

The role of fuels in decarbonising road transport

Future Fuels 2016 – 26 April 2016

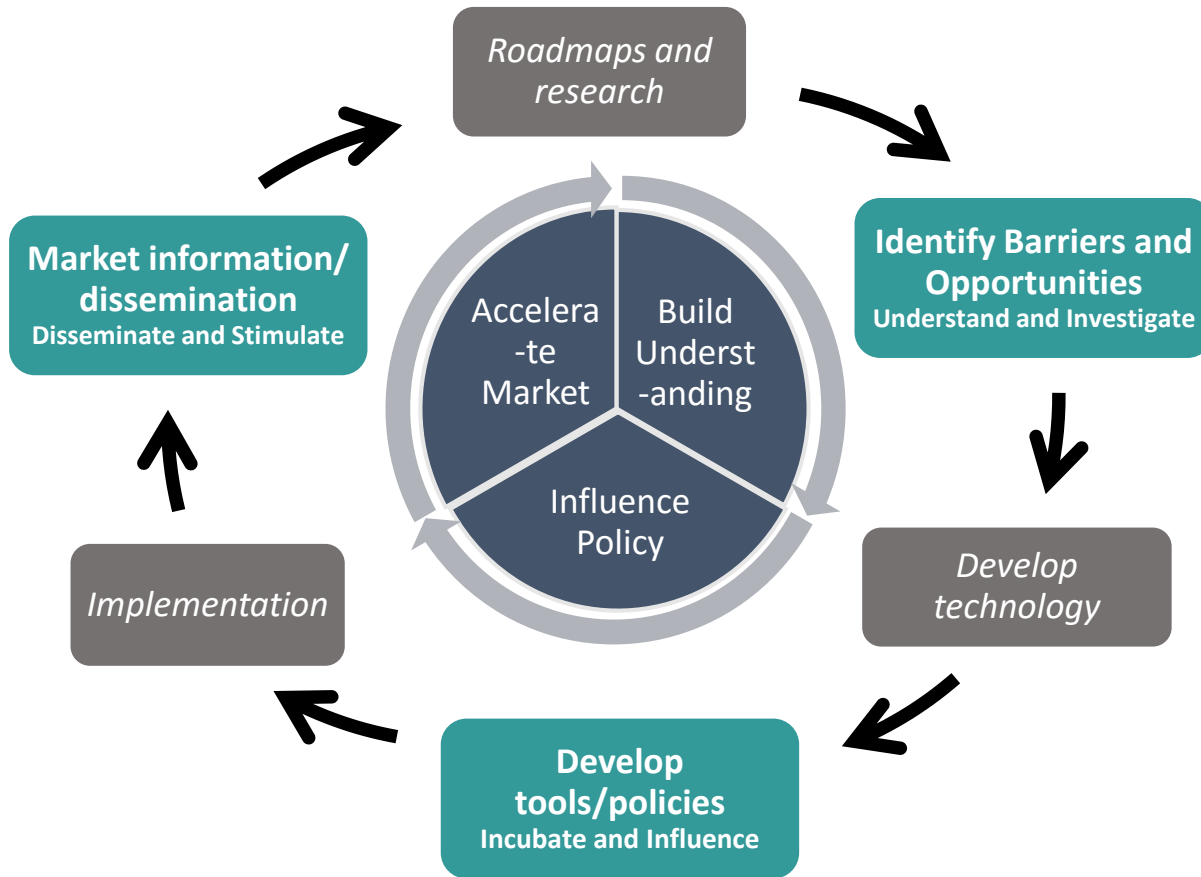


Jonathan Murray

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LowCVP activity & influence cycle

- Robust Research, Policy and Information *The LowCVP exists to accelerate shift to low carbon vehicles and fuels and stimulate UK business opportunities*

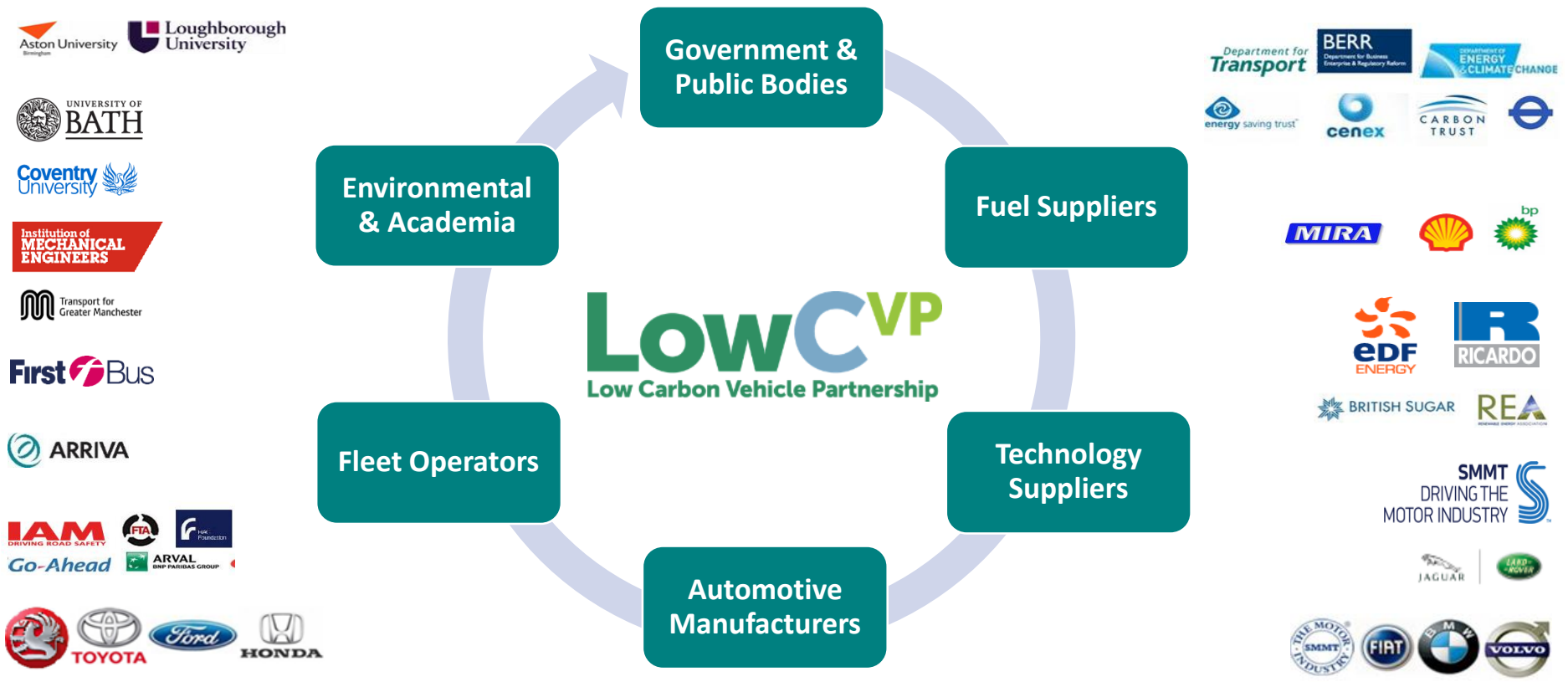


Key:

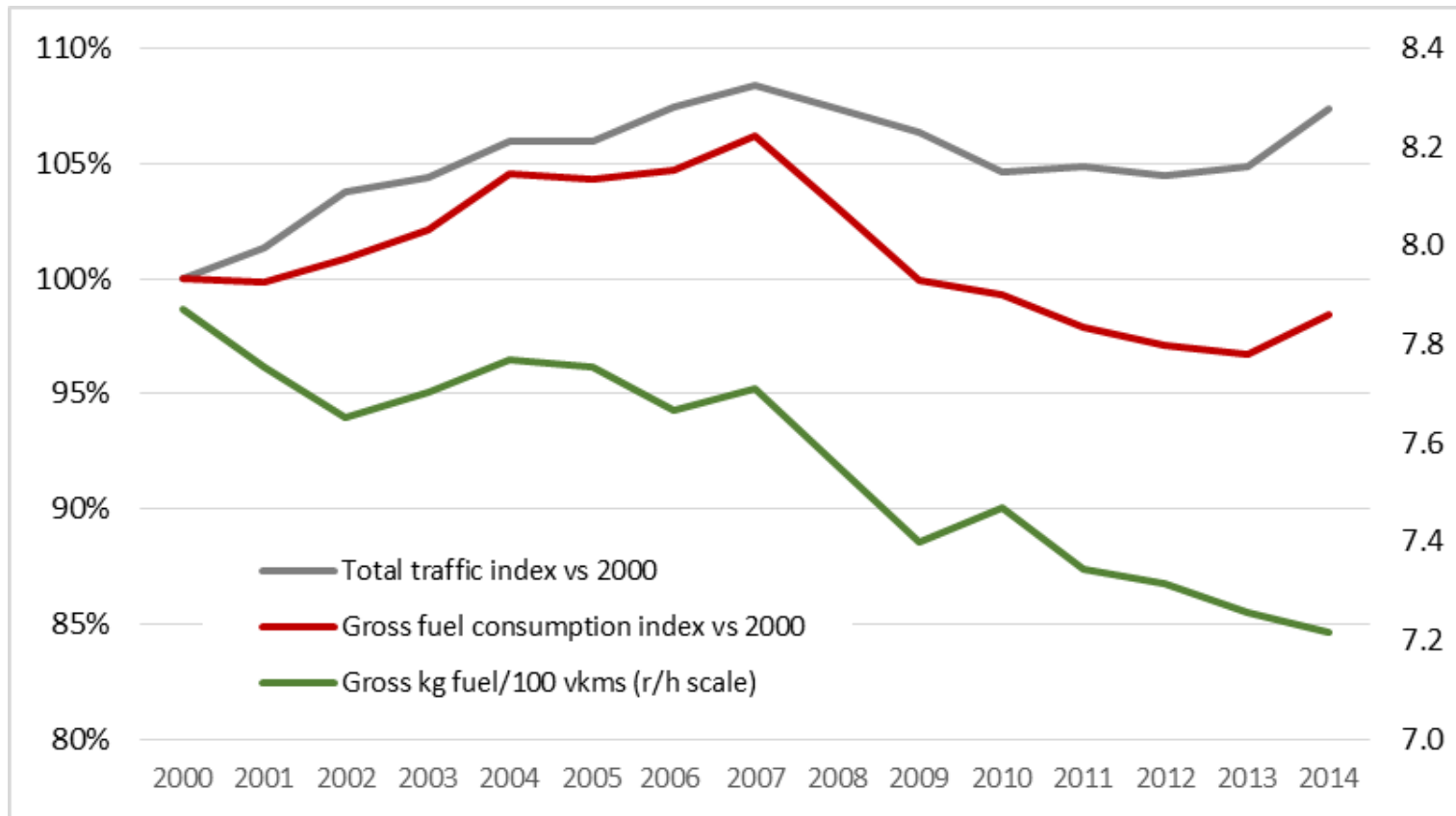
LowCVP activity

Member organisations

LowCVP is a unique public-private membership organisation building evidence and creating robust policies and innovation in UK



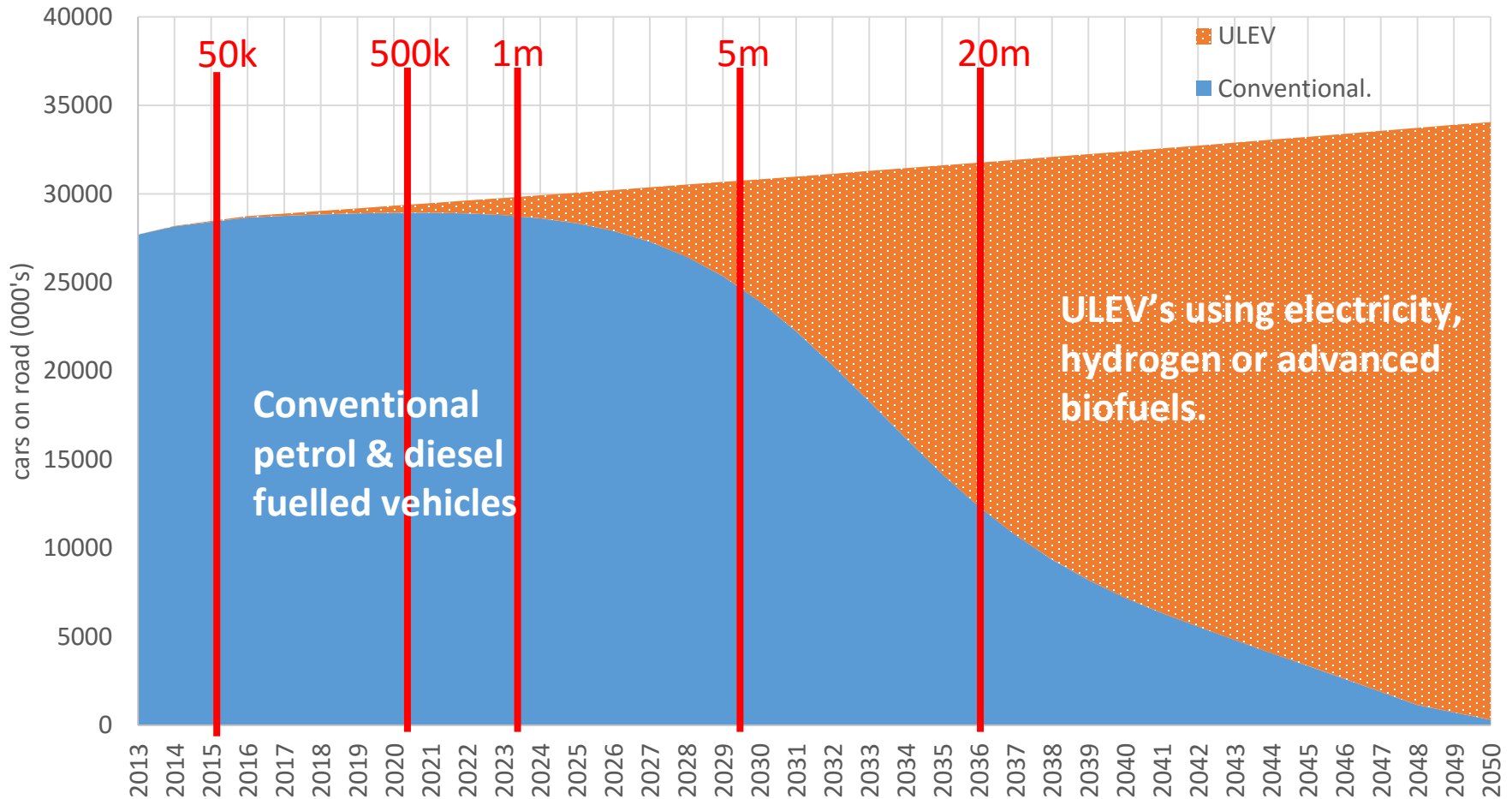
The total UK fuel consumption



- While overall fuel efficiency has been improving, the traffic and miles travelled have been increasing.
- Unless fuel is decarbonised, total GHG emissions will not reduce in line with ambition.

Reducing emissions significantly in next 15 years will require tackling conventional fuels

ULEV and conventional vehicle parc - Total parc increase 0.5% p.a.

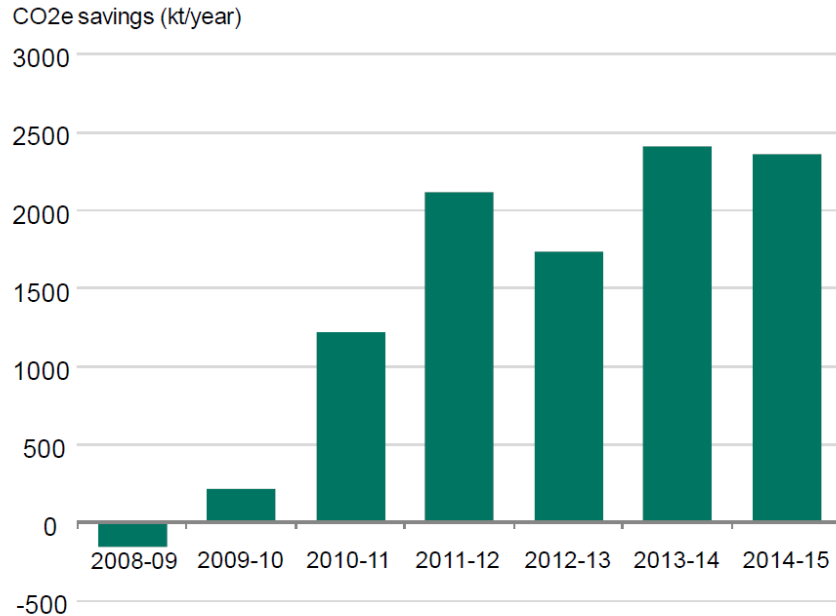


Decarbonising transport strategy

- EU strategy to decarbonise road transport has focused on tailpipe emission targets and renewable targets for fuel.
- Binding targets for Light Duty Vehicles were set. Cars 130 g/km by 2015 and Vans 175 g/km by 2017.
 - UK government supports through tax and incentives.
- Renewable Energy Directive provided a transport target for increasing the proportion of renewables in road fuels, displacing fossil fuels to 10% by 2020.
 - Implemented through the Renewable Transport Fuels Obligation.
- Both measures have faced issues in delivering the intended outcome.
 - The NEDC test cycle differs from real world emissions and the RED initially didn't take indirect effects into account.

The RTFO is delivering GHG reductions from conventional fuels

GHG savings delivered by biofuels supplied in the UK including ILUC

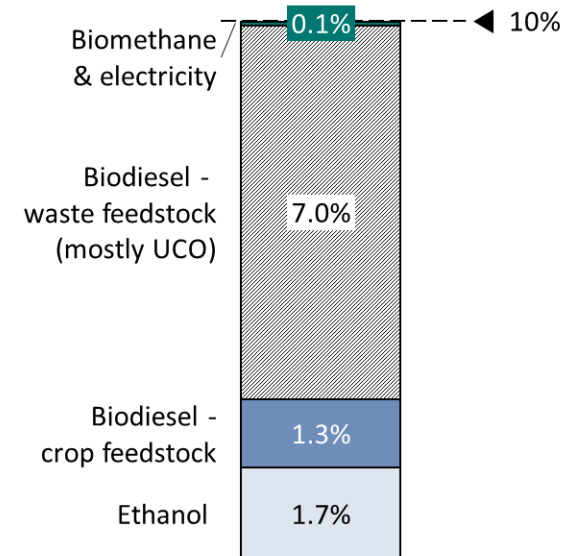


Source: DfT

- In 2014-15 1,671 million litres of renewable fuel have been supplied, 3.29% of total road and non-road mobile machinery fuel supply in the UK.
- The fuels were biodiesel FAME (50%), bioethanol (48%) and biomethanol (1%). By 2020 the RTFO could deliver between 6% and 7% GHG saving.
- The 2030 climate and energy proposals aim to continue and intensify the EU's strategy to reduce emissions from road transport.

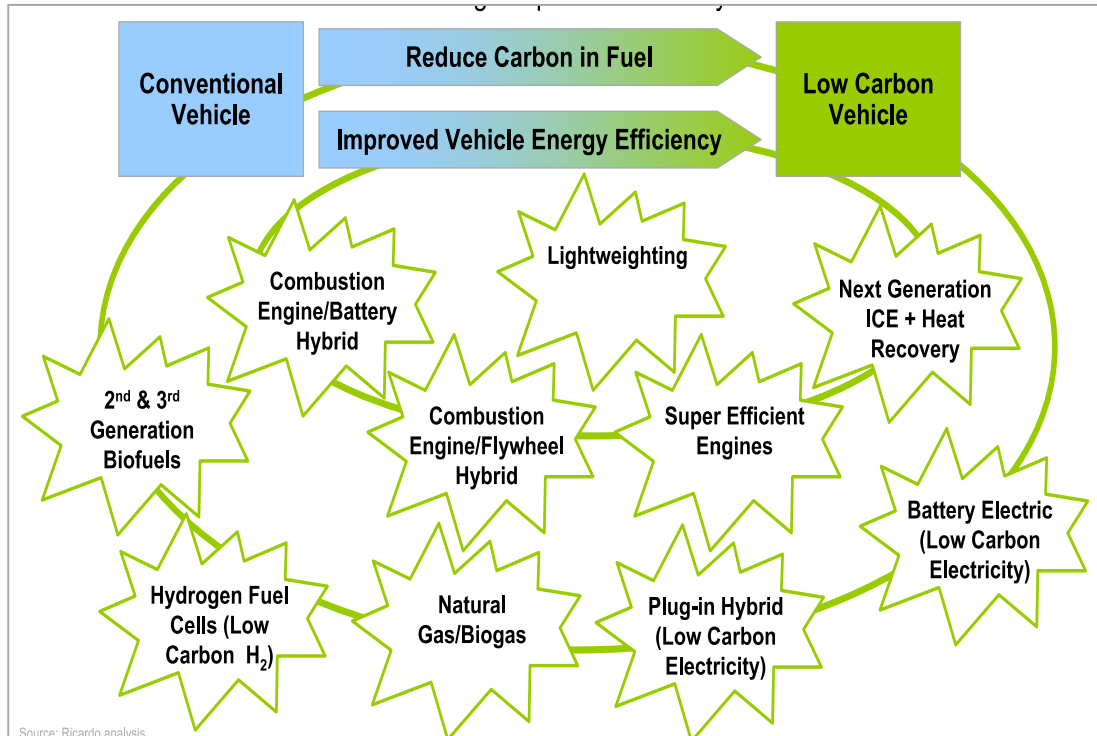
Contribution to RED target in 2020 – recommended scenario

% renewable energy in road transport



Source: Element Energy

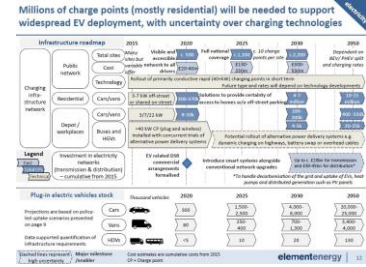
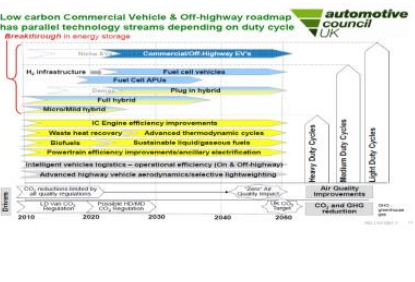
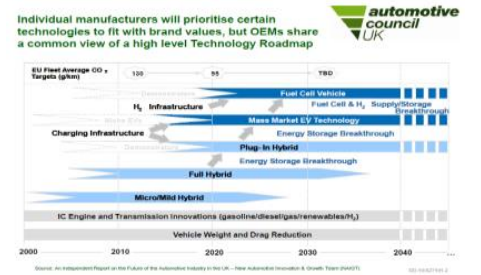
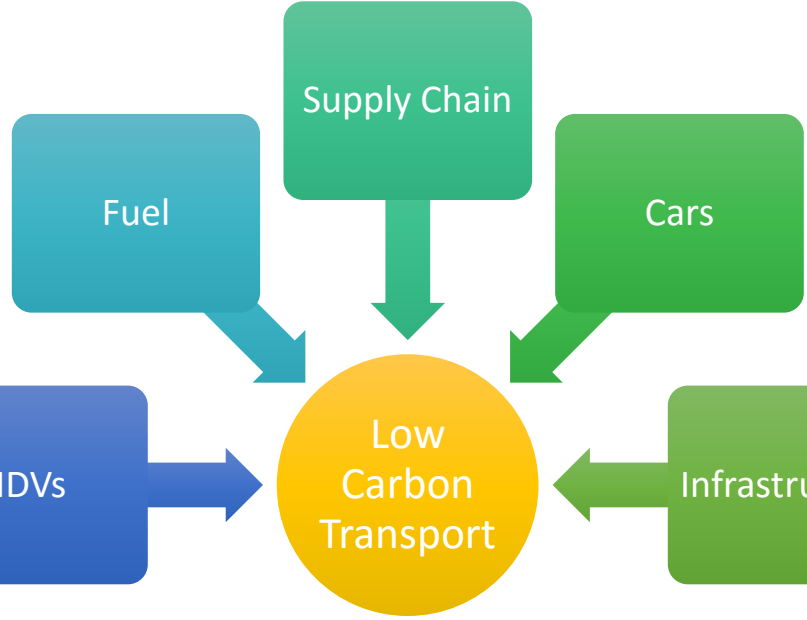
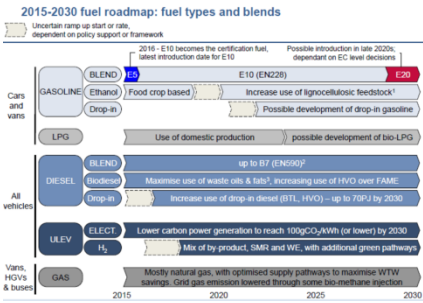
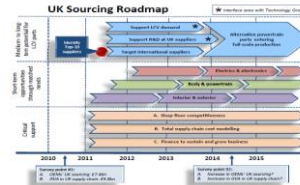
The increasingly demanding standards will encourage the roll-out of a new fuels and technologies



- Duty cycle
- Vehicle capital cost
- Maintenance costs
- Reliability / performance
- Infrastructure
- Fuel savings
- Air pollution – NO_x, PM
- GHG emissions – CH₄, CO₂, N₂O
- Sustainability / supply – biofuels
- Market availability

- Range of options to consider when selecting low carbon fuels and technology for vehicles.
- Potential impacts for operators, manufacturers, fuel suppliers, infrastructure providers and policy makers.
- LowCVP closely involved with a range of stakeholders looking at technology and policy options out to 2030.

There is a growing consensus on the building blocks for low carbon road transport in the UK

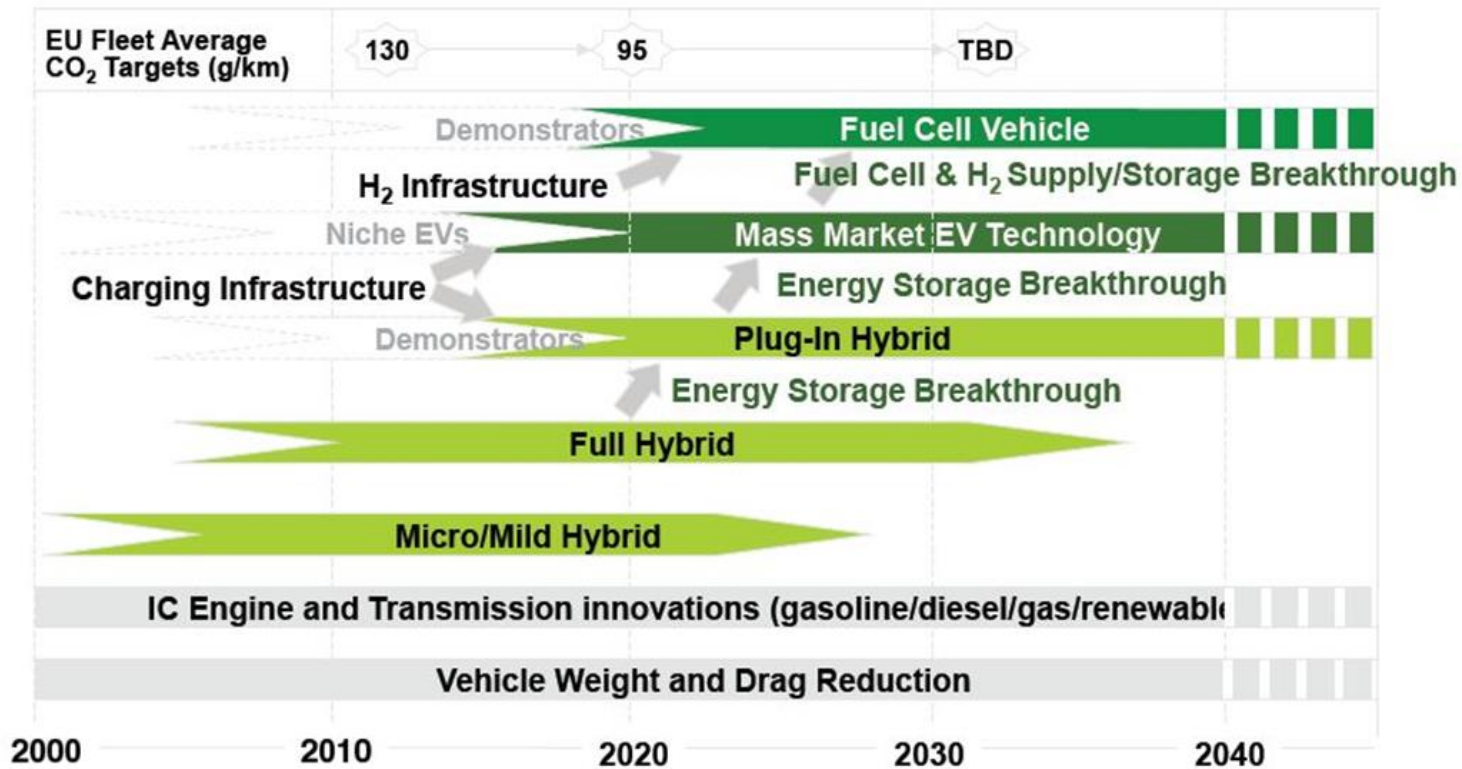


The LowCVP has provided a guide to the suite of Transport Roadmap. Available from www.lowcvp.org.uk

Transport Roadmaps
A guide to low carbon vehicle, energy and infrastructure roadmaps

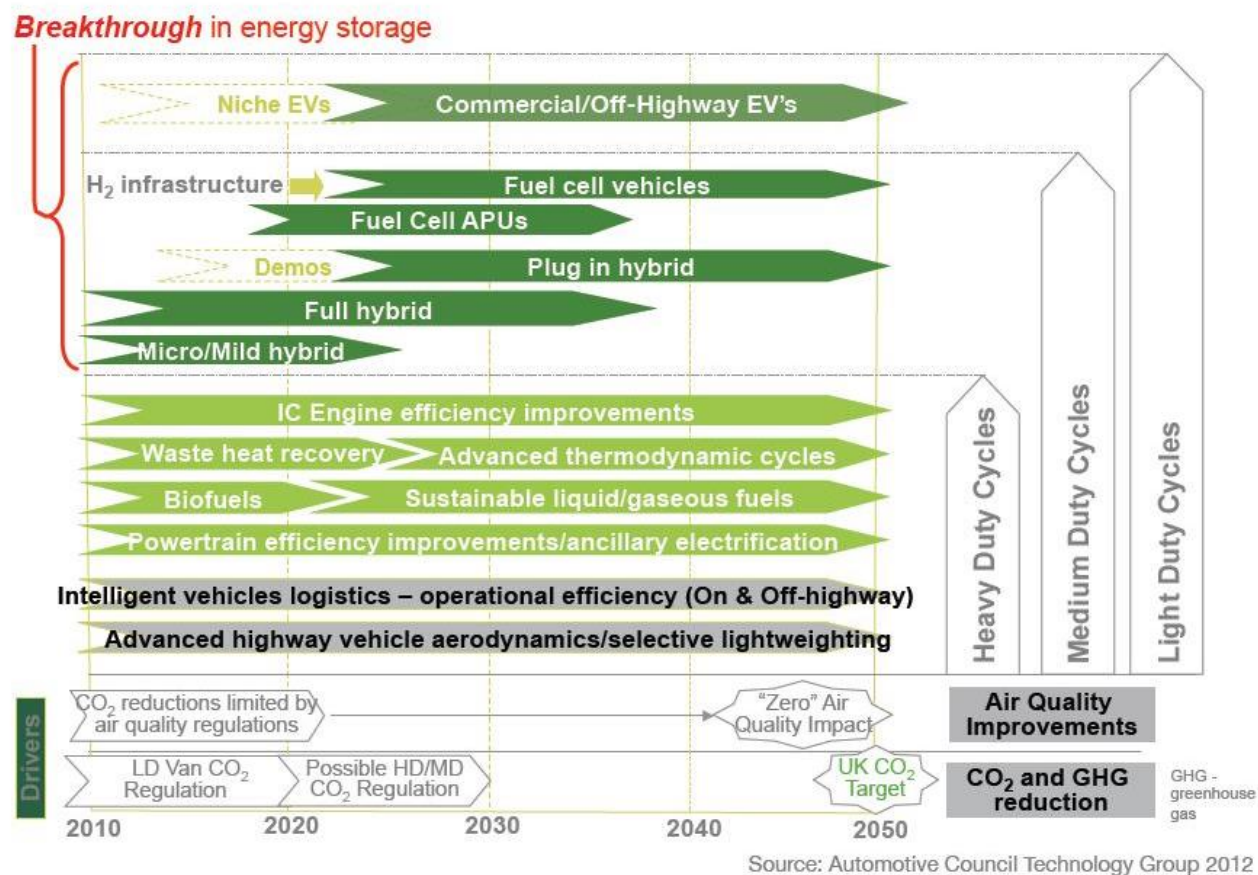


Improved efficiency, use of renewables and increased electrification of LDVs



- Improvements in internal combustion engine efficiency, weight reduction and drag resistance.
- Increased use of renewables in liquid and gaseous fuels.
- Increasing electrification through plug-in hybrids, electric and potentially fuel cell vehicles.

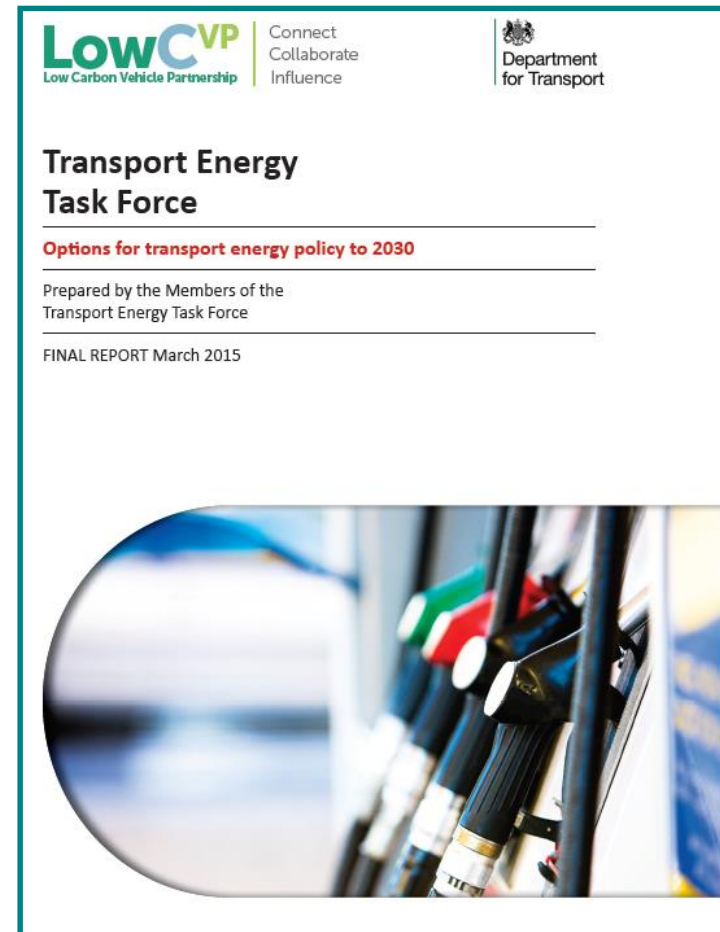
In the heavy duty sector different approaches required depending on the duty cycle



- Efficiency gains and deployment of sustainable fuels are vital and hybridisation.
- Some duty cycles are appropriate for electrification, while gaseous may be deployed in long haul.
- As with LDVs, increased use of renewables in liquid and gaseous fuels is anticipated.

Decarbonising road transport fuels to 2020 and future pathways

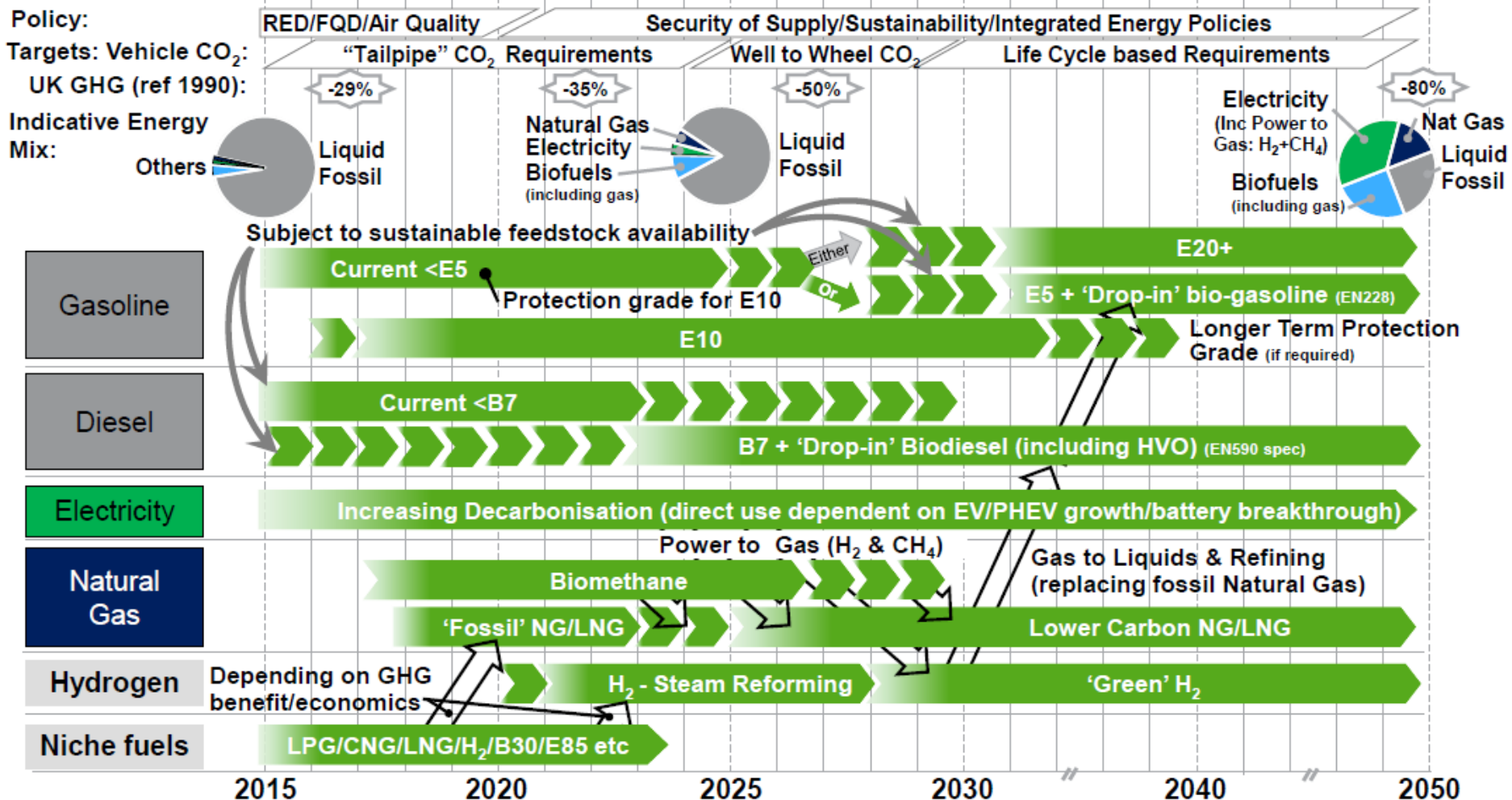
- Transport Energy Task Force was created to make recommendations to DfT on how to meet the RED transport sub target for 2020.
- Develop consensus
- Identify future pathways
- Uncover the questions/concerns
- Key messages
 - Reducing GHG now and in the future
 - Develop a 2030 pathway with 2020 targets
 - Minimise risks and uncertainty
 - Deploying;
 - E10 petrol
 - B7 with waste feedstocks
 - Framework for advanced biofuels
 - Defining “Sustainable”
 - Create UK Success, building on investment



Energy Roadmap shows long term transition from gasoline & diesel fuels to a majority renewable energy portfolio

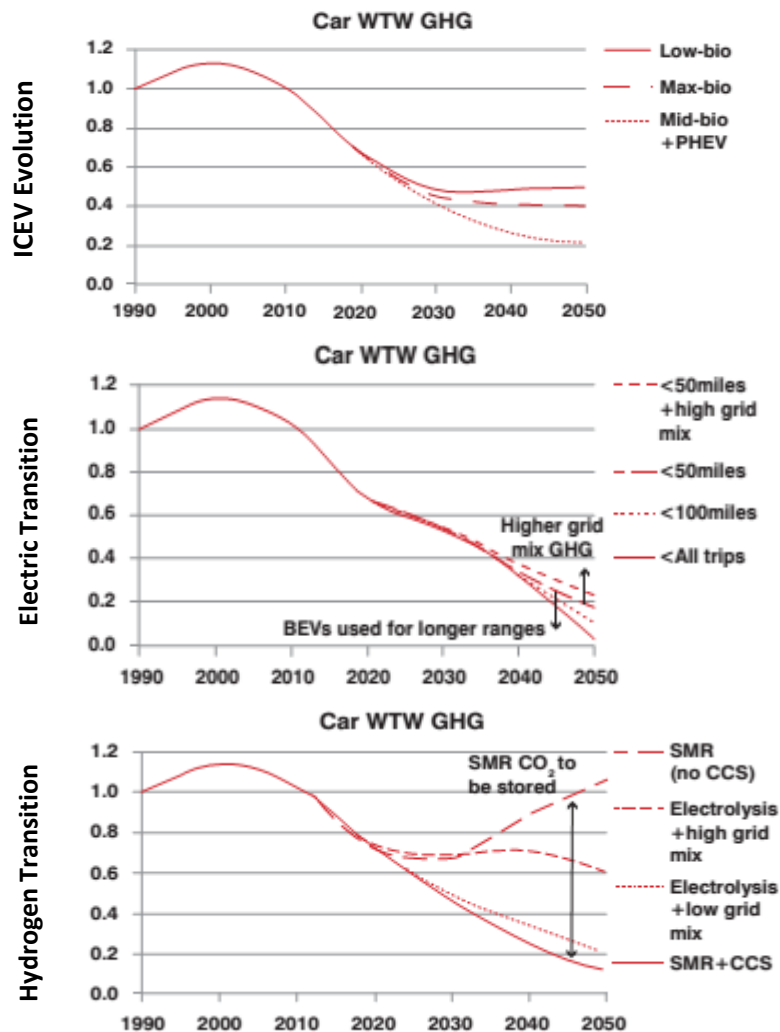


UK: Energy Roadmap for Passenger Cars, Commercial & Off-Highway Vehicles



Source: Auto Council, ETRAC, E4Tech, Element Energy

Energy vector can have significant implications for Well-to-Wheel GHG emissions

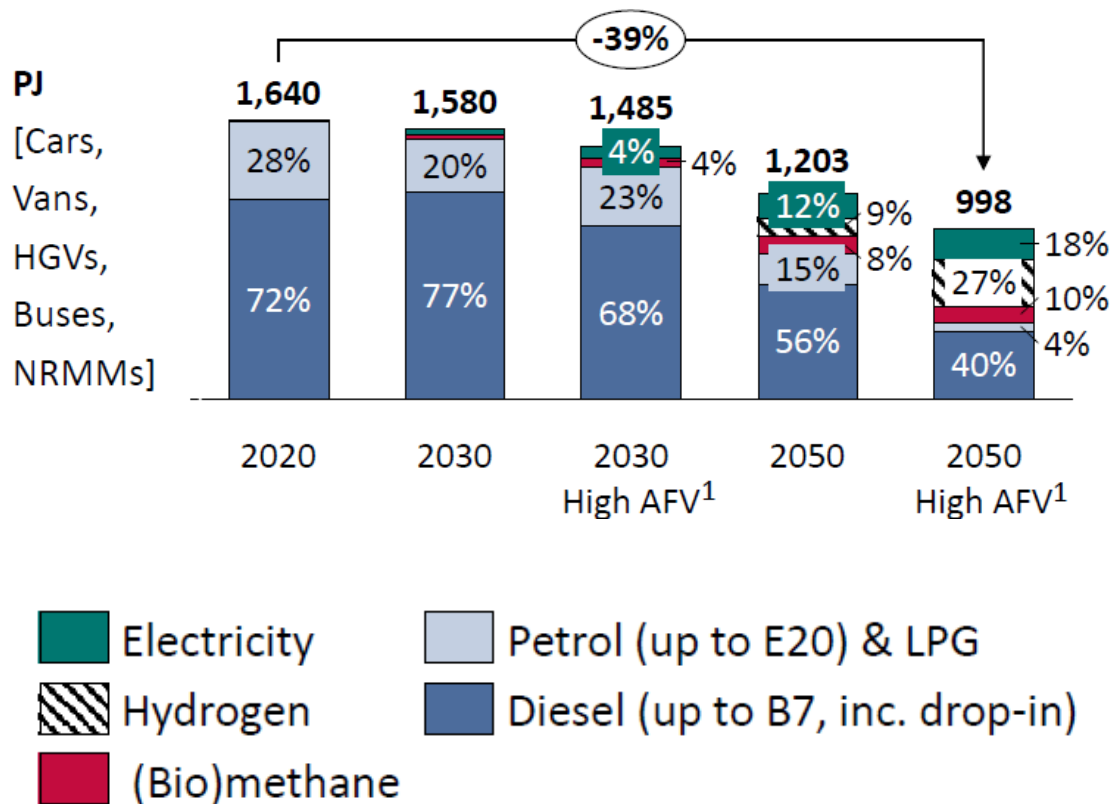


Source: ERP

- **Energy Research Partnership** have published a report into Energy Options for Transport.
- **ICEV Evolution:** liquid fuels used extensively with hybridisation and plugged in hybrids; liquid fuels have increasing proportions of biofuels.
- **Electric Transition:** BEV uptake is accelerated in the 2020s; grid mix GHG intensity continues to fall; BEV range increases due to battery improvements.
- **Hydrogen Transition:** FCEV uptake for light and heavy road transport grows significantly as part of move to a “hydrogen economy”.
- Scenarios capable of delivering 80% reductions in WTW GHG emissions, but potentially less under specific assumptions.

Roadmaps show biofuels will bring the greatest GHG emissions reduction to 2030 while alternative powertrains will be key post-2030

Illustrative impact of fuel roadmap
Total energy use (PJ)



Source: Element Energy

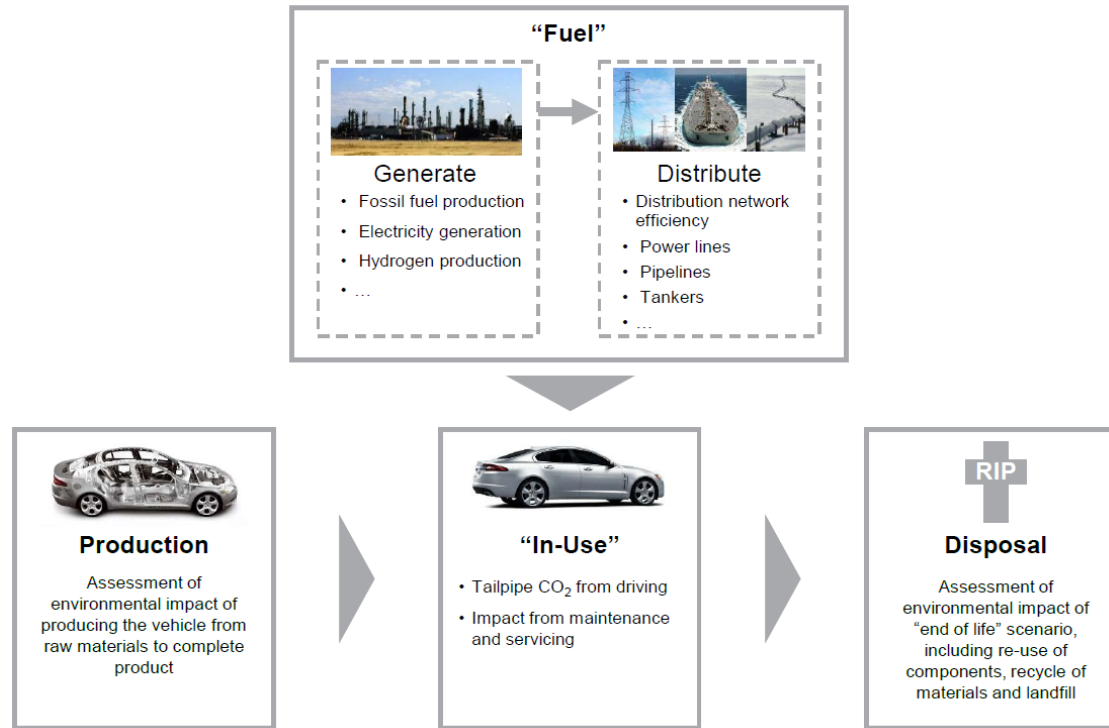
- Combination of powertrain roadmaps and fuel roadmap will deliver reduction of emissions:
 - Improvement in the fleet energy efficiency: total energy use decrease, by 4 to 10% between 2020 and 2030 (depending on powertrain technology uptake) and by 27 to 39% between 2020 and 2050
 - Increasing use of biofuels, gas and grid decarbonisation
- By 2030, FAME, drop-in diesel and ethanol provide most of the renewable energy due to dominance of petrol and diesel vehicles
- By 2050, H₂ and electric fuels are dominant, providing from 20 to 45% of the transport energy required

The Biofuel debate – the importance of defining sustainability

- Developing science and moving boundaries have made Biofuels a very difficult and sensitive subject.
- Land use, competition with food production, bio diversity, resource use.
- Use of waste is seen as one of the most obvious first steps (minimum risk).
- Focus on GHG reduction and objective definitions of sustainability are required to drive future investment.
- Competing uses for waste feedstocks from heat and power sectors, as well as transport.



In future account may need to be taken of emissions from other elements of vehicles' life cycle



Source: Ricardo

- In-Use and Fuel impacts on GHG emissions have been treated separately in policy measures to date.
- Moving to well to wheel policy measures would recognise the direct link between fuel and vehicle technology.
- Imbedded energy from production projected to become an increasingly important element of life cycle emissions

- Transport energy can play an important role in decarbonising road transport.
- In the short term, to 2020, the role of fuels in decarbonising transport will be limited. Contributing 6%-7% reduction in GHG emissions.
- Biofuels can play the greatest role in GHG emissions reduction to 2030, however this will be dependent on;
- Developing a framework for investment in biofuels and defining a robust definition of sustainability to provide investor confidence.
- In the longer term there are competing pathways focusing on liquid fuels, electrification and deploying hydrogen.
- These have the potential to be consistent with the UK ambition to reduce GHG emissions by 80% compared to 1990 levels.
- There will need to be across Government agreement on the deployment of waste feedstocks.
- The interdependency between vehicle technology and fuel will need policy measures based on well-to-wheel GHG emissions.
- In the longer term life cycle analysis may be needed. This will require development and agreement on measuring imbedded emissions from production.

Thank you for listening

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