



# Towards 50g/km, Time to look 'Beyond the Tailpipe'

Andy Eastlake – Managing Director  
Low Carbon Vehicle Partnership – UK

11Nov14



Connect  
Collaborate  
Influence

# LowCVP – Vision, Mission and Aims

- Our aspiration is for “**Sustainable and efficient global mobility with zero life cycle impact**”
- We will work towards this by “**Accelerating a sustainable shift to low carbon vehicles and fuels and stimulating opportunities for UK businesses**”
- Through:
  - **Connecting** stakeholders to build understanding and consensus regarding the optimal pathways to low carbon road transport.
  - **Collaborating** on initiatives that develop the market for low carbon vehicles and fuels.
  - **Influencing** Government and other decision makers on future policy directions and optimal policy mechanisms.

# LowCVP – The Low Carbon Vehicle Partnership

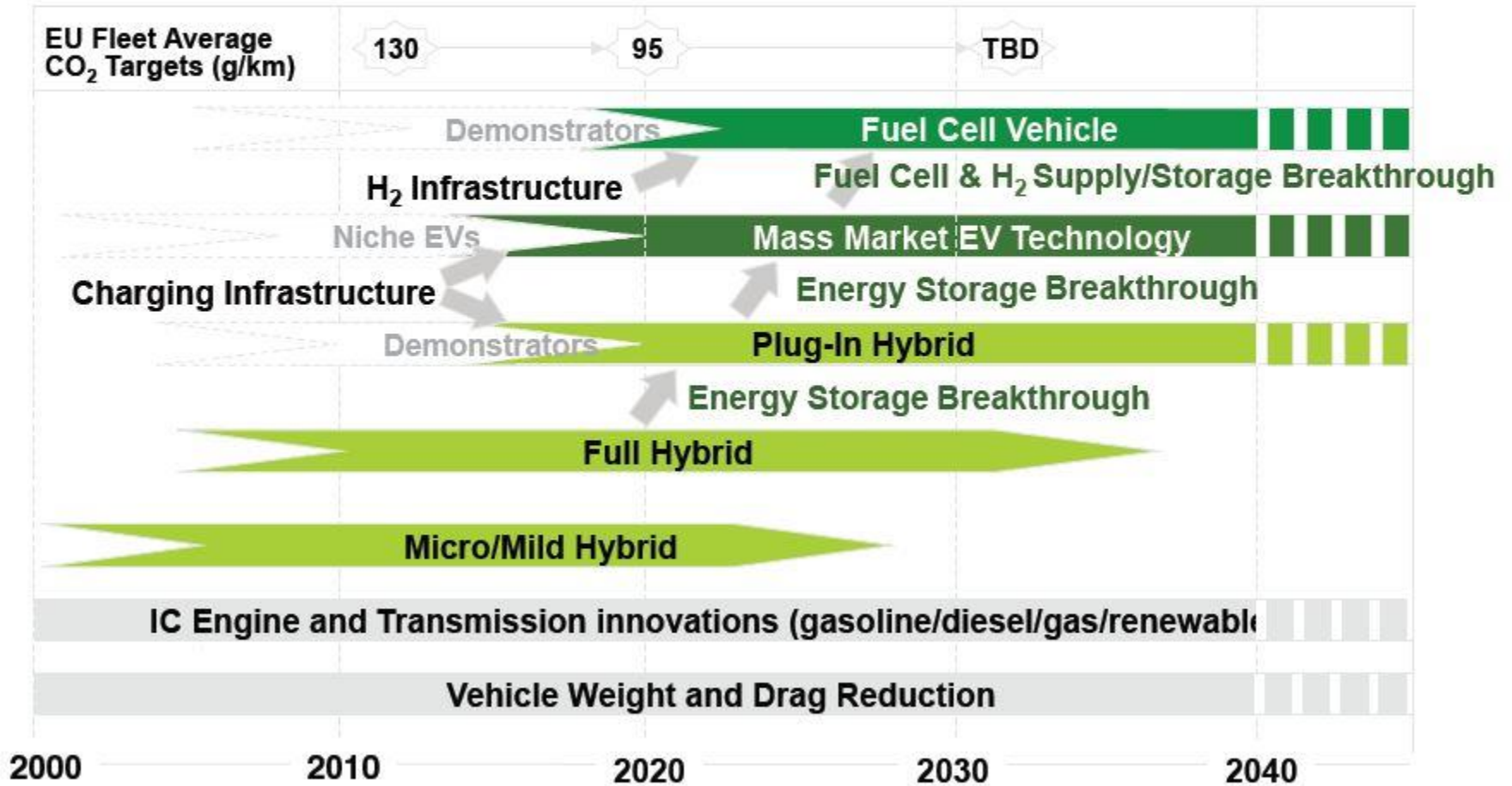
The LowCVP is an independent, not-for profit stakeholder partnership funded mainly through government grants and member contributions.

The LowCVP is the only organisation in the UK – or Europe – which brings stakeholders together to facilitate the development of better policy and accelerate the shift to low carbon vehicles and fuels.

*“The LowCVP is a unique organisation which is effective in bringing stakeholders with widely differing perspectives together.”*

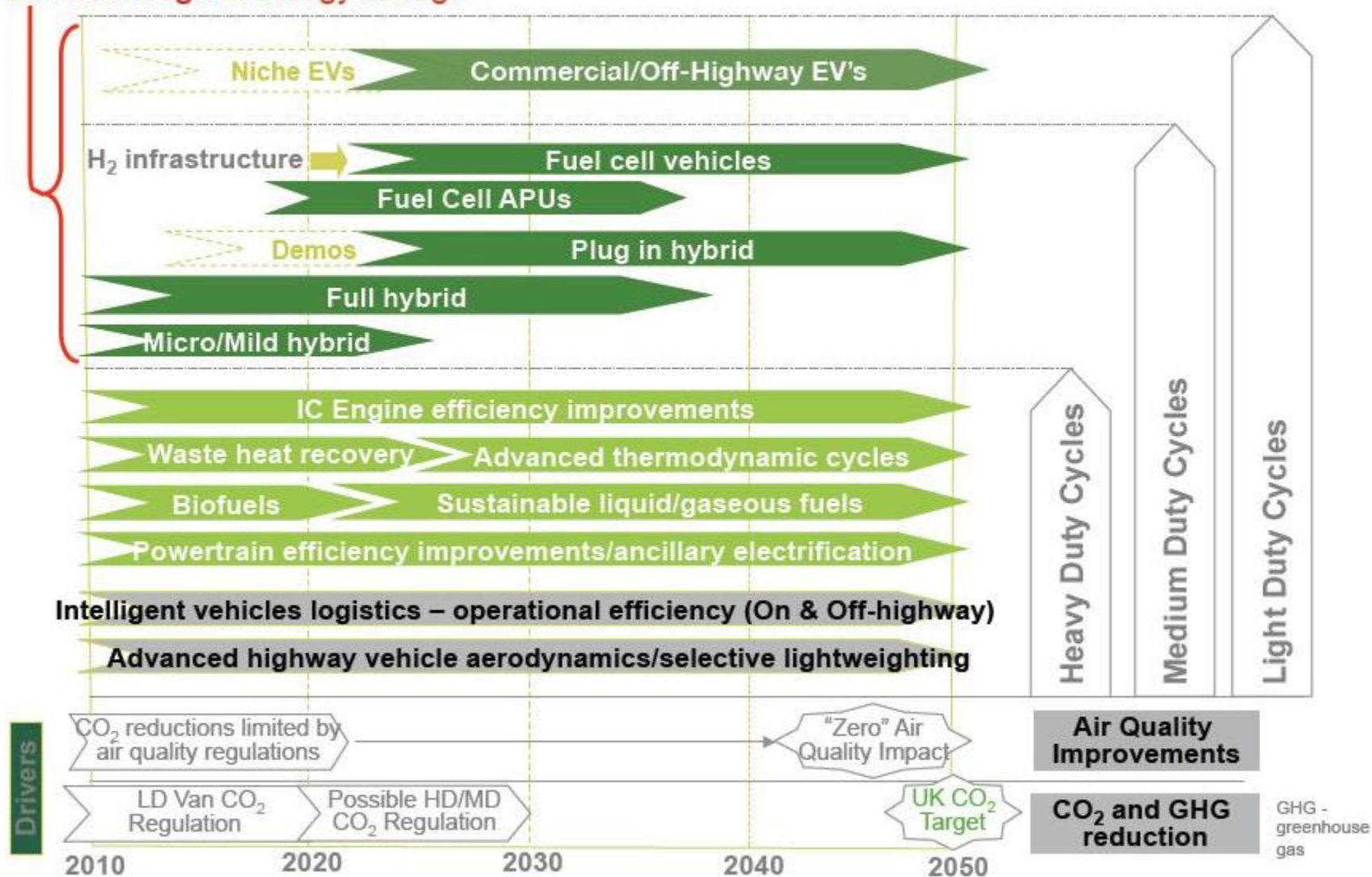
Prof Neville Jackson, Chief Technology and Innovation Officer, Ricardo UK Ltd and Chair of the LowCVP Board

# Passenger car low carbon technology roadmap



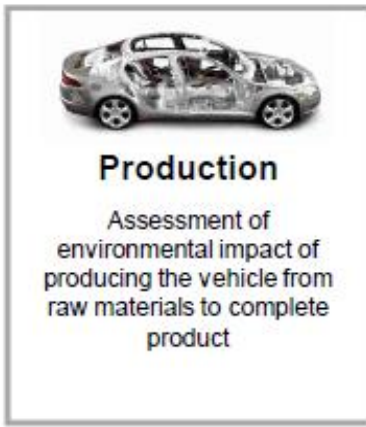
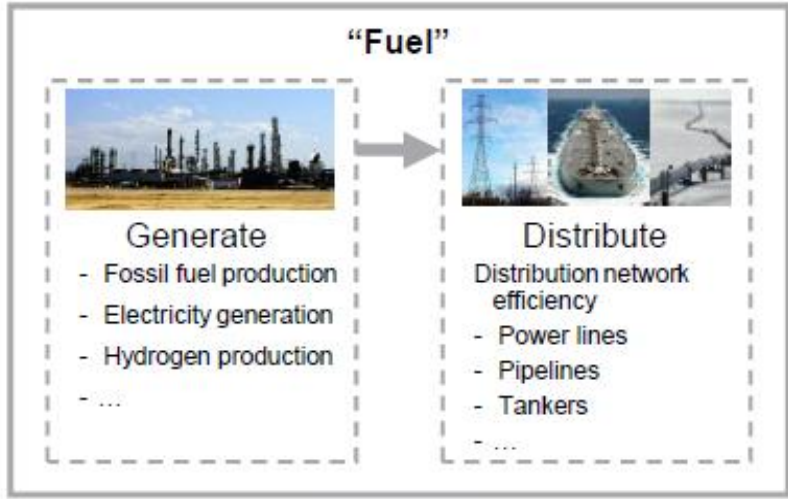
# Commercial and off highway vehicles

## Breakthrough in energy storage



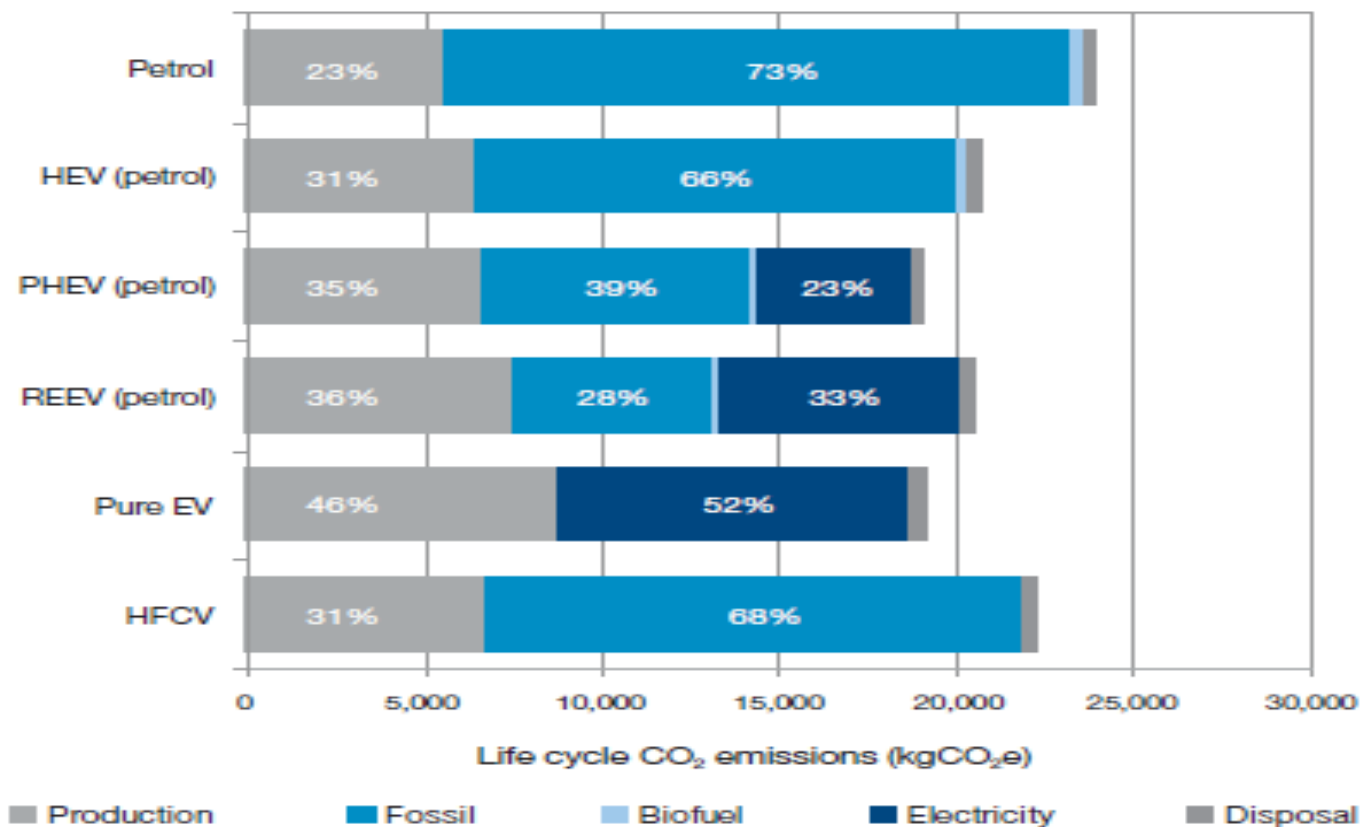


# A vehicle's lifecycle can be divided into four "blocks" – production of the vehicle, production of the fuel, "in-use", and disposal



## 2011 – LowCVP highlights technology variations

Figure 2.4: Life cycle CO<sub>2</sub>e emissions for various medium-sized vehicle technologies in 2015



Source: Ricardo (2011)

Preparing for a Life Cycle CO<sub>2</sub> Measure – Report for LowCVP 2011

# 2013 – LCA analysis gathers momentum

RICARDO-AEA

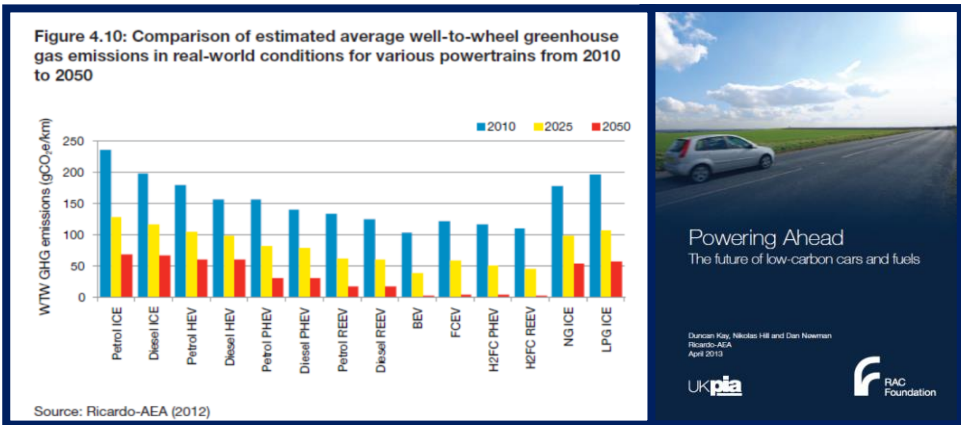
**Current and Future Lifecycle Emissions of Key 'Low Carbon' Technologies and Alternatives**  
Final Report

Naser Odeh  
Nikolas Hill  
Daniel Forster

Project carried out for the Committee on Climate Change (CCC)

17<sup>th</sup> April 2013

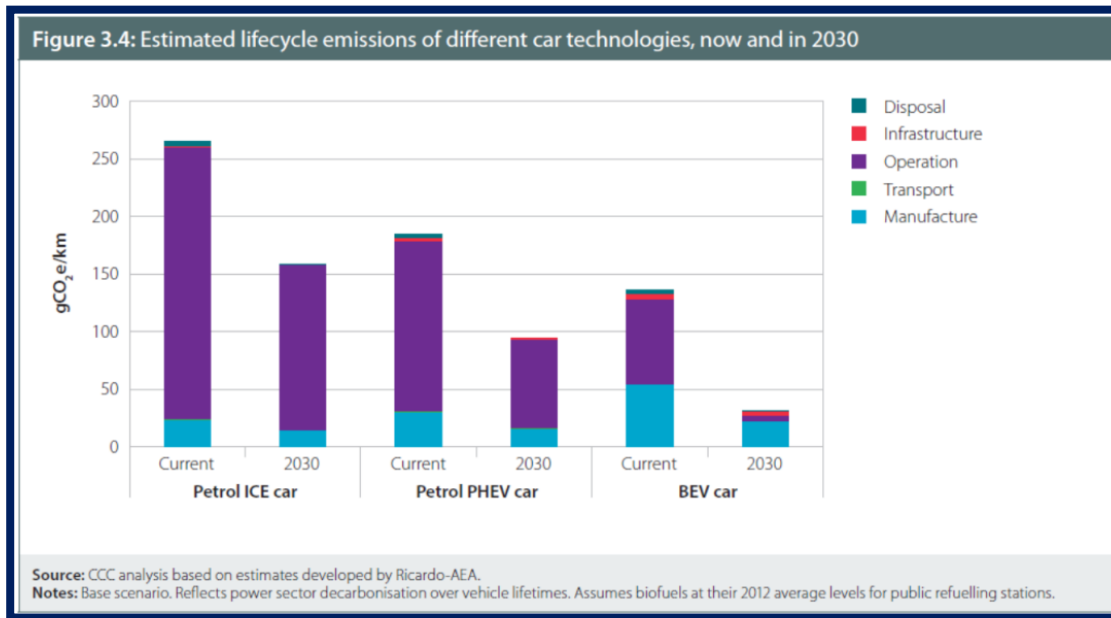
www.ricardo-aea.com



**Powering Ahead**  
The future of low-carbon cars and fuels

Simon Kay, Nikolas Hill and Dan Newman  
Ricardo-AEA  
April 2013

UKPIA  
RAC Foundation





# Manufacturers and legislators in harmony?

The shared agenda

European Union recommendation 2013/179/EU - Developing the principles for Product Environmental Footprint (PEF)

Note this excludes ILUC consideration!

SMMT 15<sup>th</sup> year of Sustainability Report

Energy and resources used in production

Year-on-year reductions

Covers over 95% of UK production

Includes Tier 1 suppliers

Manufacturers' individual reports on LCA and sustainability



# LowCVP Report 2013

Building on the previous LowCVP work:-

To study how the change in technology will affect the life-cycle impact

To identify the most carbon intensive phases of a vehicle life now and in the future

To review key areas of sensitivity in input assumptions

Considers four technology options

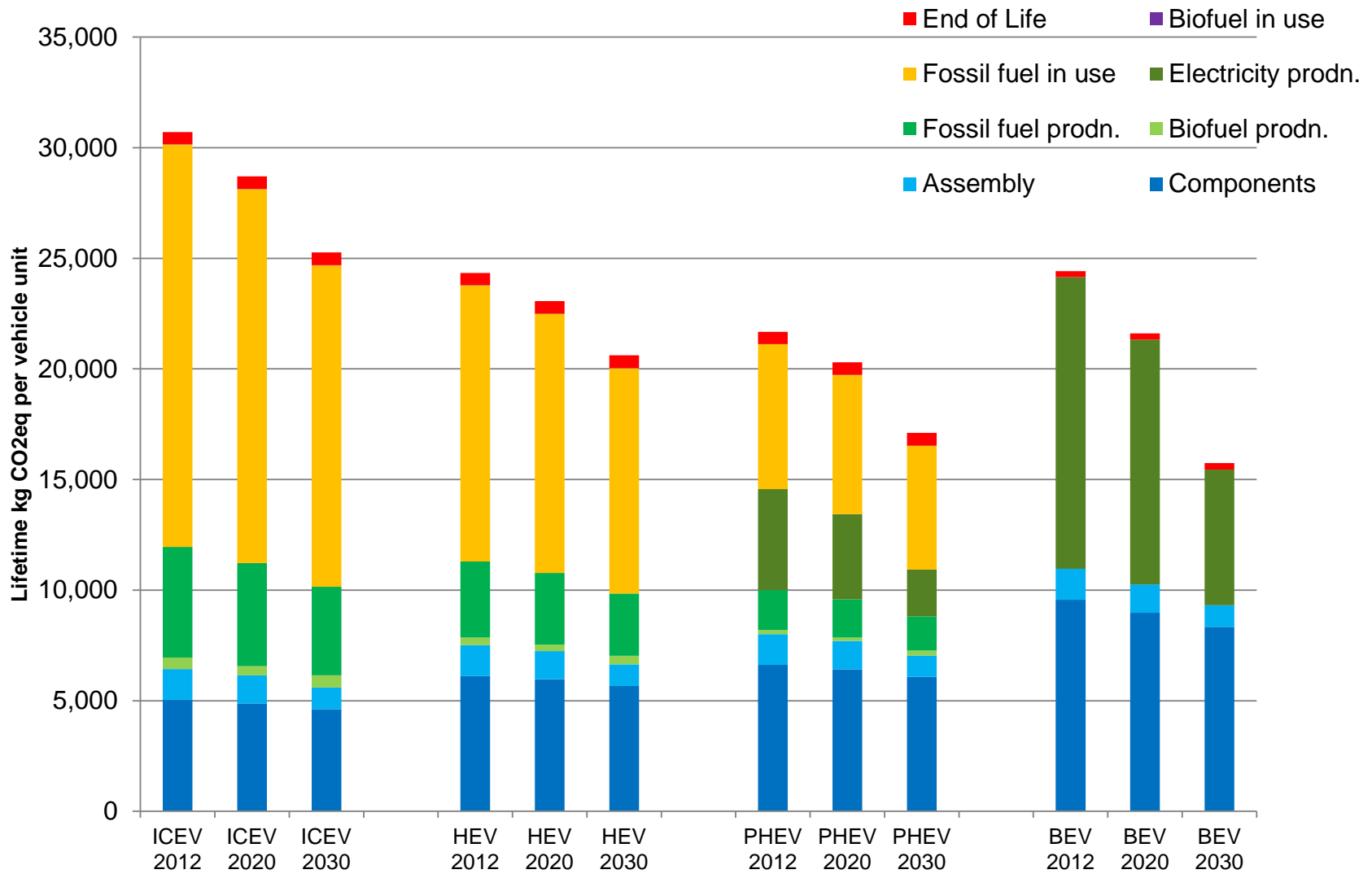
(Petrol only) ICEV, HEV, PHEV, BEV

From 2012, forecast for 2020, 2030

Identifies potential of 'best' case options



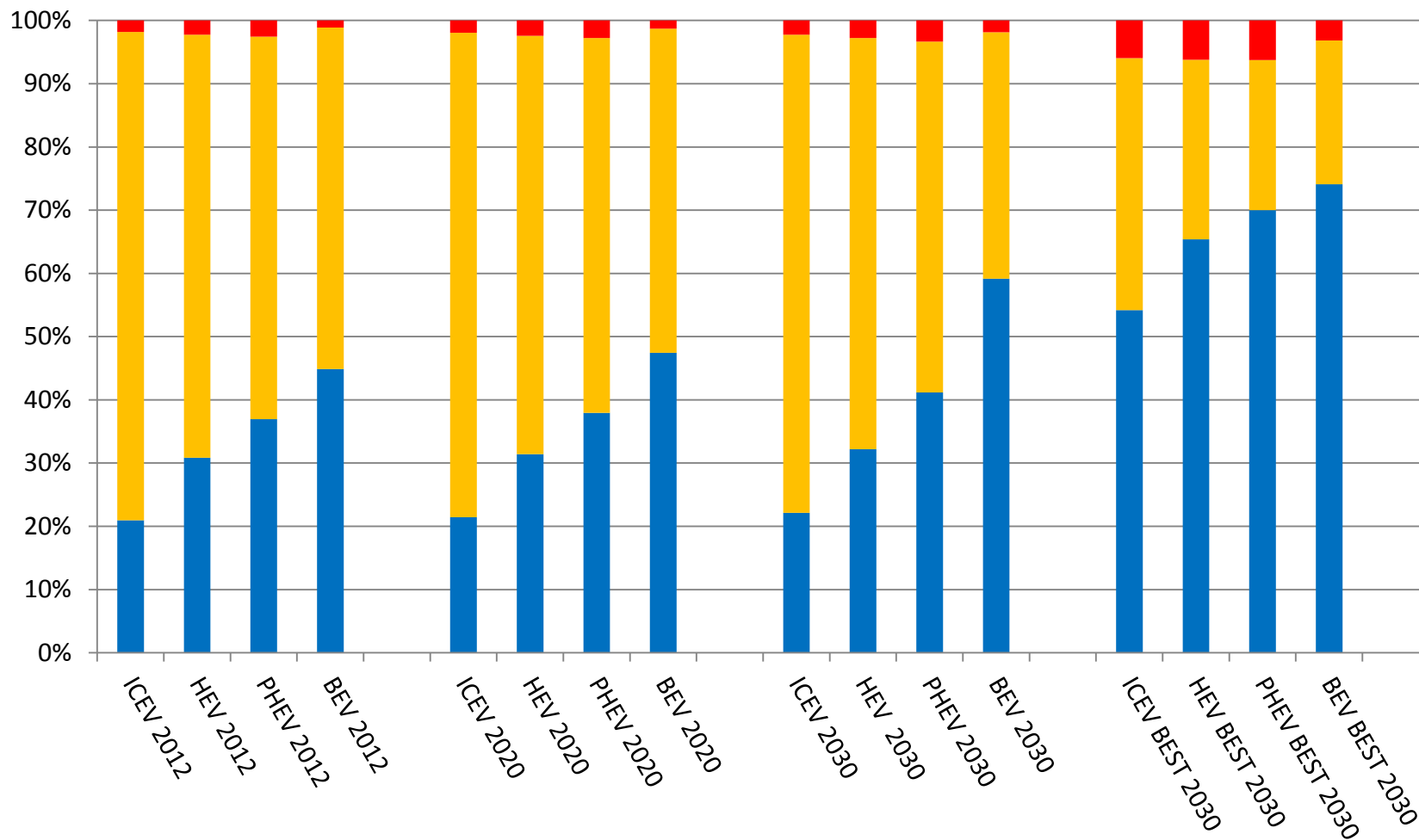
# Life-cycle impact improves with time.



# In-use phase still dominates before 2030

Proportion of Life Cycle CO<sub>2</sub>e for primary phases

End of Life USE PRODUCTION



# Assumptions are critical

Key assumptions used in this report

GaBi 5 system developed by PE International, used by major OEMs with specified emission factors for each material

Reducing carbon intensity of grid electricity for production and use

Bioethanol blended in gasoline (E10 baseline)

Driving cycle is NEDC

Vehicle life 150,000km

Progressive improvements in fuel consumption due to technology and light-weighting

Sensitivity analysis

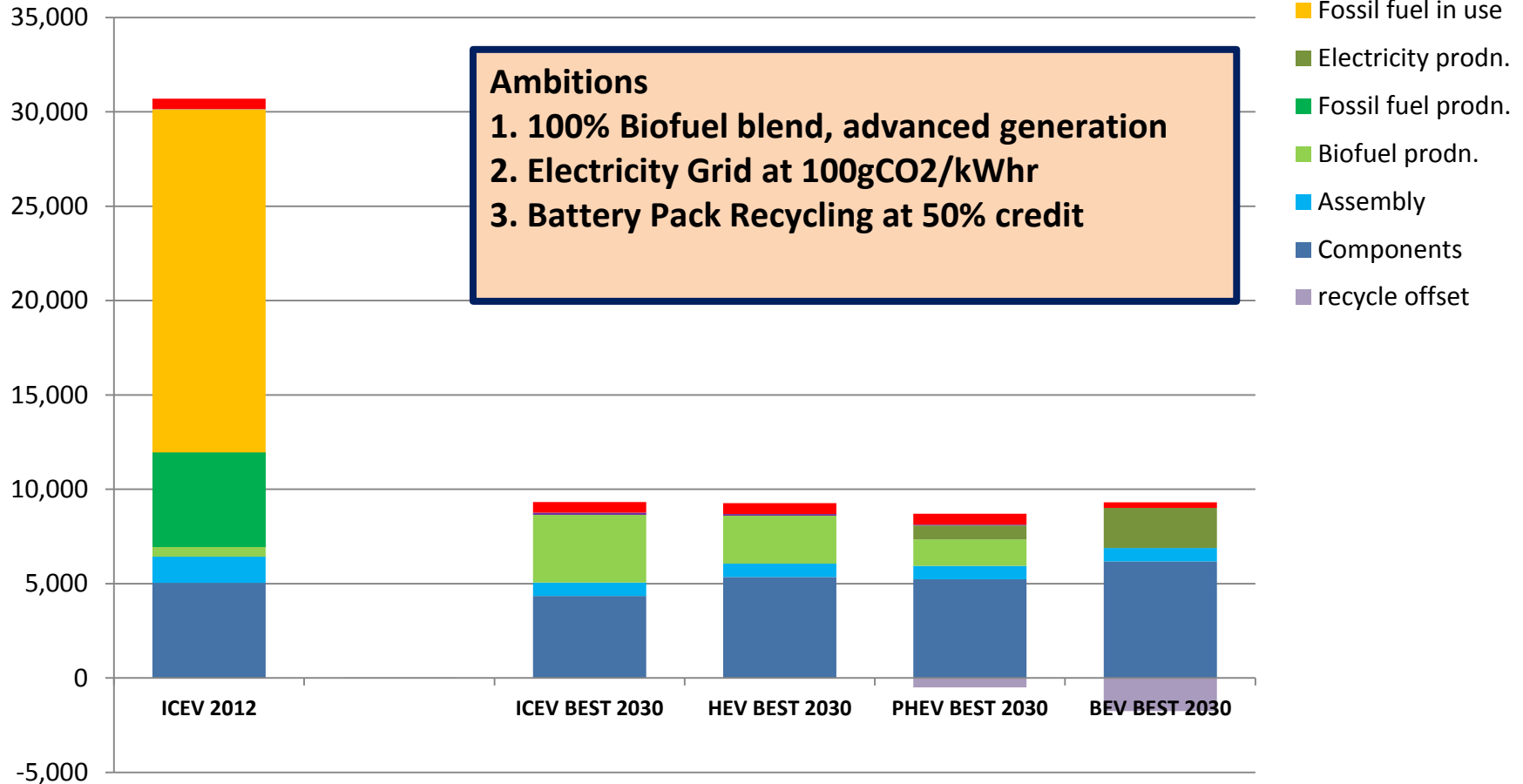
Vehicle life to 300,000km (With battery replacement assumption)

Light-weighting via aluminium or high strength steel

Potential recycling benefit of traction battery packs

# Ambitious policies could deliver >65% reductions by 2030 for all technologies

## CO<sub>2</sub>eq life-cycle impact 'best' case 2030 using 'ambitious' policies



\*100g/CO<sub>2</sub>/kWhr relates to electricity generation at the point of consumption

# BUT ... real world fuel use higher than NEDC

Recent reports have noted that consumers fuel consumption typically exceeds test cycle results by an average of 25%

ICCT report May 2013 –25% average increase based on users own data input 2014 difference is 31%

Emissions Analytics/WhatCar? True mpg - 25% higher

Interestingly the results are very consistent even though some data are from a large dataset of users own fuel measurements and other from on-road testing using Portable Emissions Measurement System (PEMS)



# BUT ... Well-to-Wheel assessment is needed

No current options completely eradicate carbon from the fuel use chain, however all have significant opportunities to reduce carbon

Liquid fuels (petrol/diesel) – higher biofuel blends and substitution

Electricity - renewables and the low carbon grid

Gas – Biomethane

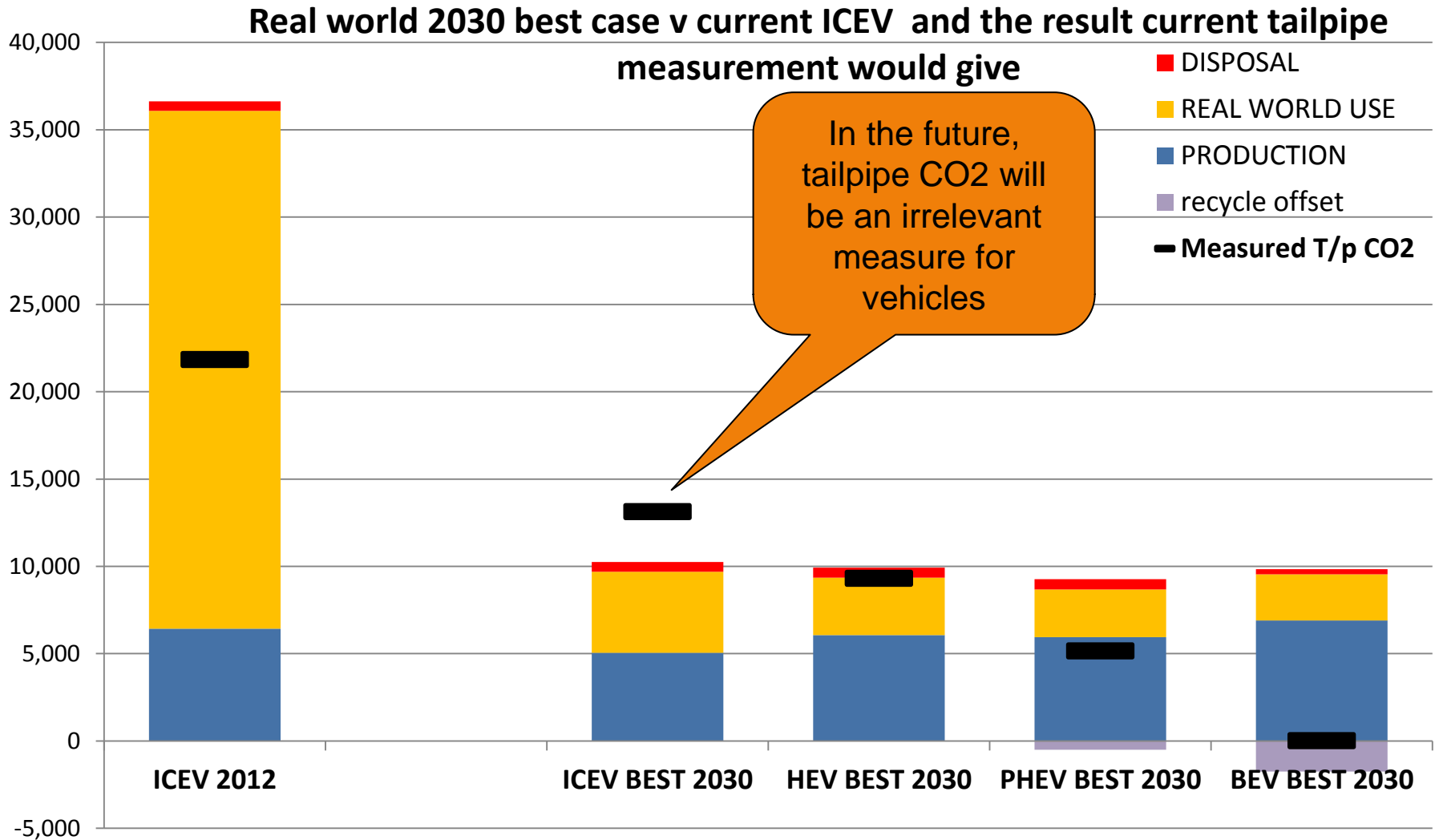
Hydrogen – production from water electrolysis.

Only by combining a WTW approach **together** with in-use vehicle energy efficiency will the lowest carbon pathway for the use phase become apparent.

There is no single solution so keeping our options open allows optimum combinations and applications of transport energy pathways

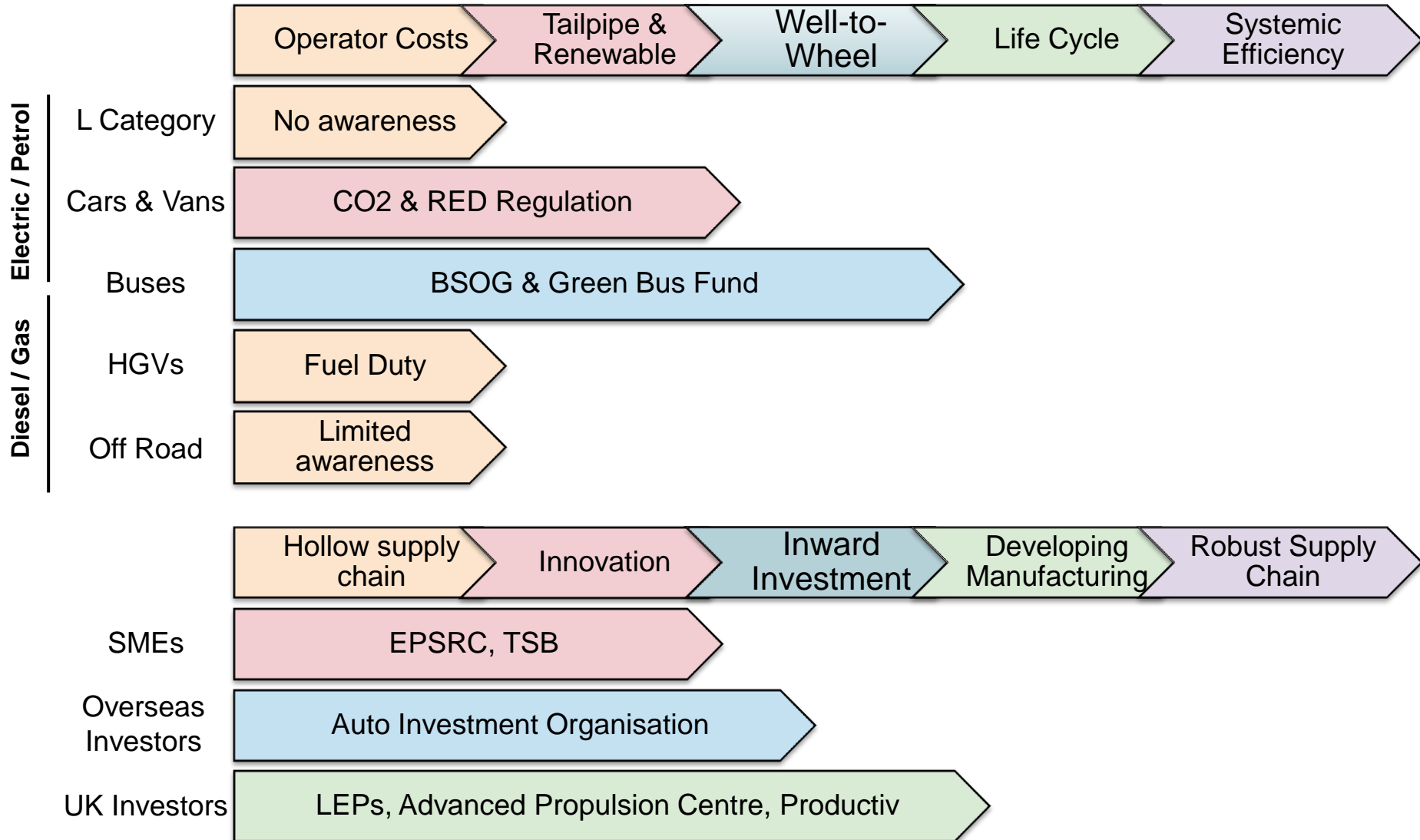


# Tailpipe CO<sub>2</sub> is no longer representative



In the future, tailpipe CO<sub>2</sub> will be an irrelevant measure for vehicles

# Road Transport in the UK today & where we need to be



# Why we must change

Tailpipe test results are increasingly unrepresentative, consumers are losing confidence and need more consistent information

Focus on lower carbon fuel/energy in combination with vehicle efficiency improvement

Awareness of life-cycle considerations is rapidly increasing

Full life-cycle analysis is highly complex and needs further development

Geographical boundaries for material, production and energy sources can have significant effect

The range of fuels and technologies available in the future need an appropriate common metric which reflects their true impact

The use phase of vehicles dominates carbon impact so is the obvious place to start

For commercial vehicles the use phase is even more dominant

**Regulation** will happen!

# The Low Carbon Vehicle Partnership

## Connect | Collaborate | Influence

- ❑ **Connect:** With privileged access to information, you'll gain insight into low carbon vehicle policy development and into the policy process.
- ❑ **Collaborate:** You'll benefit from many opportunities to work – and network - with key UK and EU government, industry, NGO and other stakeholders
- ❑ **Influence:** You'll be able to initiate proposals and help to shape future low carbon vehicle policy, programmes and regulations



LowCVP is a partnership organisation with over 180 members with a stake in the low carbon road transport agenda.