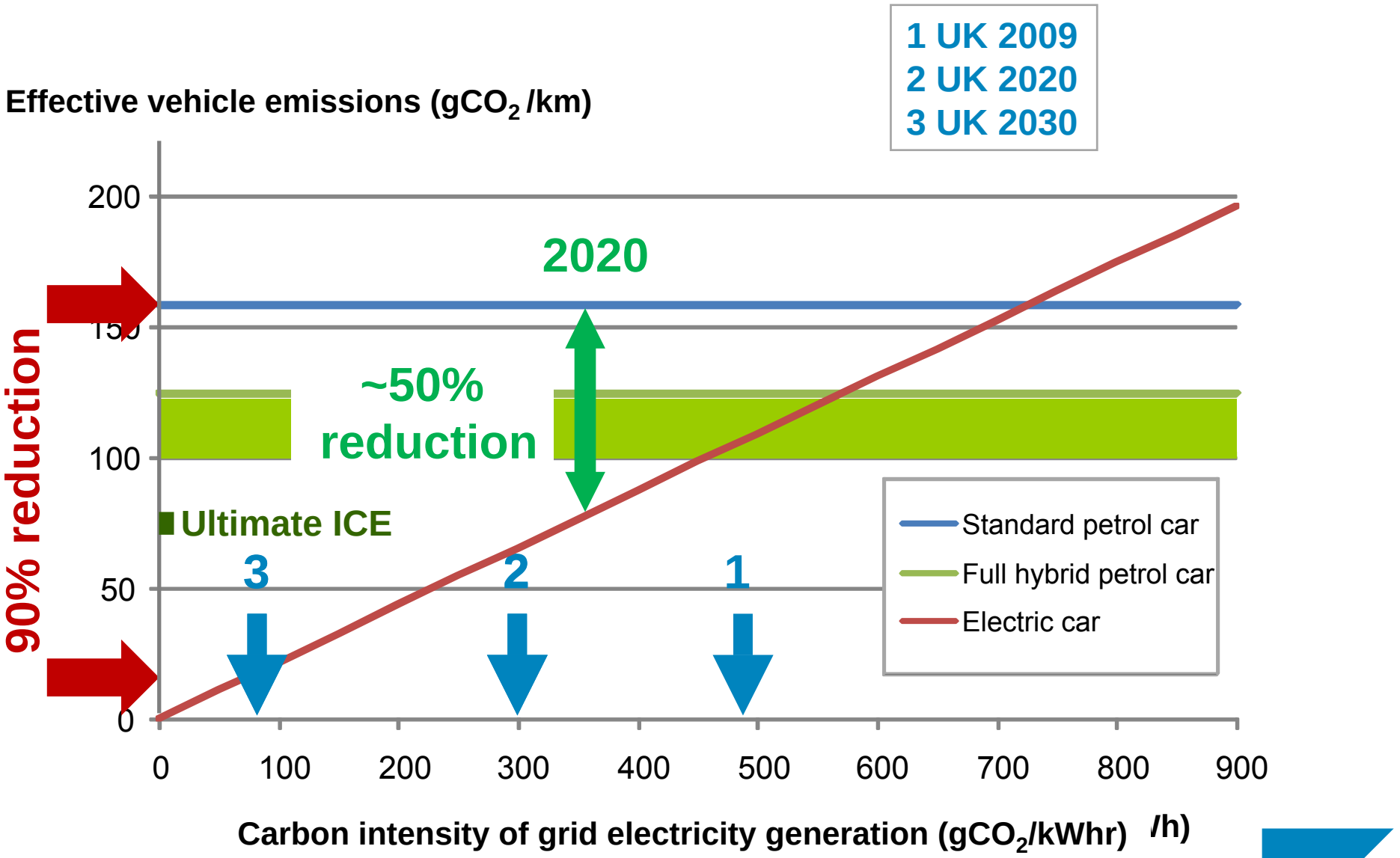
CO_2 emissions from UK electricity generation

UK: 26% of total annual CO_2 emissions
2010 490g CO_2/kWhr
2020 300g CO_2/kWhr
2030 90g CO_2/kWhr



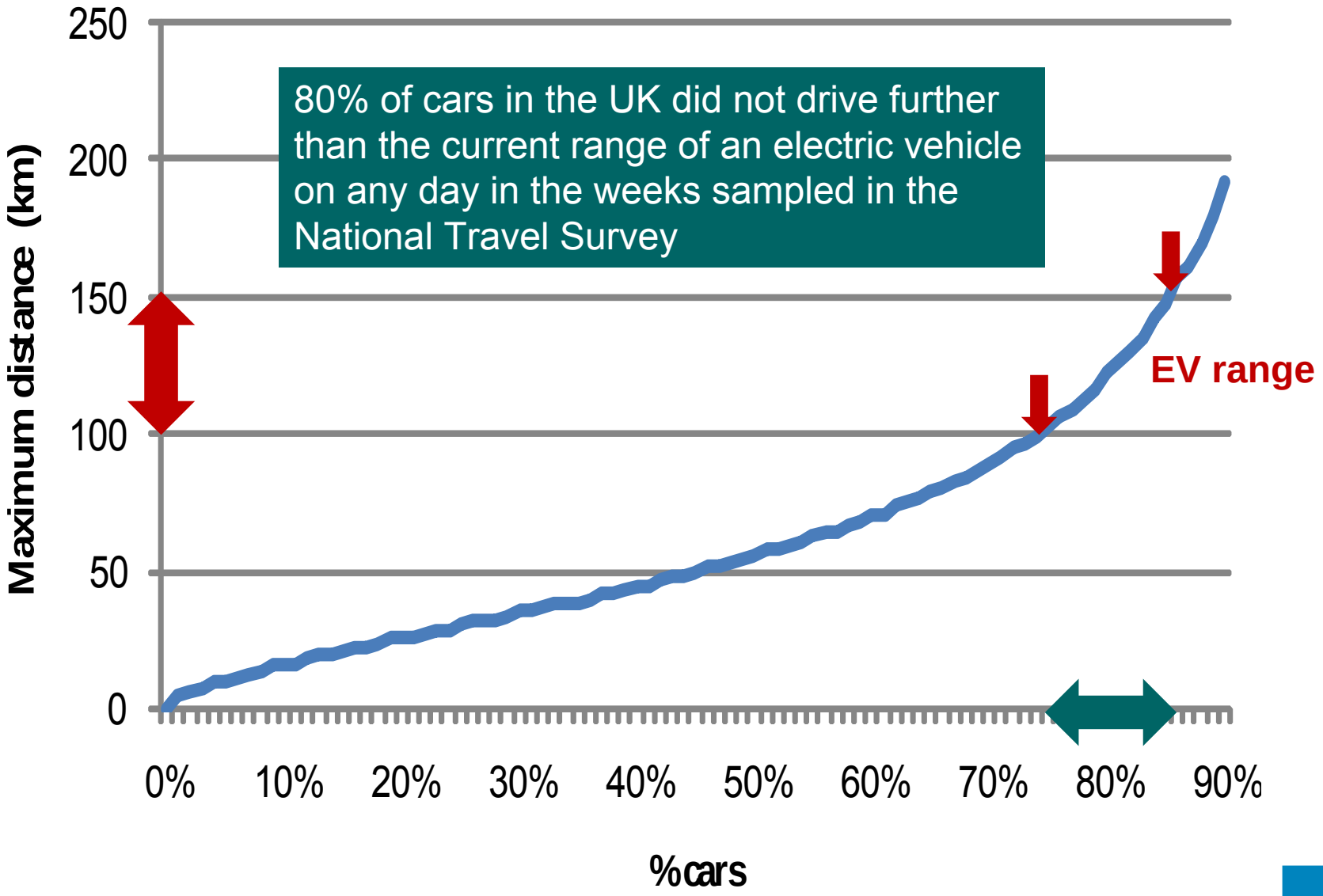
Committee on Climate Change modelling

Electric cars: emissions



Courtesy David Joffe, Committee on Climate Change 2008; SEI website data Jan 2011; EPA Scenarios 2010

Range: UK maximum daily driving distances



Source: 2008 National Travel Survey

Cost

- The UK Government is offering price support of up to £5,000 per car in 2011….
- Other policy approaches include zero VED and ultra low emissions vehicle leasing from pre-tax salary
- Battery prices are falling and could drop by 70% with technology maturity and mass production
- By 2020 the reduced running costs of an EV will probably significantly outweigh the higher price

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CCC 2030 Budget transport recommendations

- To reduce surface transport emissions by 44%, to 67Mt, in 2030, through:
  - Smarter Choices, Speed Limiting, Eco-driving
  - Conventional vehicle efficiency: 80g cars, 120g vans
  - 17-28% reduction for heavy goods vehicles
  - Electric cars and vans reach 60% of new vehicle sales: 40% PHEV, 20%BEV
  - Biofuels remain at ‘Gallagher’ level of 12% of liquid fuels, 11% by energy
  - Hydrogen used preferentially where battery technology is not suitable - hydrogen buses reach 50% of new vehicles

- ***Less than*** the average economy reduction

- Total cost of abatement in 2030: £1890 million or 0.1% of GDP

Ultra low-carbon cars: 60% of new sales in 2030

	2030		
	Share of new car	**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 146g/km today)

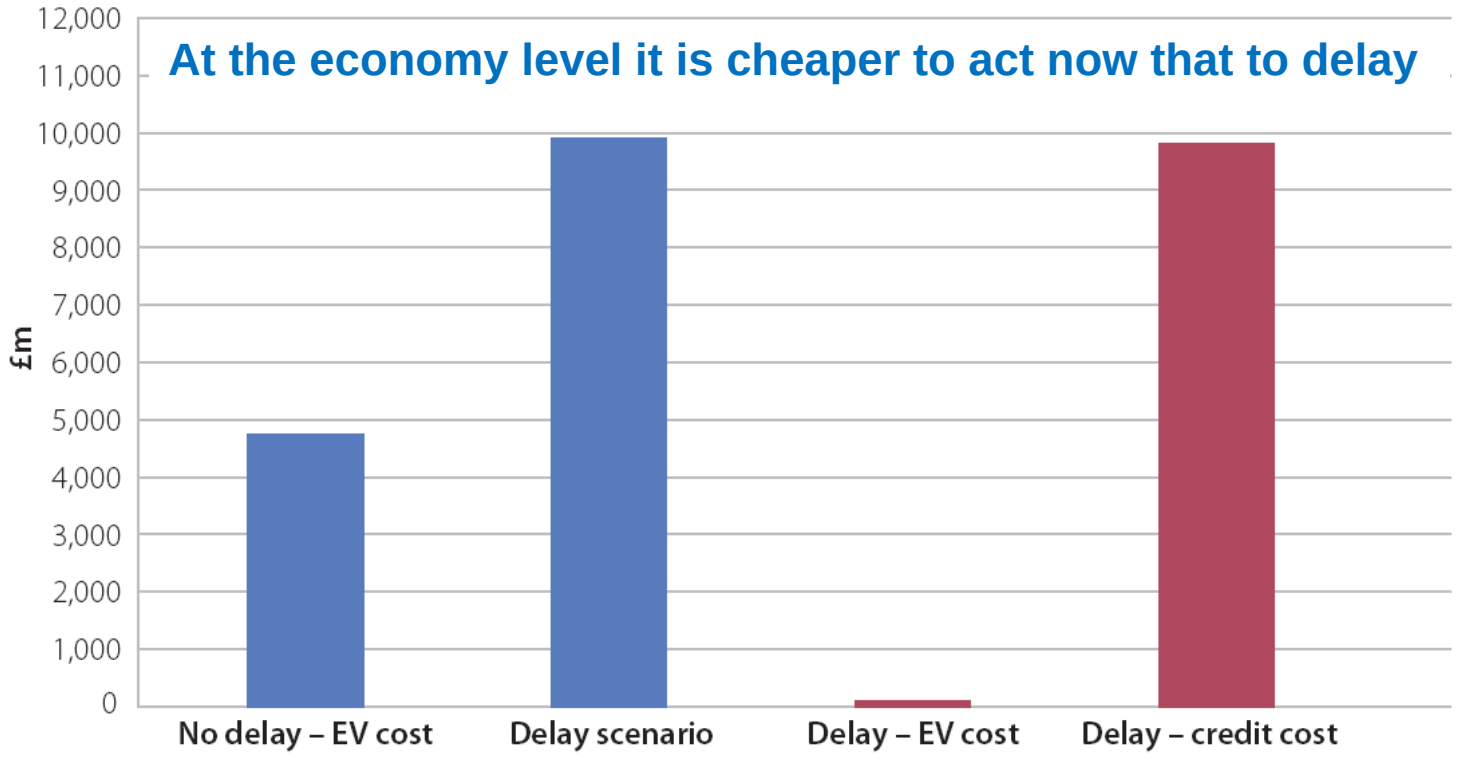
All cars on road: 81 g/km (versus 173 g/km today)

The case for early action

- If we don't meet these high levels of ultra low carbon vehicles in the 2030s, UK will be buying carbon credits in the 2040s to meet the required emissions reduction trajectory

- DECC forecast carbon price of £135-200/tCO_2e 2040-50

- Substantial cost saving from electric vehicle abatement in 2040s



The King Review of low-carbon cars

Part I: the potential for CO_2 reduction

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The King Review of low-carbon cars

Part II: recommendations for action

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March 2008

www.hm-treasury.gov.uk/king

Meeting Carbon Budgets – the need for a step change

Progress report to Parliament
Committee on Climate Change
October 2009

www.theccc.org.uk