Options for certifying low carbon HGVs

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Jonathan Murray
Deputy Director
Low Carbon Vehicle Partnership

Neil Fulton,
?
Millbrook Proving Ground

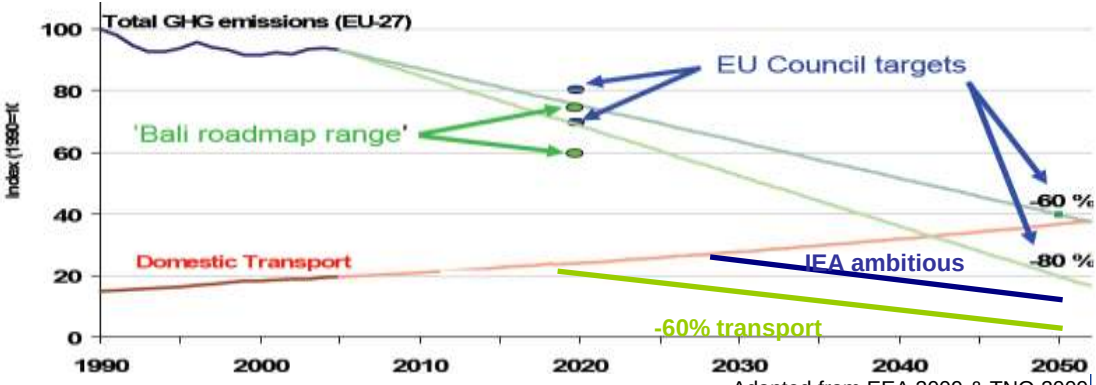
Low Carbon Vehicle Partnership

Accelerating a sustainable shift to low carbon vehicles and fuels in the UK

Stimulating opportunities for UK businesses

EU domestic transport emissions will consume the available CO2 budget on current trends. Even ambitious scenarios leave inadequate headroom for other sectors

EU GHG Emissions Projections



Adapted from EEA 2009 & TNO 2009

European Commission investigating the regulation of HGV CO2 & fuel consumption

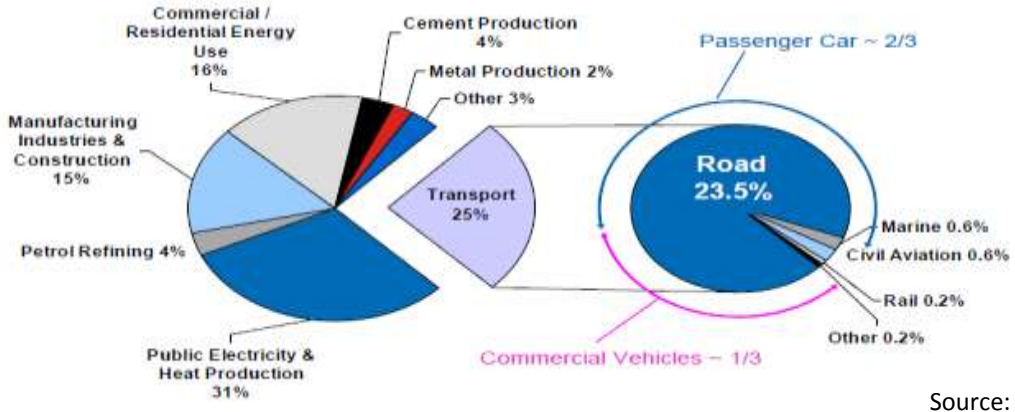
DG Environment study - March 2008 "ACEA has agreed in principle to look at the viability of **creating a methodology of measuring the efficiency of the whole vehicle. We understand that this process would model the likely efficiency of any** vehicle combination […]"

Commission proposal Euro VI

Proposed amendment EU Council - June 2008

"[...] the Commission **should develop a definition and a methodology of energy consumption and CO2 emissions for whole vehicles and** not only for engines. [...] **should also cover alternative driveline concepts (e.g. hybrid vehicles) and effects […] of aerodynamics, weight, loading capacity and rolling resistance [...]" "[…] should not prejudice virtual and actual testing"**

Climate Change Act 2008 requires UK to reduce emissions by 34% by 2020 and 80% by 2050 compared to 1990



Source: DfT

Technologies were assessed through a four stage process for four types of operation

Technology road mapping process

Select technologies → **Assess CO2 benefits** → **Calculate payback period** → **Construct road map**

Four applications

Heavy Goods

Inter city delivery

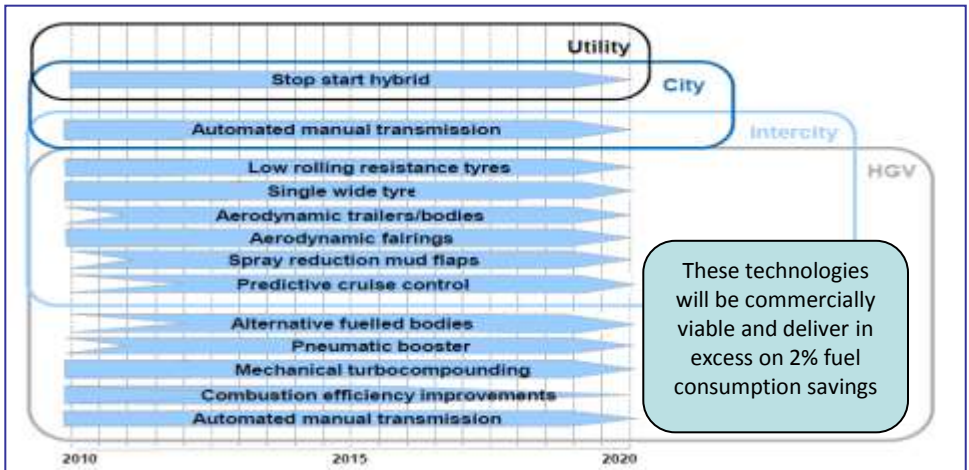
City delivery

Utility

Technology Areas

Vehicle		Powertrain		Fuel	
Aerodynamics	Fairings	Efficiency	Combustion	Alternatives	Natural gas
	Trailers		Friction		Biofuels
	Spray suppression		Acillaries		Biogas
Rolling	Low Res tyres		Gas Exchange		Electricity
Resistance	Single wide tyres		Waste heat use		Hydrogen
	Auto tyre pressure		Trans/Driveline		
Driver /	Predictive cruise	Alternatives	Fuel cells/Evs		
Control	AMT		Hybrids/ICE		

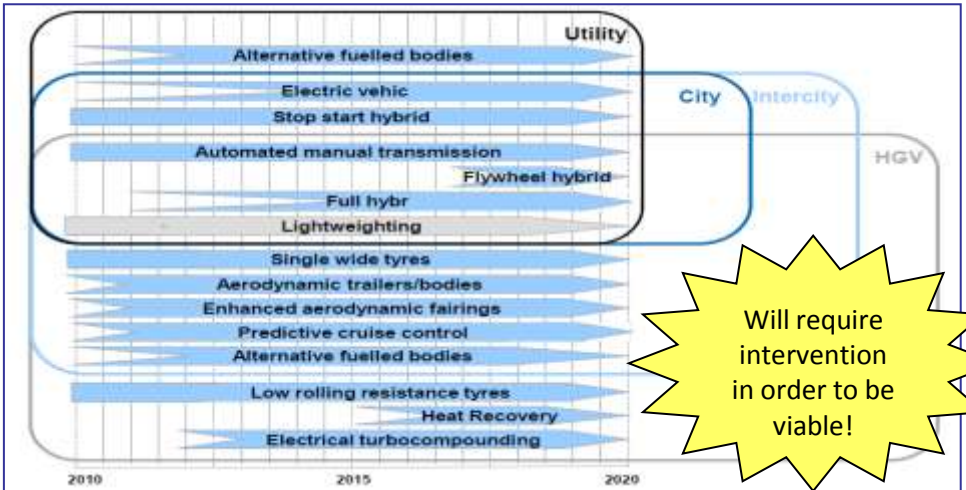
Vehicle and powertrain technologies which are likely to be commercially viable by 2020



Technologies delivered 2% fuel savings in the moderate scenario.

Source: Ricardo

Technologies which can deliver more aggressive fuel savings but are unlikely to be commercially viable



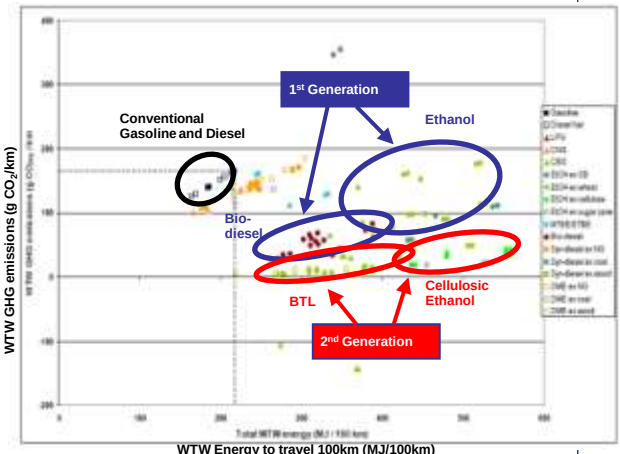
Technologies deliver in excess of 5% fuel savings in the challenging scenario.

Source: Ricardo

Reducing the carbon footprint of fuels is challenging

1st generation biofuels can deliver up to 80% WTW CO_2 reductions but 2nd generation expected to do better

- 1st generation biofuels deliver 5%-80% CO2 reductions
  - Highly dependent on production process
- 2nd generation biodiesel gives significant CO_2 benefits when compared to 1st generation fuels
  - BTL (Biomass To Liquid) is expected to give 60-90% reductions
  - HVO (Hydrogenated Vegetable Oil) is expected to reduce WTW CO_2 emissions by 40-60%
  - Less harmful emissions are produced by BTL and HVO than diesel
    - They contain no sulphur or aromatics

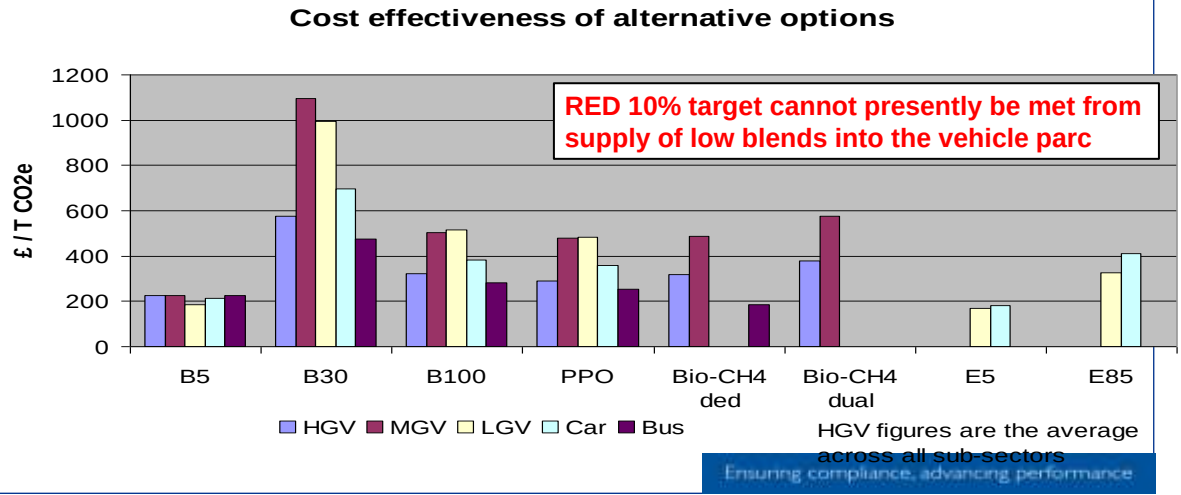


To 2020 the challenge is to ready the market for renewable fuels – but which option?

	1st G Bio	2nd G Bio	H2-IC	H2-FCV	Bio-CH4	EV
Technology readiness						
Cost competitiveness						
Vehicle availability						
Infrastructure deployment						
Driver acceptability						
Sustainability						

NB: The relative scores do not represent LowCVP policy

Low blends are (generally) more cost effective than other options particularly for HGVs & buses.



Source: TTR

Recommended approach to measuring fuel consumption and CO2 from HGVs

- Proposed approach needs to be cost effective
- Evidence based and independently witnessed

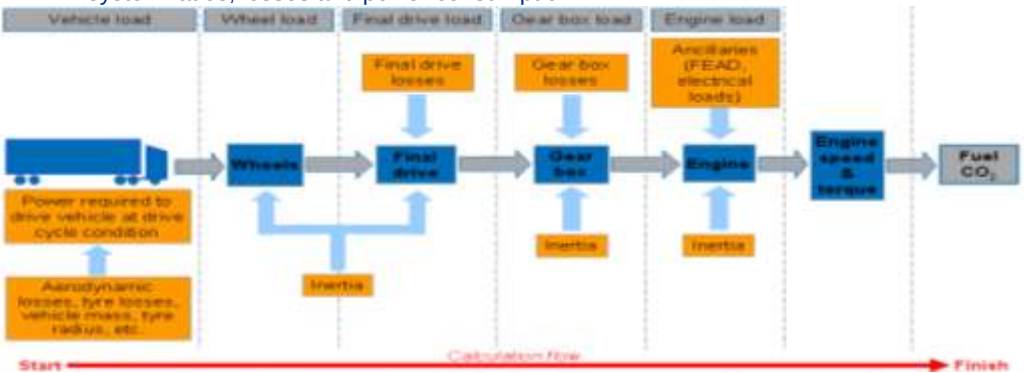
- Cope with diversity;
  - Range of different vehicle types
  - Range of different operations
  - Range of different technologies

- Propose a combination of
  - Physical testing of vehicles
  - Complemented by computer simulation

Neil Fulton – role of vehicle testing

Approach taken to computer modelling of fuel consumption and CO2

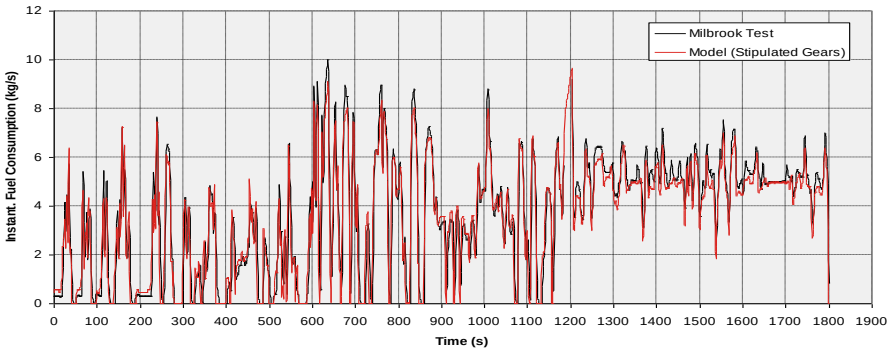
- The model is a backward facing calculation tool (no driver control model). It performs the following actions:
  - Calculates wheel speed and torque conditions based on drive cycle definition and vehicle characteristics
  - Propagates torque and speed information back towards the engine, accounting for system ratios, losses and power consumption



Source: Ricardo

Model validation; model predicted fuel consumption within 5% of measured chassis dynamometer data on the FIGE cycle

Scania P230 Rigid Body – GVM 18t



- The **relative fuel consumption between model and test data is -4.5%**
  - This lays within the **5% margin**

Ensuring compliance, advancing performance

Scania P230 18t Rigid

Source: Ricardo

Summary

- Road transport is an important source of carbon dioxide and fuel consumption is a major cost to the transport industry.
  - We need to reduce both.
- There are a range technologies with the potential to deliver carbon savings.
  - Clear guidance which is backed up with evidence is needed
- To deploy vehicle and powertrain technologies capable of more aggressive reductions in carbon emissions may require incentivises.
- Market forces will lead to low blend biofuels, delivering limited CO2 WTW savings
  - No clear policy on how to comply with the RED and secure greater WTW CO2 savings.
- At a European and national level a consistent strategy to promote low carbon vehicle and fuel technologies is needed in order to achieve government targets.
- A combination of physical testing supplemented by computer modelling offers an opportunity to measure fuel consumption and CO2 emissions effectively.
  - This should be placed in public domain

Thank You!

020 3178 7859
The Low Carbon Vehicle Partnership

secretariat@lowcvp.org.uk

www.lowcvp.org.uk

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