Evolving vehicle and fuel technologies

Presentation to Motability

London

9th December 2010

Greg Archer

Managing Director, Low Carbon Vehicle Partnership

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Outline

- Introduction to the LowCVP
- The scale of the challenge
- Improving vehicle efficiency
- Alternative fuels and electric vehicles
- Conclusions

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LowCVP ‘s mission is to accelerate a sustainable shift to low carbon vehicles and fuels & stimulate opportunities for UK businesses

THE LOWCVP
LOW CARBON CHAMPIONS
AWARDS 2010

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ACT ON CO2

Low carbon technologies for HGVs

WINNER
THE LOWCVP TECHNOLOGY CHALLENGE 2010
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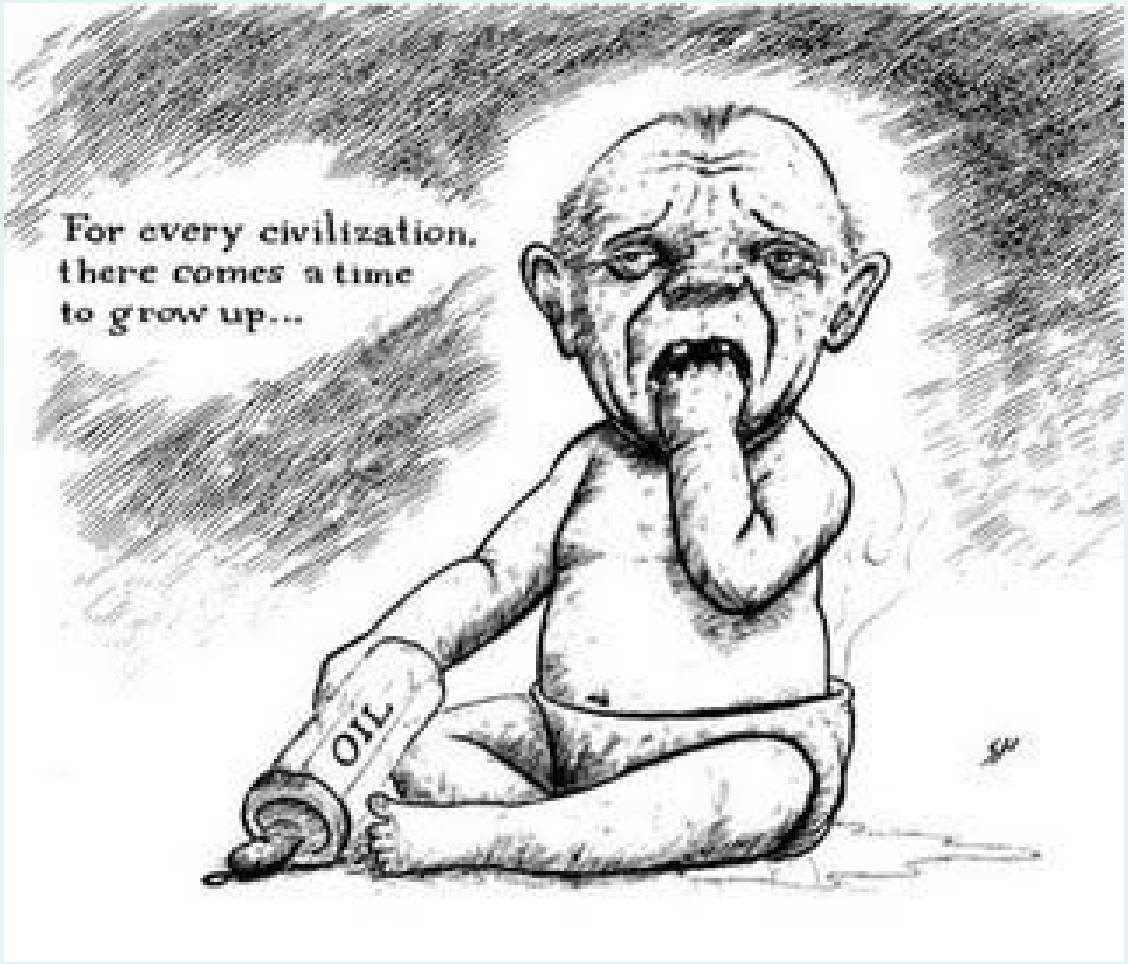
energy saving trust

Community Challenge
Leading the way to lower carbon journeys

cenex

The scale of the challenge



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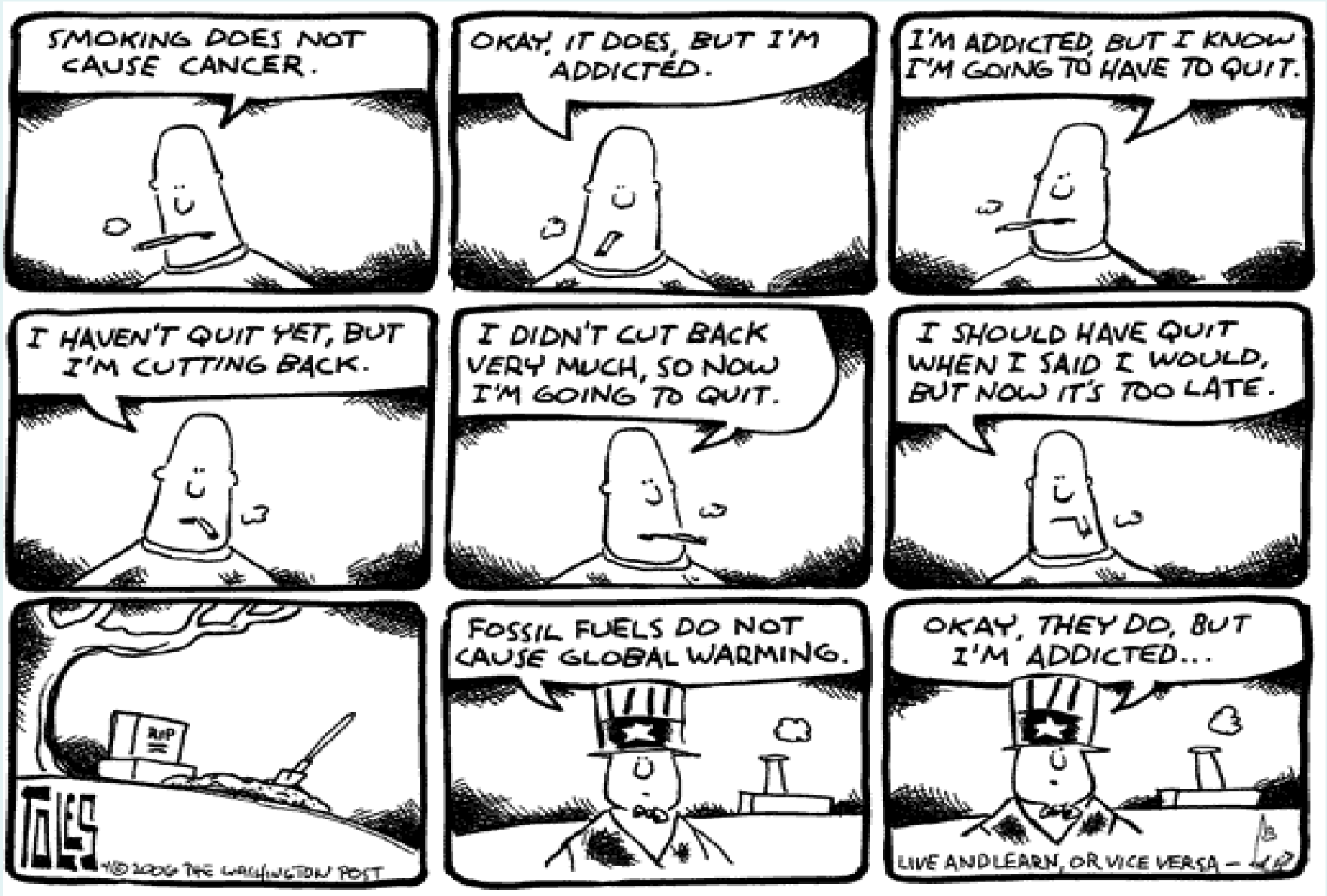
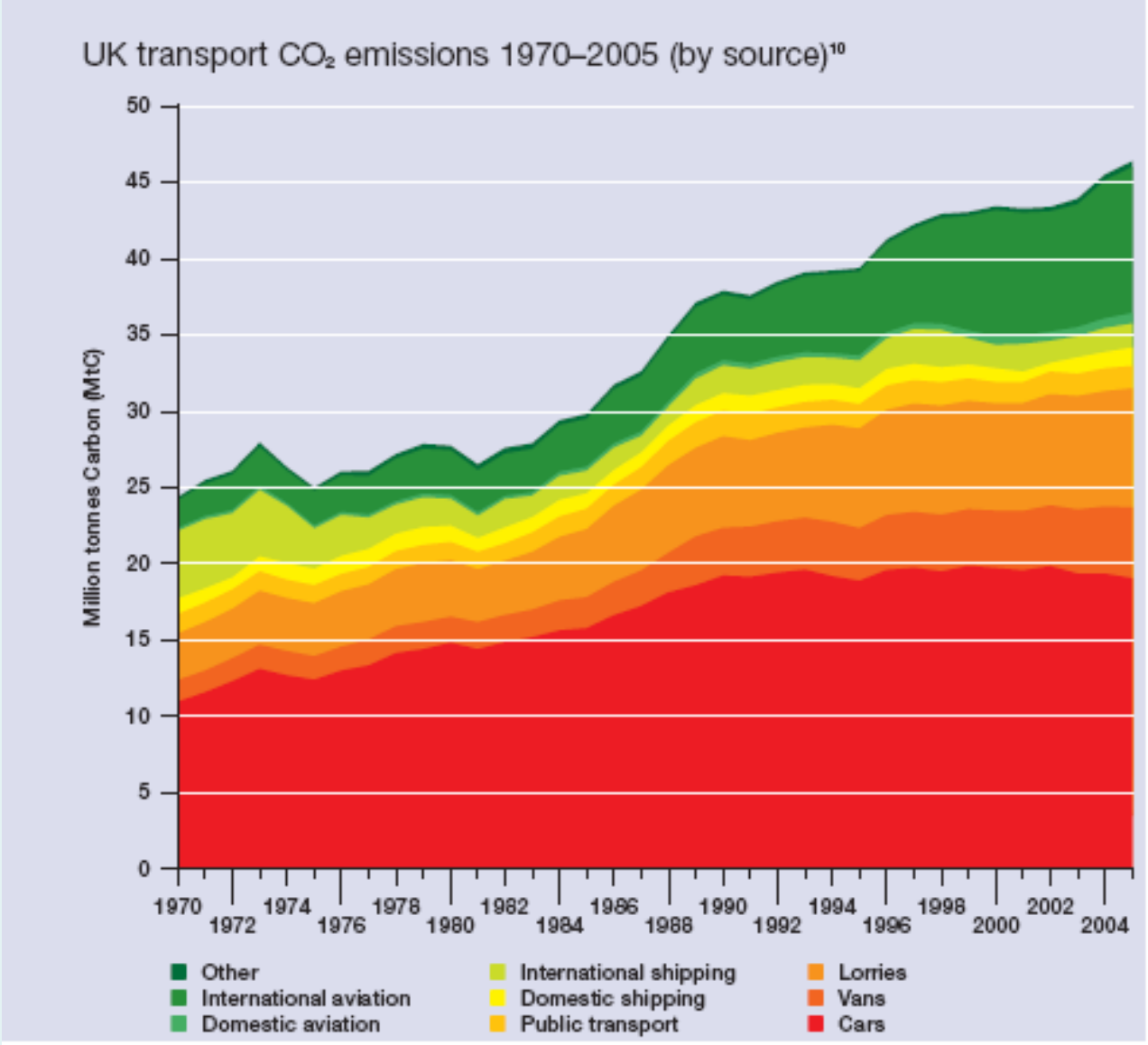
Petroleum accounts for 99% of transport fuel use with widely recognised future climate, security of supply and price risks



UK transport emissions have almost doubled since 1970

Emissions trends are driven by:

- The demand for movement and need to access facilities, services and goods
- The mode of transport used
- The carbon intensity and efficiency of the mode
- The operational efficiency of vehicle use



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Improving vehicle efficiency

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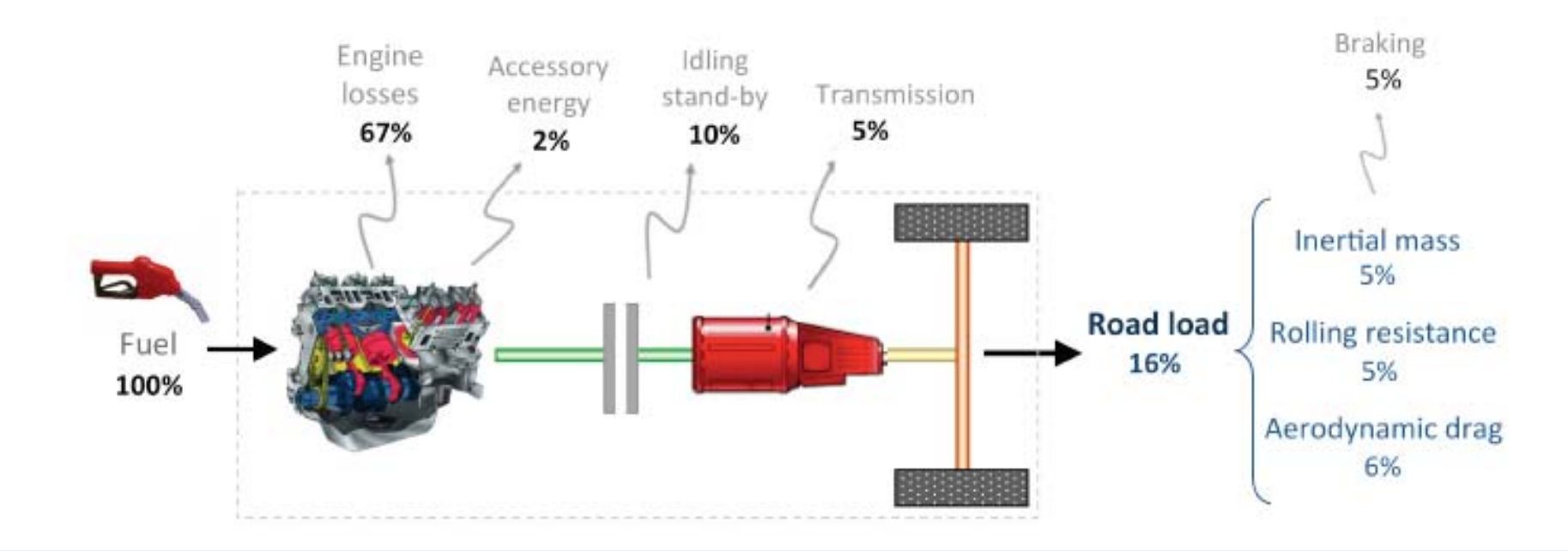
Modern cars are only 15-20% efficient – there is considerable opportunity for improvement



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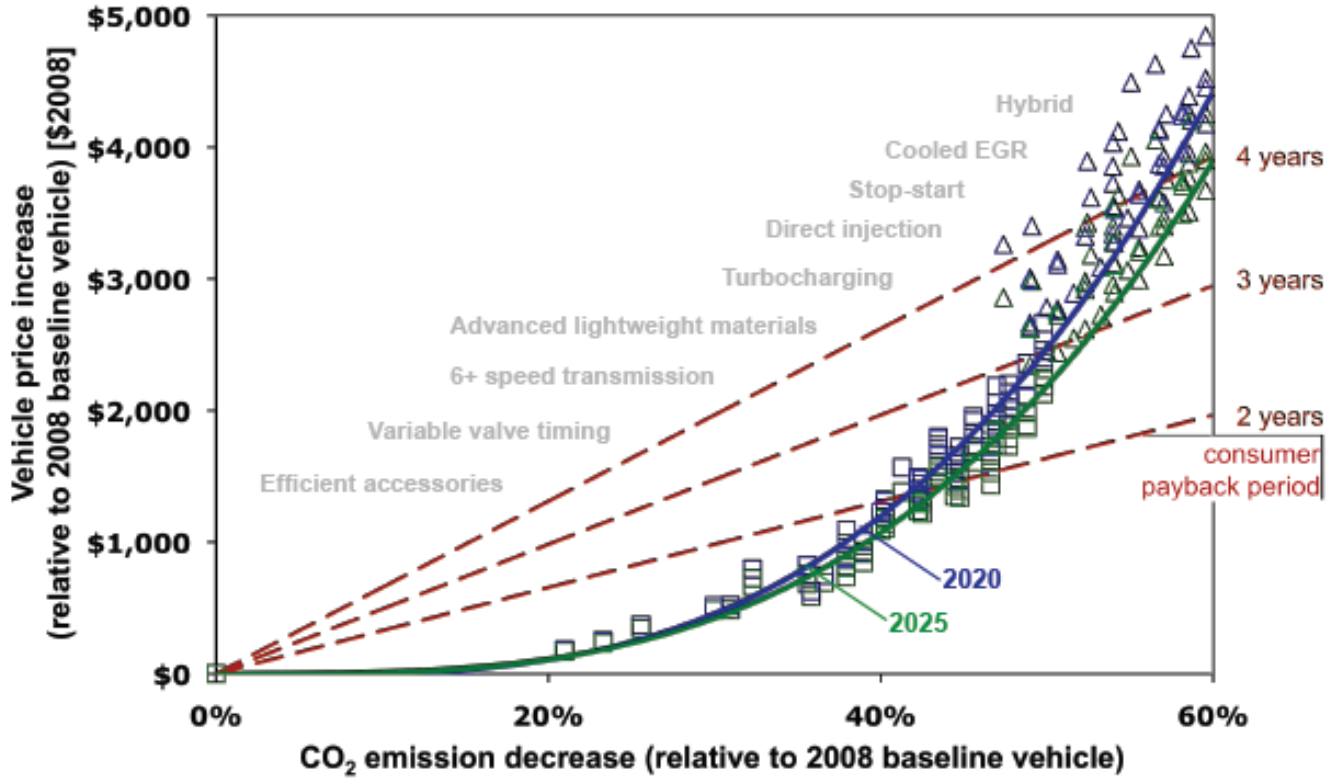
ICCT 2010

A 50% improvement in vehicle efficiency is possible with current technologies which payback within about 4 years

Cost-benefit assessment of alternative vehicle technologies



Data source: EPA, NHTSA, CARB Interim Joint Technical Assessment Report: Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2017-2025
Consumer payback calculation assumptions: Baseline fuel consumption 6 l/100 km, fuel price 1.30 €/l, annual mileage 15,000 km

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ICCT 2010

There are a wide range of lower carbon vehicles now available - but relatively few are bought

Smart for two 88g/km
Mini 124g/km

Prius 3 89g/km
Lower medium 154g/km

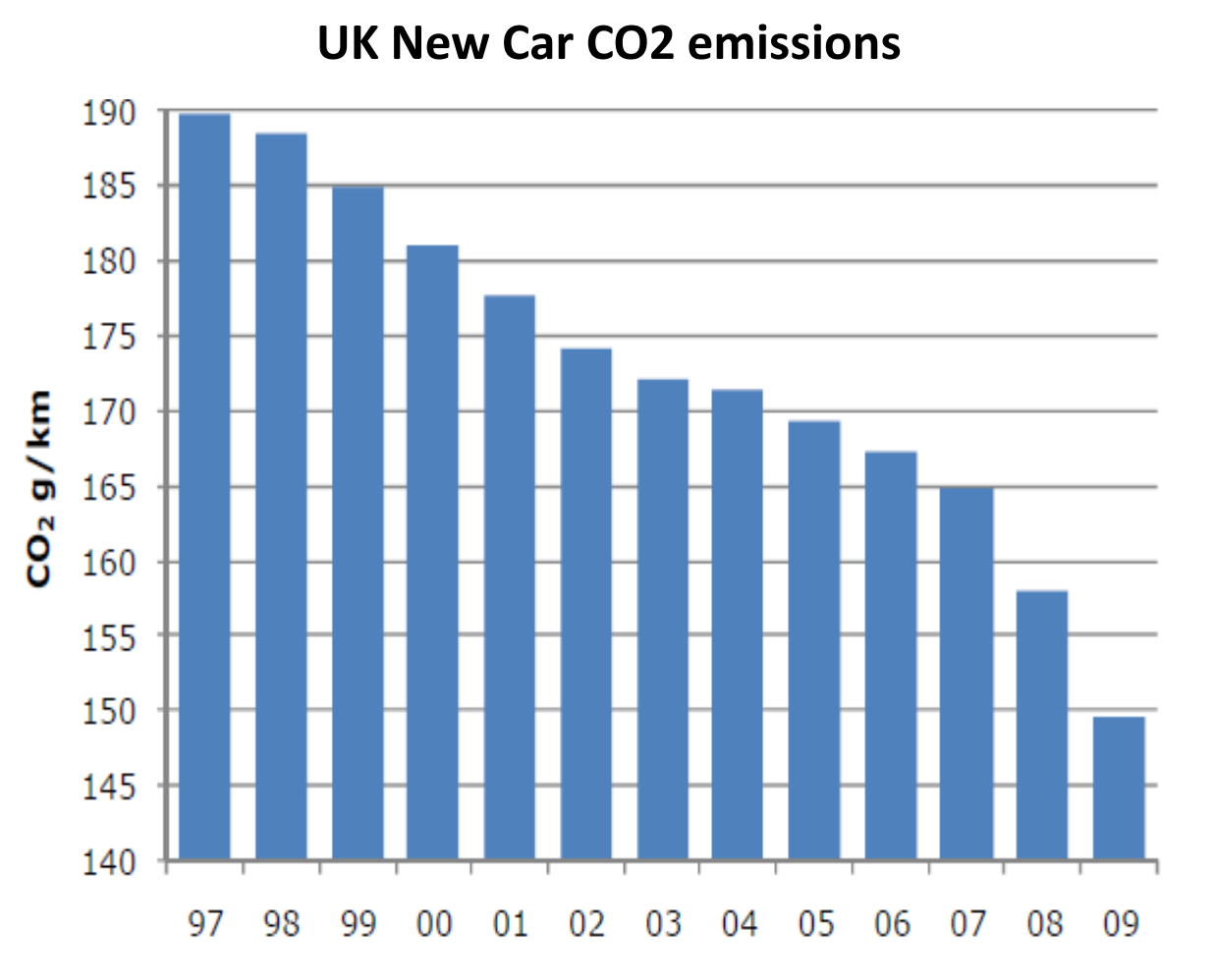
Volvo S80 129g/km
Executive 186g/km

Lexus RH450 148g/km
4x4 219g/km

Seat Ibiza118g/km
Super mini 138g/km

Volvo V50 104g/km
Upper medium 161g/km

Improvements in new car CO2 emissions are accelerating as a result of regulation and changing consumer attitudes



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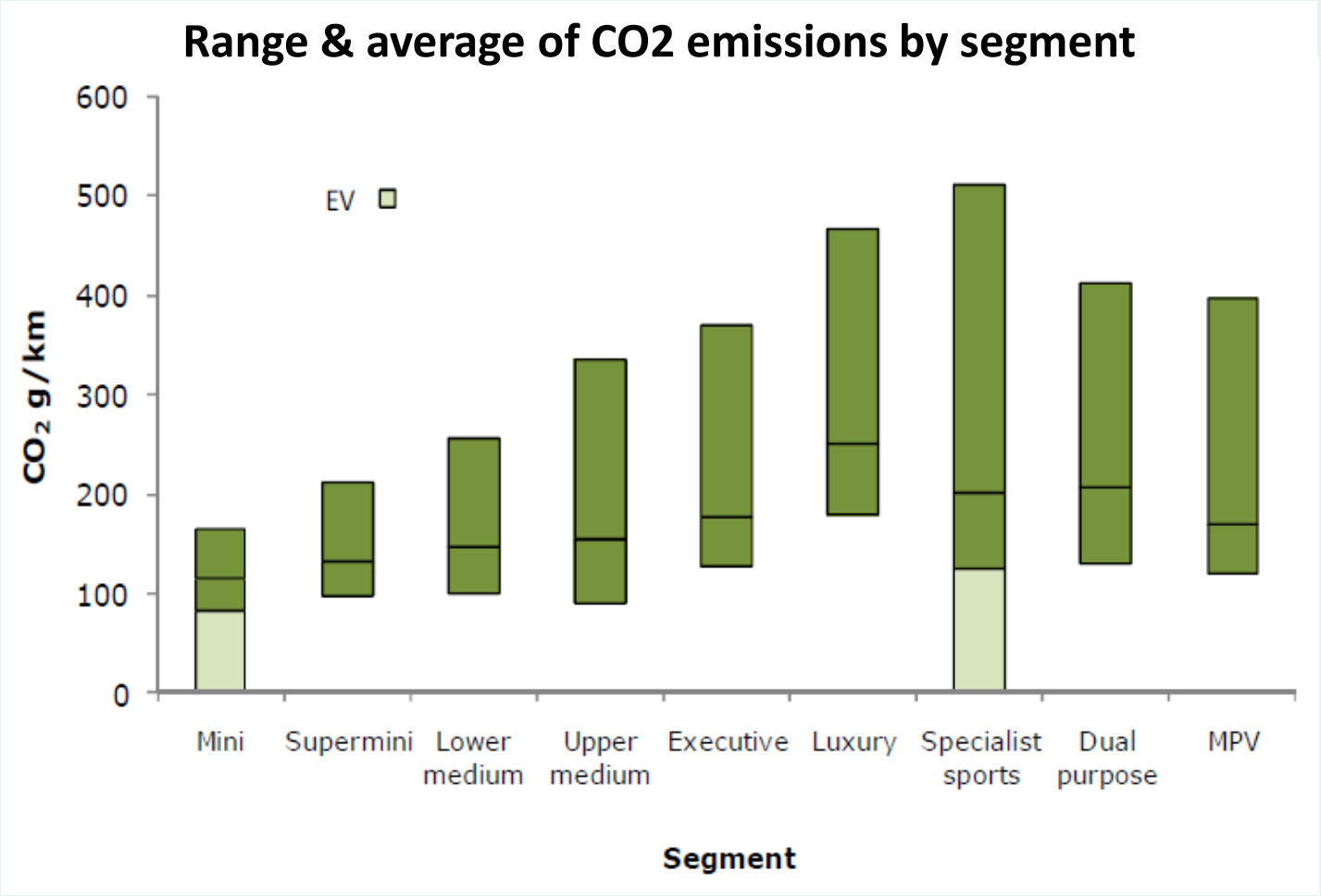
SMMT 2010

The most efficient vehicles in each market segment have around 30% better fuel consumption than the segment average



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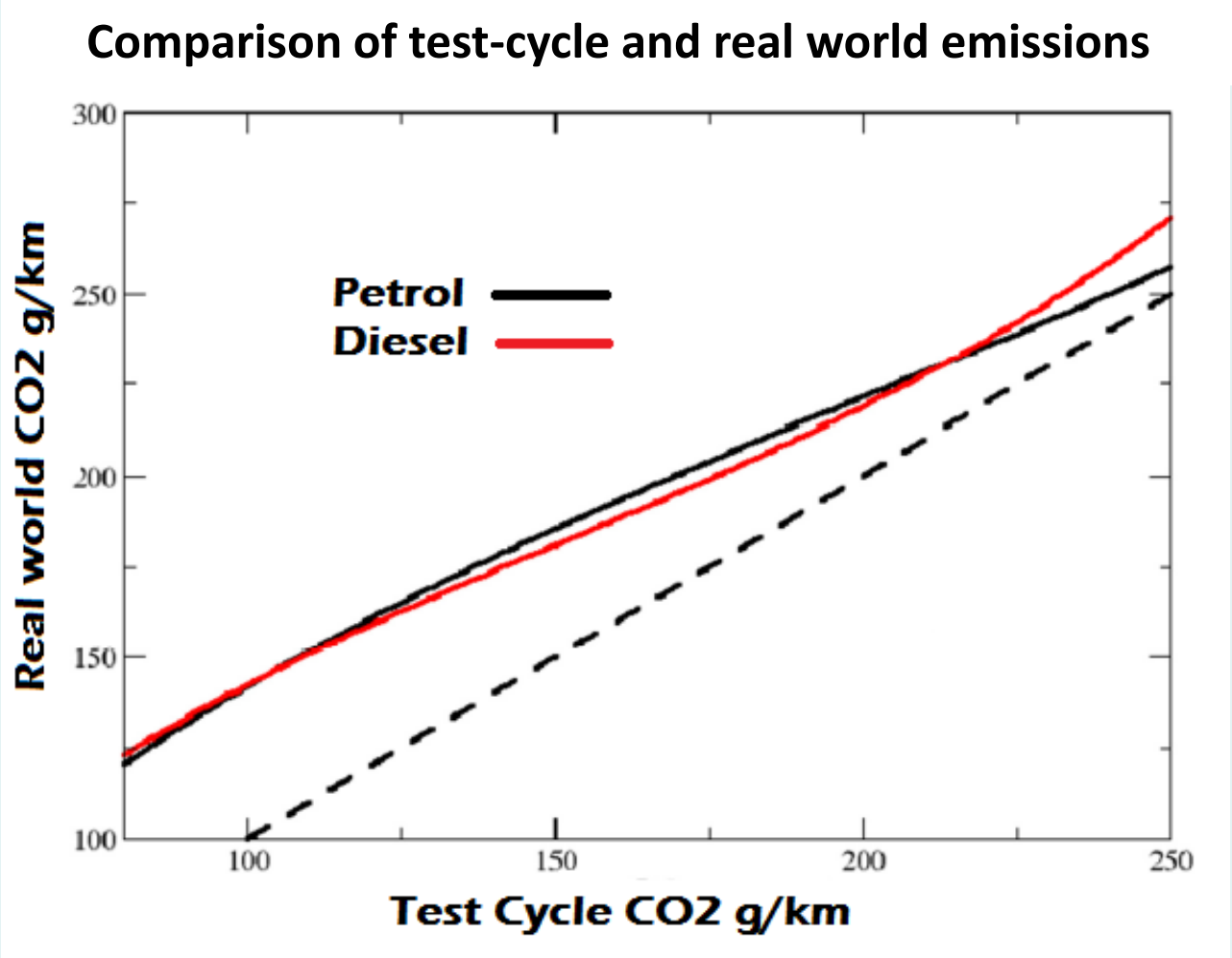
SMMT 2010

The disparity between real world and test cycle emissions increase disproportionately for more efficient vehicles



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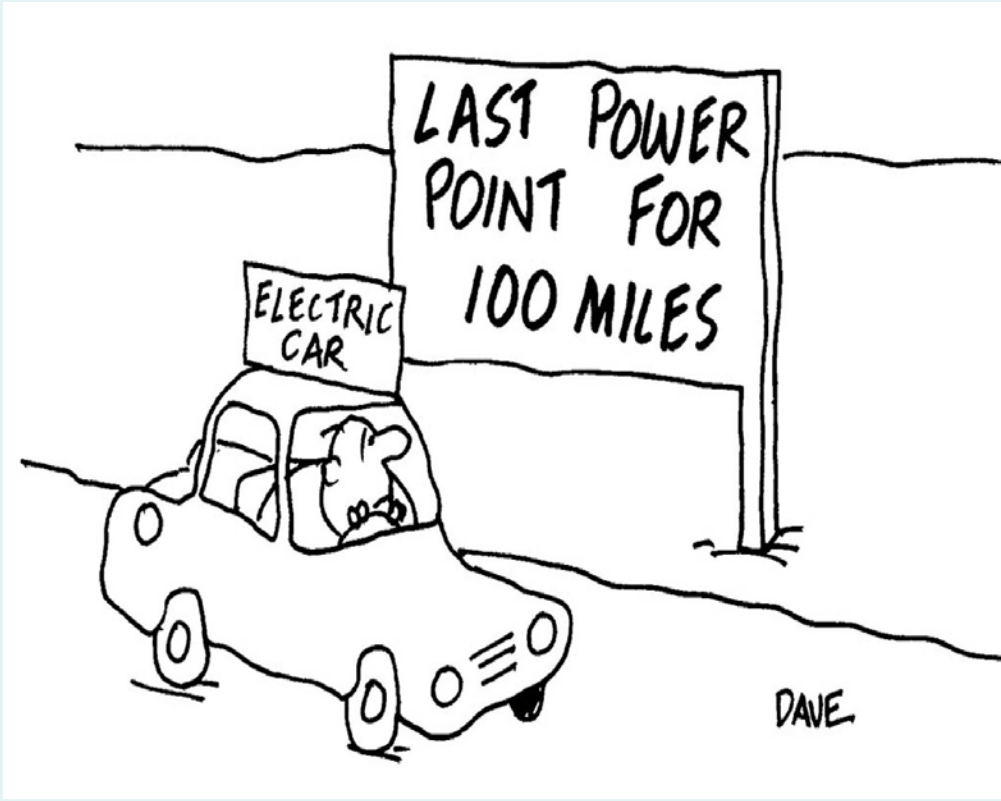
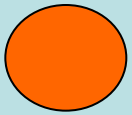
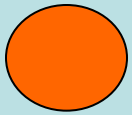
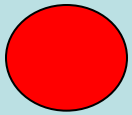
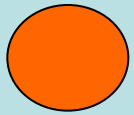
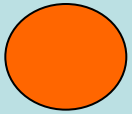
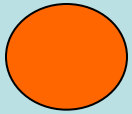
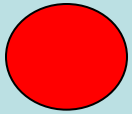
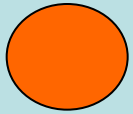
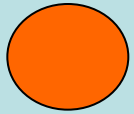
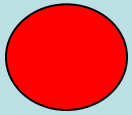
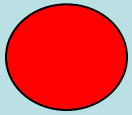
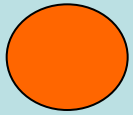
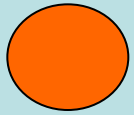
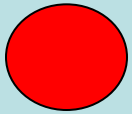
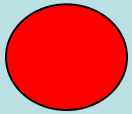
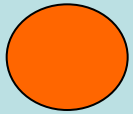
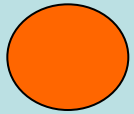
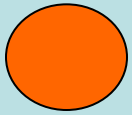
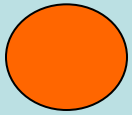
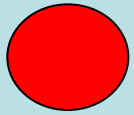
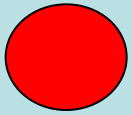
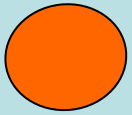
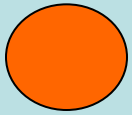
Alternative Fuels & Electric Vehicles



Renewable fuels will become increasingly important but there are limitations with all the current options

	Current Biofuel	Adv. Biofuel	H2-ICE	H2-FCV	Bio-methane	EV
Technology readiness						
Cost competitiveness						
Vehicle availability						
Infrastructure deployment						
Driver acceptability						
Sustainability						

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The relative scores do not represent LowCVP policy

There is global momentum towards electrification of transport

- EVs address key geopolitical concerns:
  - Climate
  - Energy security
  - Peak oil
- Early consumer interest as sustainable, cool, high technology products
- Substantial public funding of research, development and demonstration and purchase support
- Investment & commitment from global OEMs

But ...early visionary vehicles do not create a mass market

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A range of EVs from global manufacturers will become available from 2011 – most based upon current models

Toyota FT EVII - 2012

Toyota Prius PHEV - 2011

Nissan Leaf – 2011

Mitsubishi MiEV – 2010
Citroen Evie – 2011

Renault Fluence – 2011
(not EU) + others

Vauxhall Ampera - 2011

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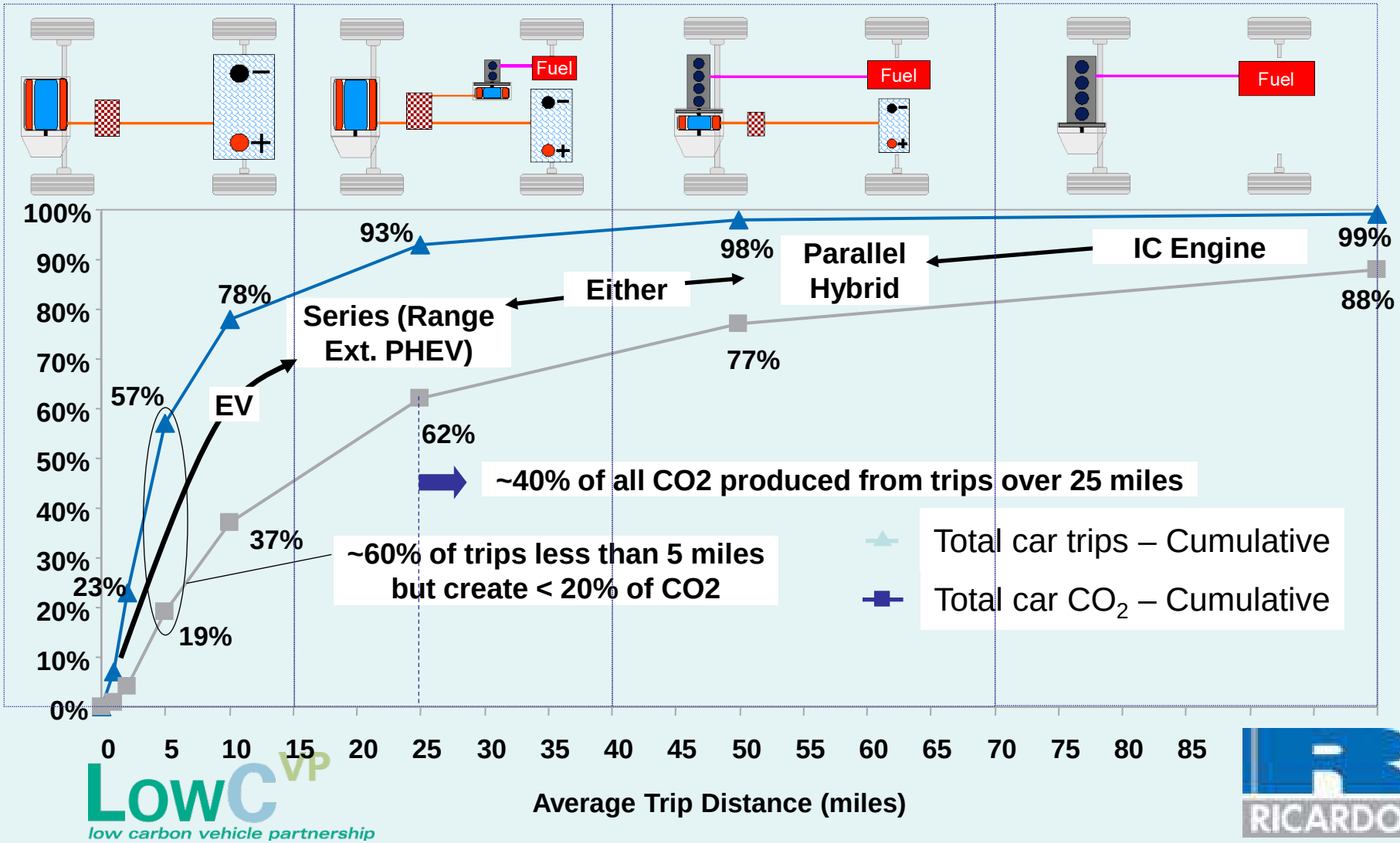
Technology will be tailored to the application - EV for city use, PHEV or parallel hybrid for medium length journeys; IC for long journeys



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RICARDO

Electric vehicles will only appeal to most car-buyers with significant incentives

EV users are educated, relatively affluent, multi-car households with off-road parking

- High capital costs – key purchase determinant
  - Leasing options likely
- Fuel-cost savings heavily discounted
- Requirement for very high range
- Range anxiety reduces usage to 33-50% of technical range
  - Fast charging / battery swap builds confidence
- Low willingness to pay – beyond early adopters
- Limited availability of recharging infrastructure
- New technology aversion

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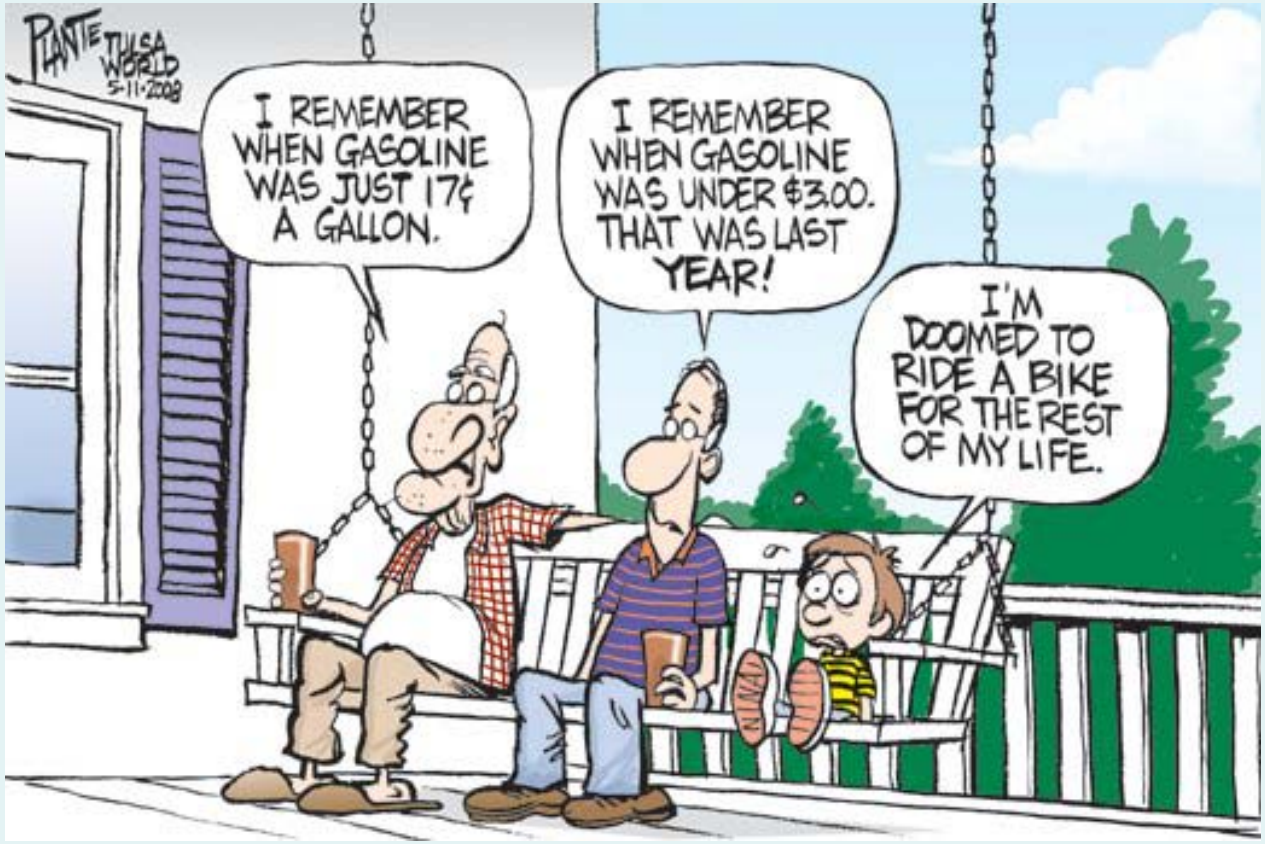
Final Thoughts



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In the next 5-years?

Small, light-weight, efficient cheap vehicles

e.g., TATA Nano

Diesel hybrid

e.g., Citroen C4

Efficient family cars

e.g., Ford Econetic

Electric vans and gas trucks

e.g., Modec

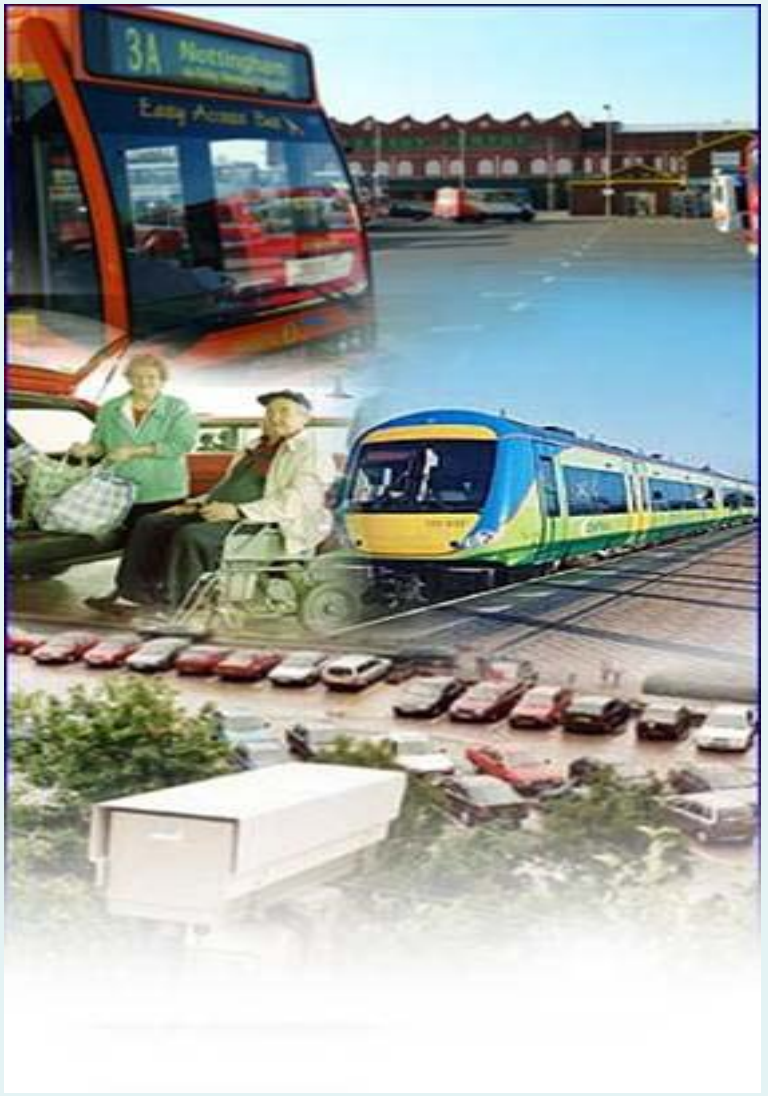
In-use efficiency tools

e.g., Fiat Eco-drive

An increasing range of EVs e.g., Leaf

Technology can only be part of the solution - demand management and mode shift are also needed – in part to manage rebound effects

- Smarter driving improved driver behaviour
- Reduced vehicle use
- Better freight distribution
- Modal shift
- Land-use planning
- Tele-working



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Final Thoughts

- We must wean ourselves off our petroleum dependency
- Selecting lower carbon options can deliver significant savings now!
- There are no silver bullets
- Vehicle efficiency can be improved by 50% using existing technologies that payback within c4 years
- Barriers to electrification of transport are unlikely to be resolved quickly; the market share of electric and plug-in hybrid vehicles will become important 2020+
- Beyond 2020 renewable fuels will play an increasing important role including biofuels and hydrogen
- Technology is only part of the solution – demand management and building public transport infrastructure to encourage modal shift is crucial

2000

2004

2006

2008

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Any Questions?

020 3178 7860

The Low Carbon Vehicle Partnership

secretariat@lowcvp.org.uk

www.lowcvp.org.uk

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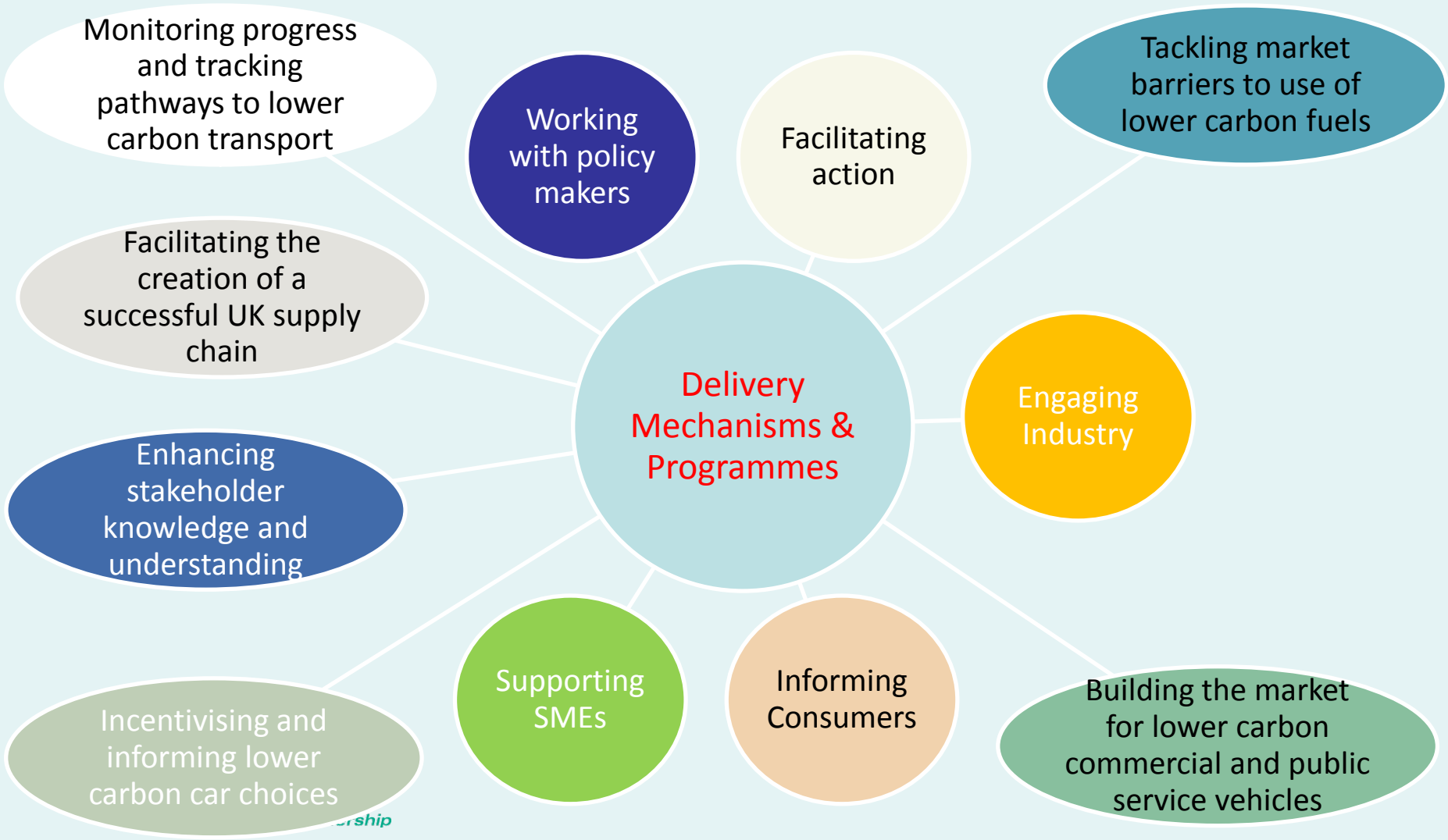
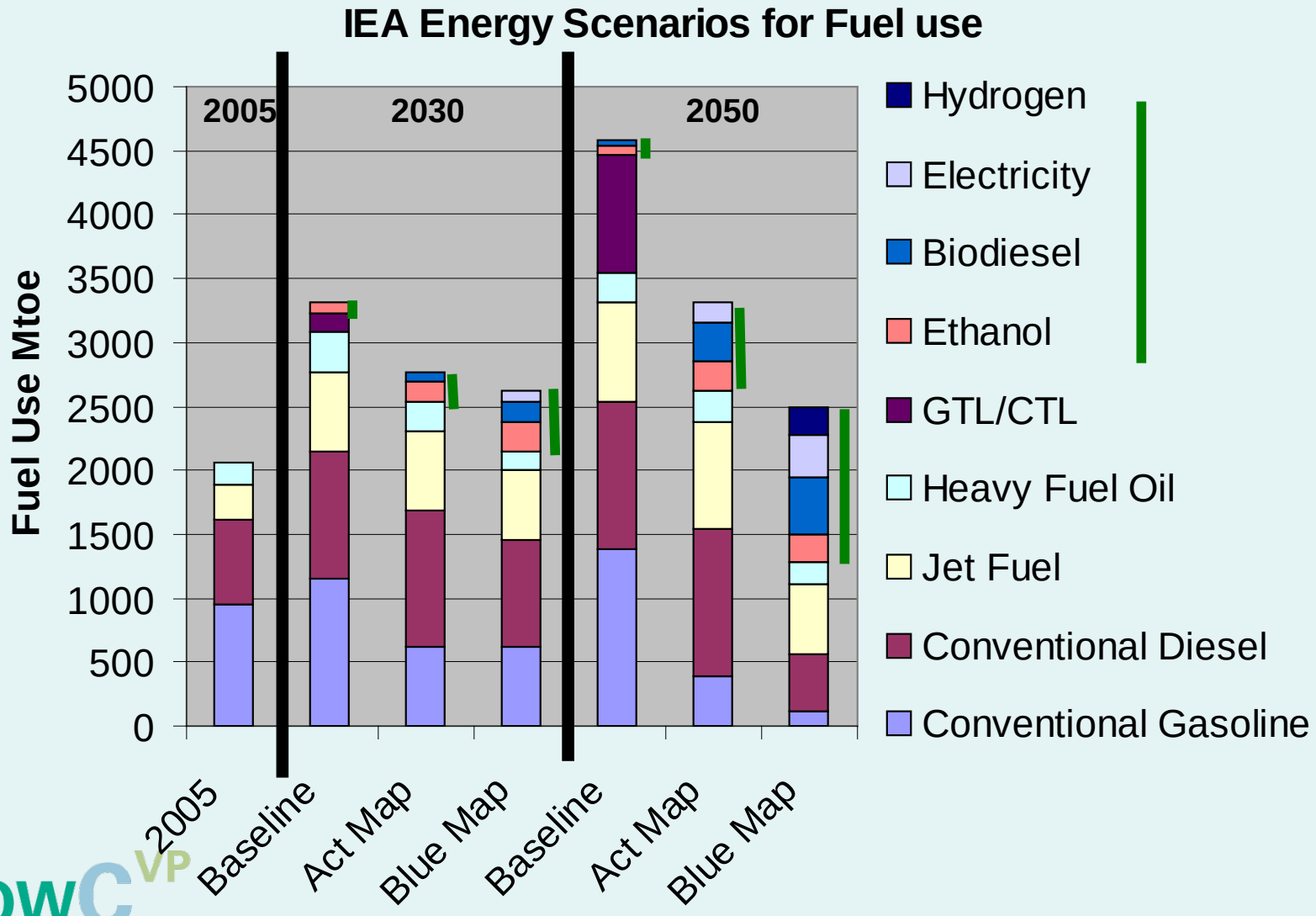
LowCVP works with multiple stakeholders to tackle market barriers and stimulate change



IEA scenarios show an increasing penetration of renewable transport fuels to meet increasing demand



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IEA 2008, Energy Technology Perspectives