EU initiative for CO2 emissions reduction in Europe

Presented to FTA Logistics Carbon Working Group

13th September 2011

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Low Carbon Vehicle Partnership

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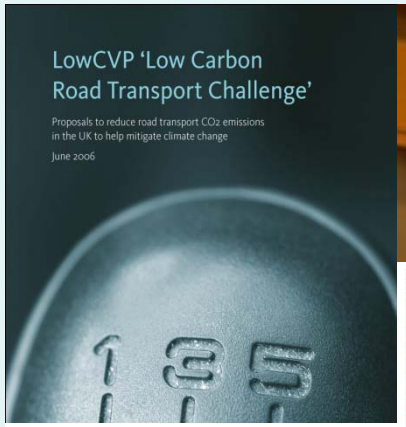
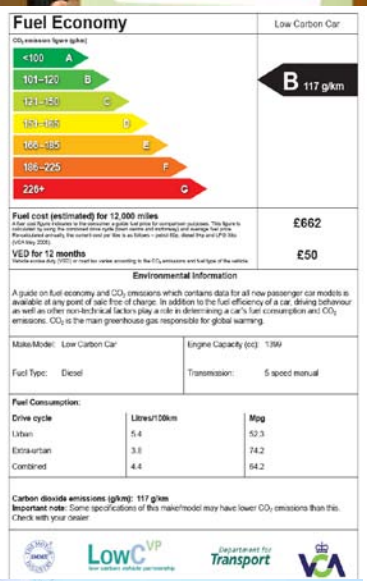
Accelerating a sustainable shift to low carbon vehicles and fuels in the UK

Stimulating opportunities for UK businesses





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Overview

- Tackling climate change and the transport sector
- Pressure for fuel consumption improvement
- Fuel efficiency technologies in development
- The need for Government intervention
- Appropriate metric for fuel efficiency
- Categorising the HDV market
- Appropriateness of test cycles
- Alternative approaches to certification
- Proposed approach in Europe

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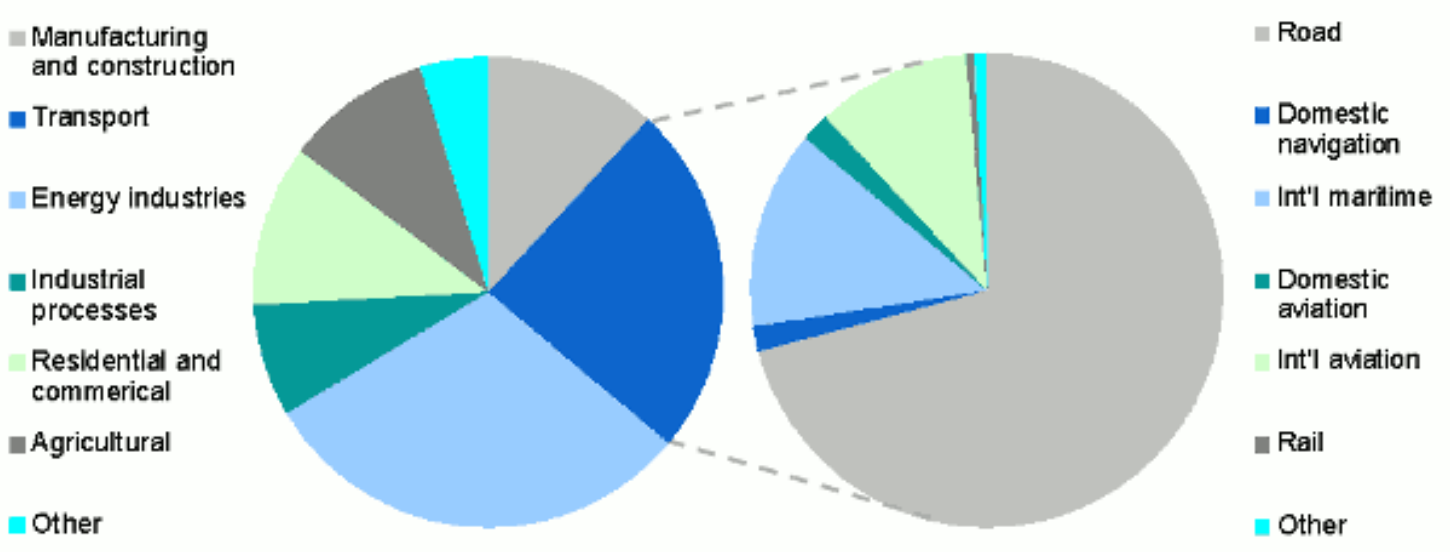
EU is committed to reducing GHG emissions by 20% by 2020 compared to 1990

EU27 GHG emissions by sector and mode of transport, 2007



- Transport and particularly CO2 emissions from road transport have been increasing since 1990
- In 2007 road transport accounted for 21% of man-made CO2 emissions.
- HDVs account for 26% of total road transport CO2 emissions
  - 85% from trucks, the remainder from buses and coaches
- HDV CO2 emissions projected to grow by 15% by 2030

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Source: EC

European Commission has tackled CO2 emissions from cars and LCVs through regulation to date

- The European Union regulation of new car CO2 emissions sets targets for average new car CO2:
  - 2015 target of 130g/km
  - 2020 target of 95g/km
- A similar approach has been taken for new LCV CO2 emissions with targets of:
  - 2016 target of 175g/km
  - 2020 target of 135g/km
- The targets are pan-European per manufacturer.

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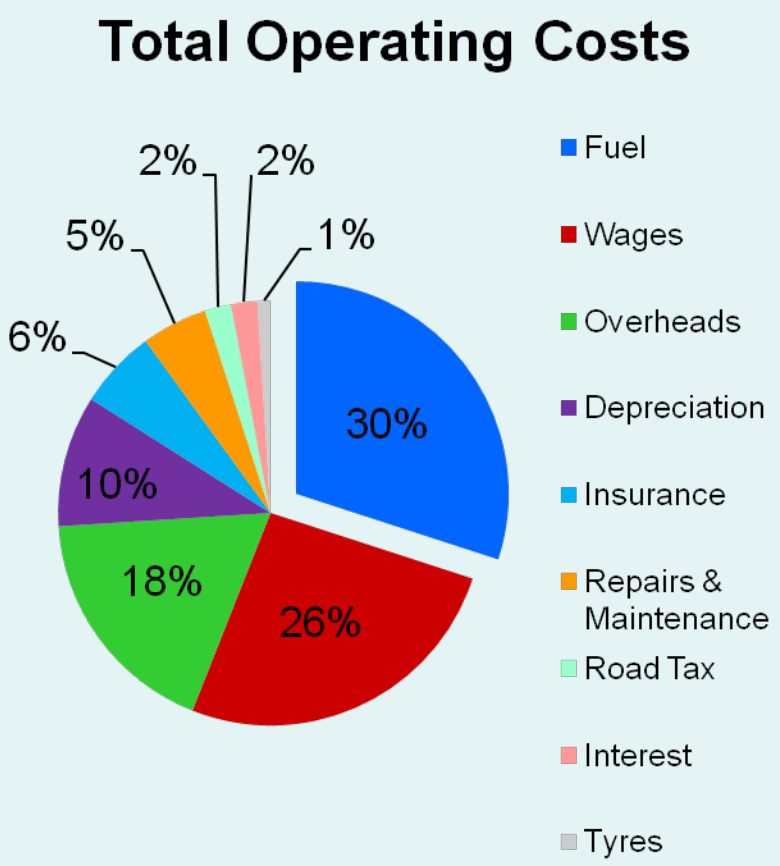
Customer demand should drive product development on fuel efficiency

- European haulage industry is characterised by:
  - High fuel prices
  - High weights and volumes
  - Relatively long distances
- Fuel costs are a significant element of the operating costs of a haulage fleet.
- This should ensure pressure to drive fuel efficiency in operation and in HDV development.



Based on 40 tonne tractor – semitrailer combination

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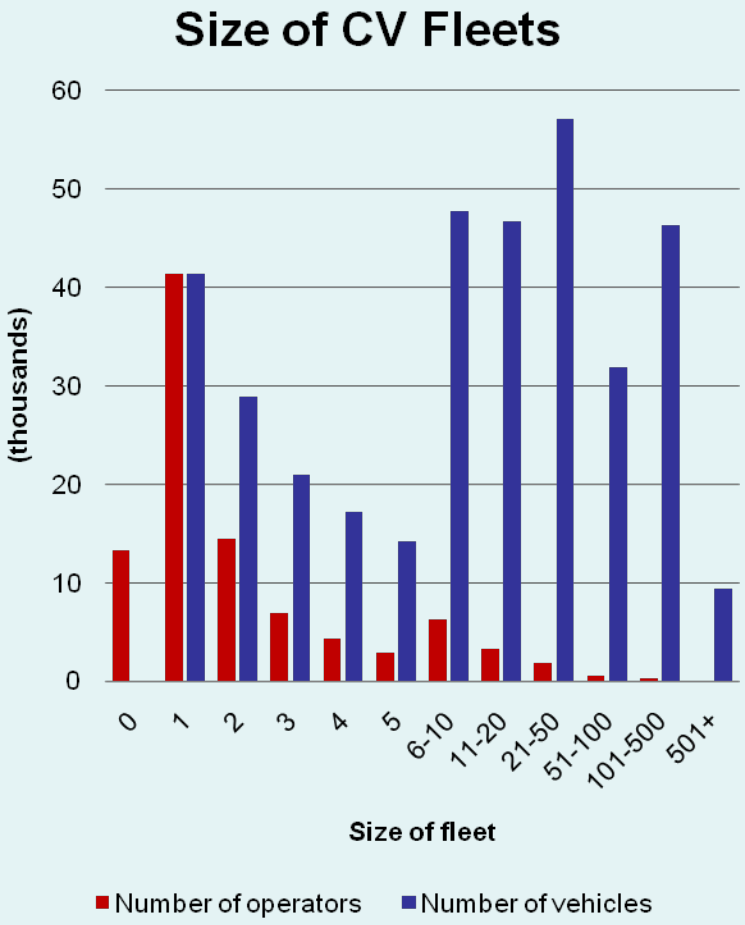
47% of trucks are operated in fleets of less than 10 vehicles



- Small and medium sized fleets play a vital role in haulage industry providing local and flexible transport sector. A major part of the truck market.
- Fleet operators lack confidence in manufacturer claims, and have expressed demand for independent certification.
- Small and medium sized fleet operators lack in-house engineering expertise.
- Haulage industry works on a low profit margins resulting in risk adverse approach to procurement.

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Purchasing decisions of fleet operators don't deliver most fuel efficient vehicle fleet

- Reliability and flexibility of vehicles and trailers has a greater impact on the profitability of a HGV fleet than fuel consumption.
  - Market failure to deliver fuel efficient HGVs.
- Fleet operators are very short term focused but purchasing decisions now will have an impact for at least a decade.
  - Policy instruments required now in order to deliver targets for CO2 reduction for the sector for 2020.
- Public sector controlled fleets are most in line with CO2 agenda but relatively small and specialised.

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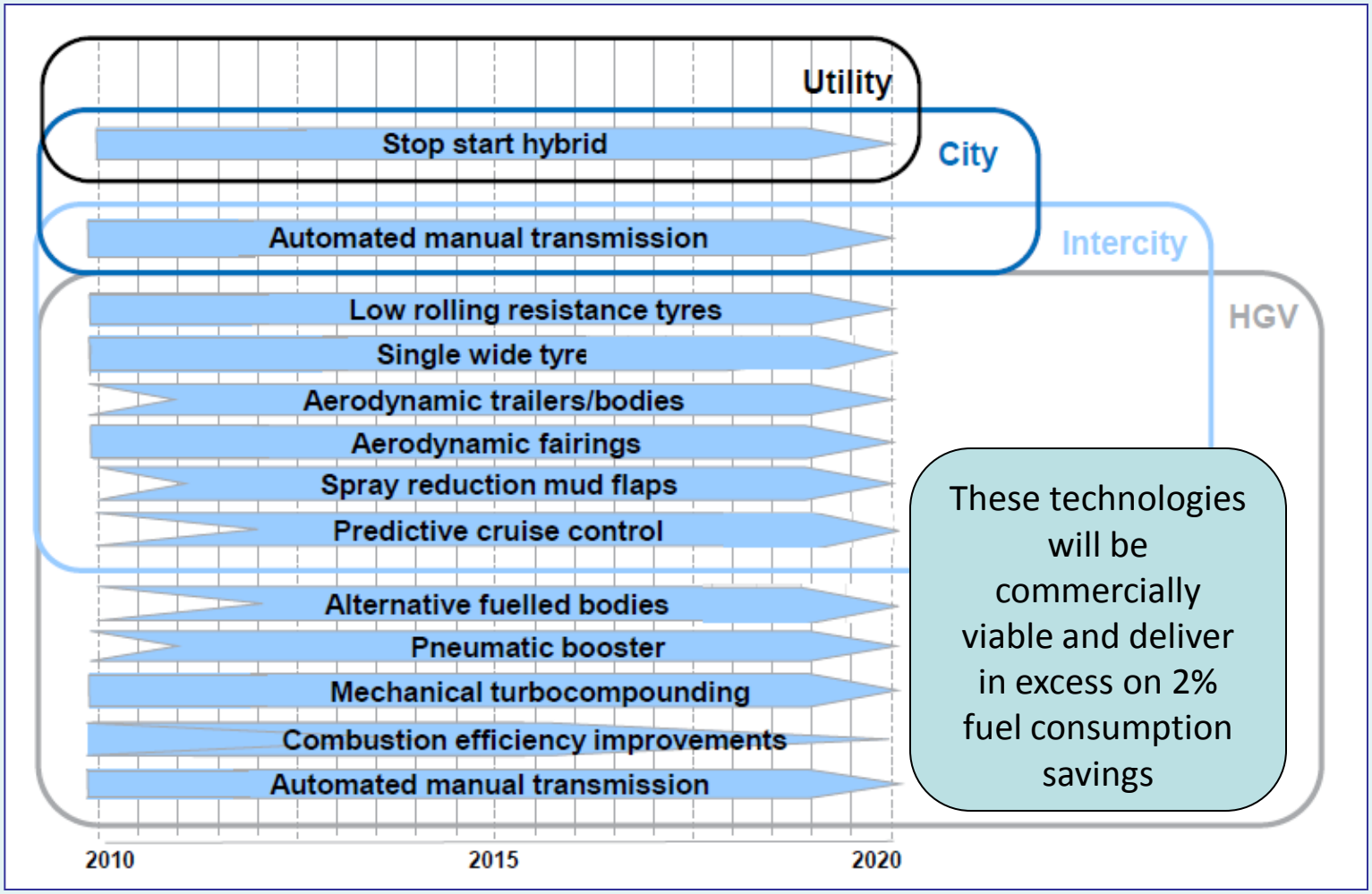
There are a range of low carbon HDV technologies which have the potential to significantly reduce fuel consumption in this decade



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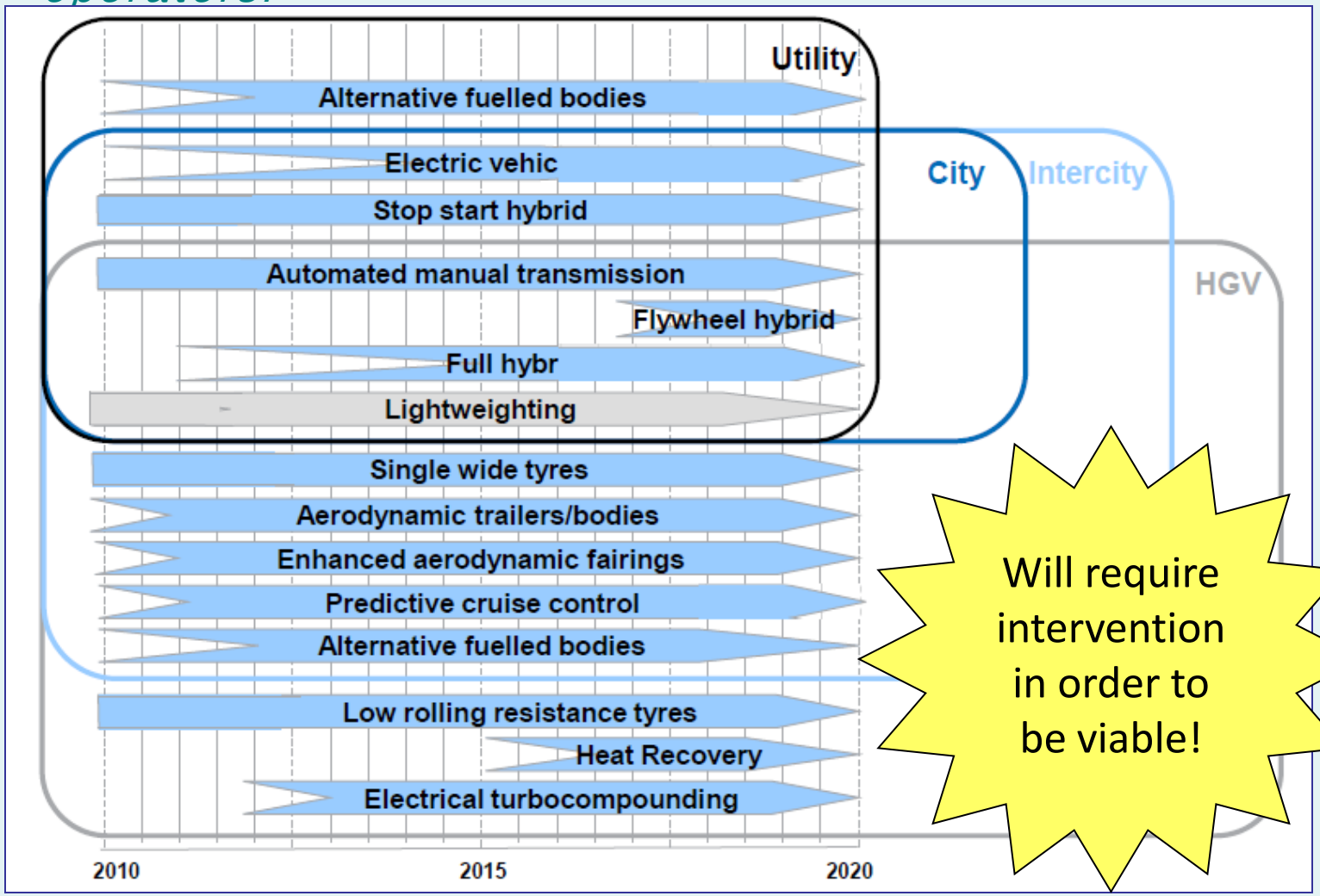
Technologies delivered 2% fuel savings in the moderate scenario.

Source: Ricardo

But the majority of technologies do not provide a return on investment sufficiently quickly to be considered by fleet operators.



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

Source: Ricardo

Need for Government intervention in the HDV market, called for by vehicle manufacturers

In order to ensure the haulage sector reduces CO2 emissions requires:

- Basis for comparing fuel consumption in operation.
- Certification of fuel consumption to provide confidence.
- Creation of market conditions to encourage technology deployment.

Global recognition and commitment to tackle issue from regulatory authorities and vehicle manufacturers

'The world's leading commercial engine and vehicle manufacturers are well aware of the importance of fuel efficiency to their customers and support global efforts to reduce GHG emissions. Global cooperation in developing specific requirements as well as metrics and methodologies to evaluate fuel efficiency, provides needed elements to further improve the environmental performance of our vehicles and increases the efficiency of goods transport. That will serve both our customers and the environment.' Ostling

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Using an appropriate metric for fuel efficiency

- Litres/100km is not a good fuel efficiency metric for commercial vehicles as it is only relevant for comparison between vehicles of similar duty cycles and size
- Metric based upon fuel used/work done is more relevant
- Work done can be expressed as tonnekm, cubicmetrekm or passengerkm.

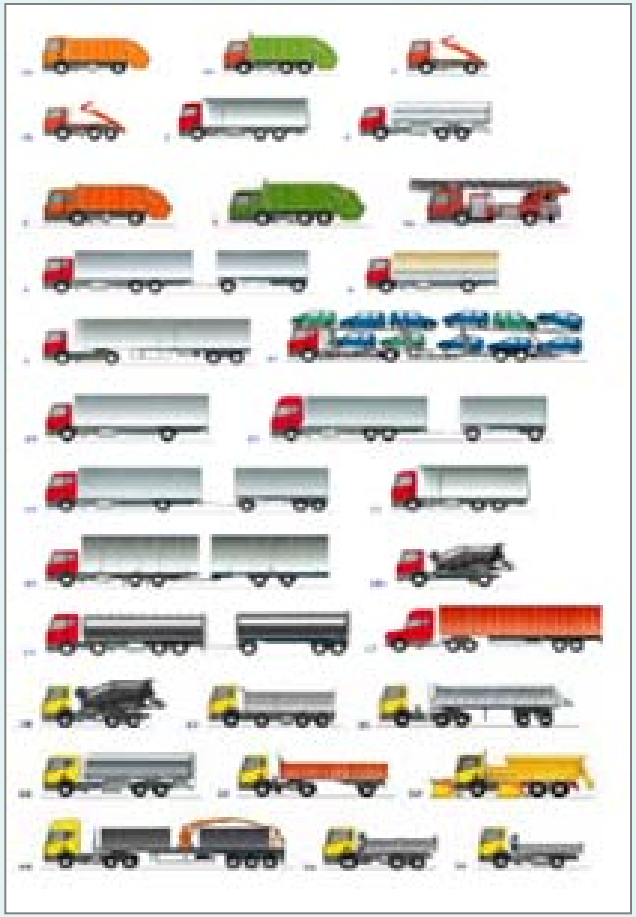
GCW/GVW* tonne	Load Capacity tonne	Distance km	tonnekm	l/1000tonnekm at 100% utilisation	normal utilisation	l/1000tonnekm considering normal utilisation
LONG DISTANCE						
26	17	100	1700	14.7	70%	21.0
40	25	100	2500	12.8	70%	18.3
60	40	100	4000	10.8	70%	15.4
URBAN DISTRIBUTION						
3.5	1.5	100	150	80.0	45%	177.8
7.5	4	100	400	37.5	45%	83.3
12	7.2	100	720	26.4	45%	58.6
18	11	100	1100	20.0	45%	44.4

SOURCE VOLVO

*Gross Combination Weight (Long Distance) / Gross Vehicle Weight (Urban Distribution)

There is a huge variety of HDV variants performing unique missions and duty cycles

Huge variety of vehicles



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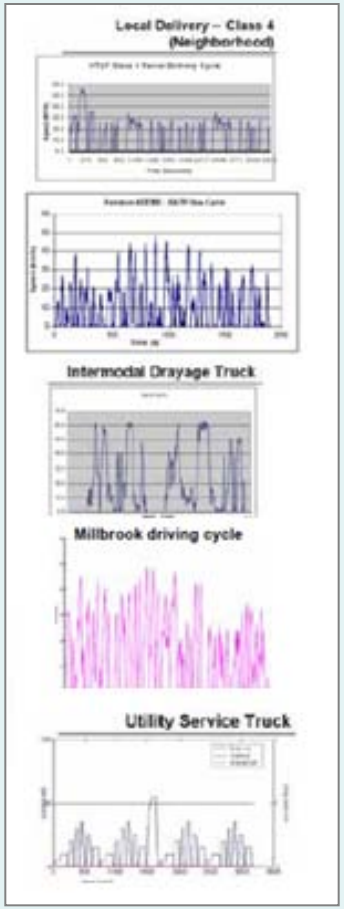
Unique duties



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Missions & duty cycles

City delivery		1
Delivery / communal		2
Heavy delivery		3
Long haul		4
One Overnight		5
On-road constructio		6
Heavy construction		7
City Bus		8

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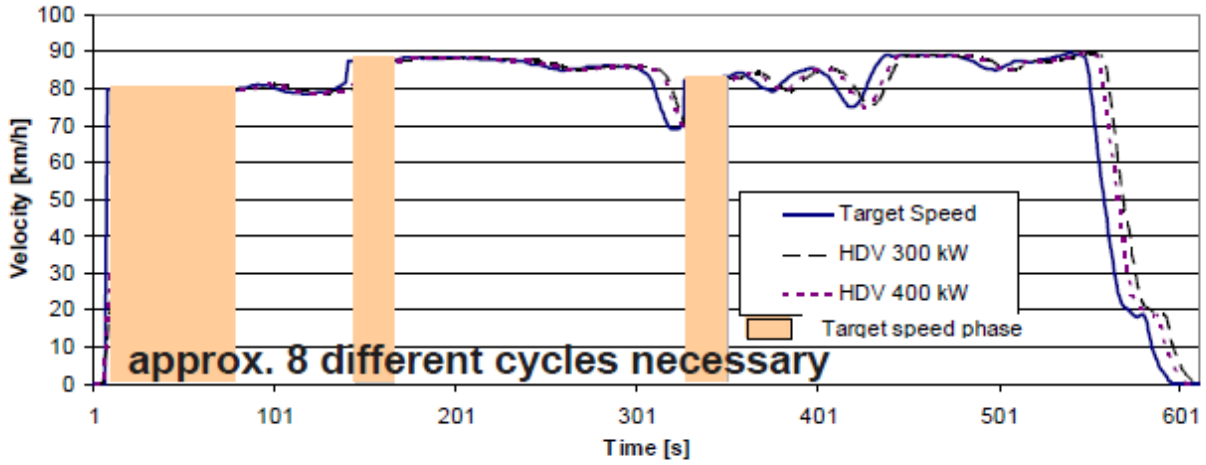
Consensus forming around 8 distinct missions.

Ideally test cycle should reflect real world conditions as closely as possible.

Driving conditions very different between vehicle categories and mission profiles. Options:

a) One representative cycle per vehicle category (and mission profile) eventually including target speed phases and road gradients + one short standard cycle verifiable with PEMS or on chassis dyno



Length not limited

b) WHVC with different weighting factors for urban, road, motorway
Disadvantages: no target speed phases, no road gradients
→ may be unfair for several future technologies
Advantages: simpler, compatible with engine test approach

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Source: TUG

Computer simulation is the preferred option as the basis for certification

	Repeat-ability	Effort	Capable of all systems	Sensi-tivity	Incentive for optimisations
chassis dyno & driving resist.	+	--	+	0	+
on-road testing (PEMS)	--	--	++	--	0
Simulation tool & driving resist. & other test data	++	++	-	+ (1)	+ (1)

(1) Depends on details of the approach

Due to manifold combinations of engine, transmission, cabin, body etc. each manufacturer would have to test hundreds of models

Certification procedure shall include all relevant vehicle components

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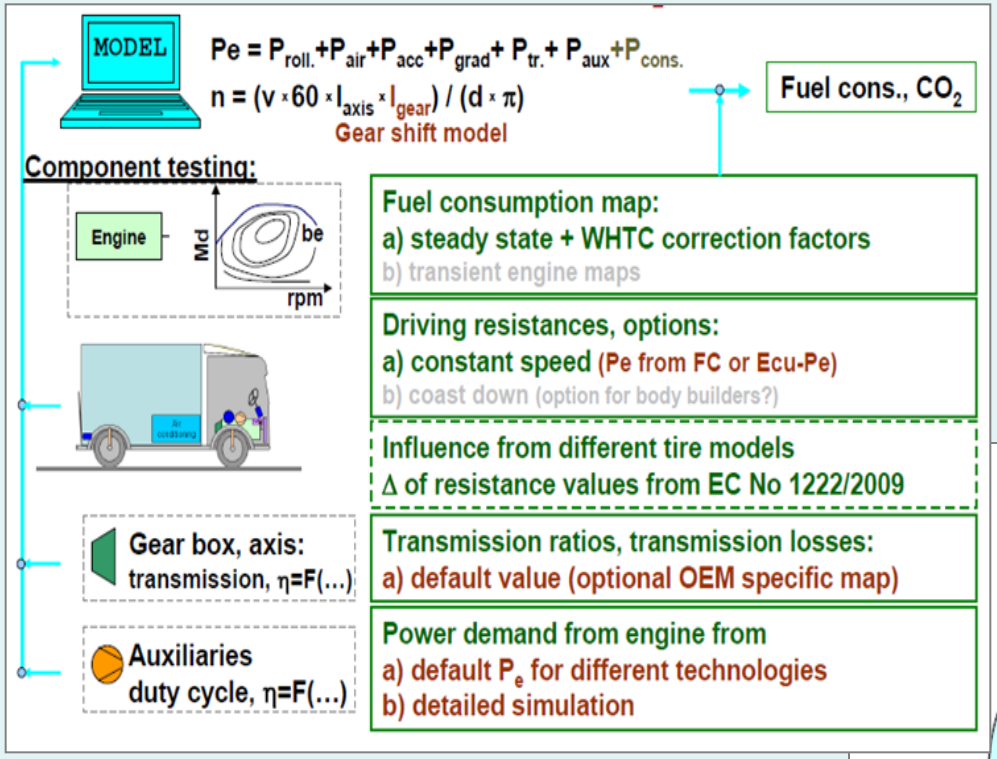
Source: TUG

Proposed approach to simulation tool and its limitations



- Target date for implementation in Europe 2013.
- Simulation tool requires testing with manufacturers in 2012.
- A driver model and trailer specification to be defined.
- Extent of elements incorporated into simulation to be confirmed.

Accuracy of simulation tool is an issue, likely to need to be supplemented by physical test for main variants in product range.

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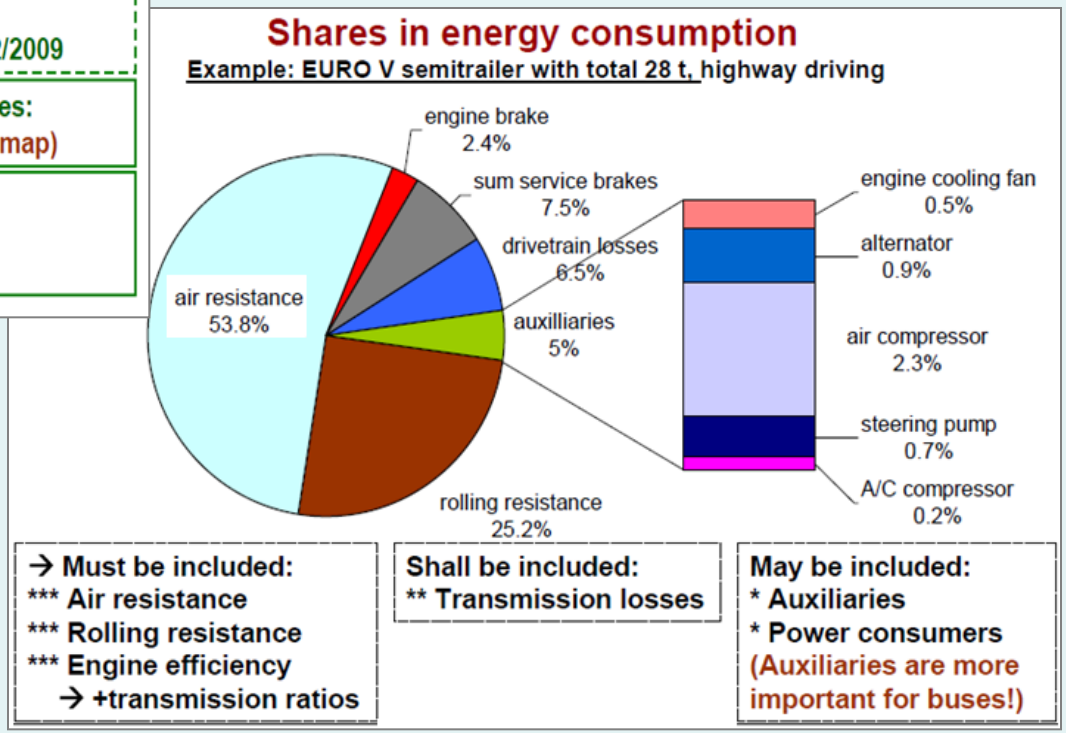

Summary

- Europe is unlikely to regulate CO2 for HDVs in the manner it has for cars and LCVs. However there is a strong case for certification and incentives.
- The need to minimise the cost of testing as part of a CO2 certification scheme will in the use a simulation tool in conjunction with component testing as part of a certification process.
- Absolute accuracy of simulation tools is likely to require benchmarking against dyno or road tests for a limited number of variants.
- During type approval an additional engine test will be required to provide a standardised engine fuel map.
- Standardised bodies and trailers will need to be defined for the purposes of certification along with a driver module.
- The extent to which auxiliaries will be incorporated is still in question.
- Ideally a fully representative test cycle will be developed to include gradients and target speed phases.
- Original target of rolling out certification scheme in 2013 is likely to be challenging.

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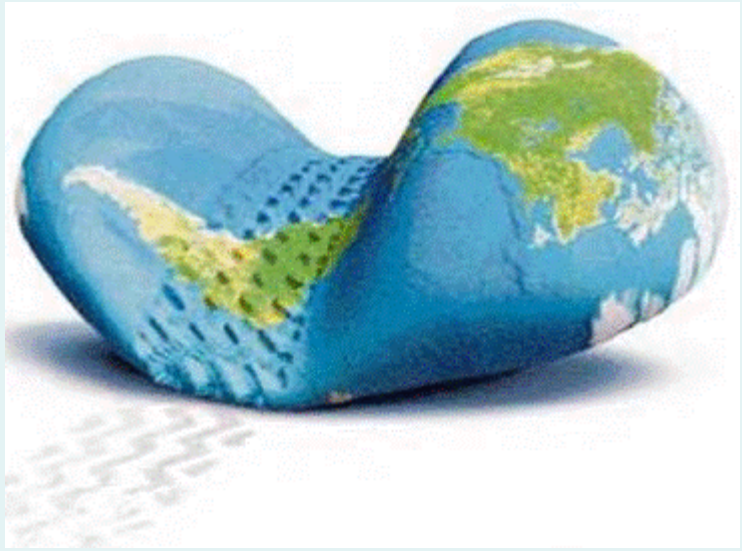
Thank You!



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