



Working Paper No. **HDH-09-03**
(9th HDH meeting, 21 to 23 March 2012)

Reducing CO₂ from Heavy Duty Vehicles

Status quo and steps to policy options



The Outline

EC Transport White Paper

Political commitment to reduce emissions by 80-95% below 1990 levels by 2050

Communication on a roadmap for low carbon economy – 80% reduction in emissions by 2050 (Base 1990)

White Paper on Transport – 60% reduction in transport emissions by 2050 (Base 1990); 20% by 2030 (Base 2008)

- IA: HDV 40% improvement in energy efficiency by 2050



LOT1 results

HDV market - manufacturers and operations

HDV market is complex

- EU market: 7 HDV manufacturers
 - 93% EU registrations; some 40% total worldwide production
 - Some 75% bus and coach market served by same manufacturers
- Trailer/bodybuilder market highly fragmented but 7 companies have some 60% of the market
- Final vehicle:
 - configuration (and performance) results from a chain of organisations
 - specification often bespoke/unique to fit particular application/cycle, with a wide variety of different auxiliary equipment utilised

Data for the number and distribution of HDV operators across Europe

- 40% of the tonne km - trips > 500km
- 75% of the tonne km - trips > 150km
- Most freight operators small in size, with 85% having fewer than 10 vehicles
- Hire or Reward operators >85% tonne km, travel longer distances vs Own Account operators. Hire or Reward also purchase and own the majority of road tractors
- Road tractor and semi-trailer often owned by different organisations

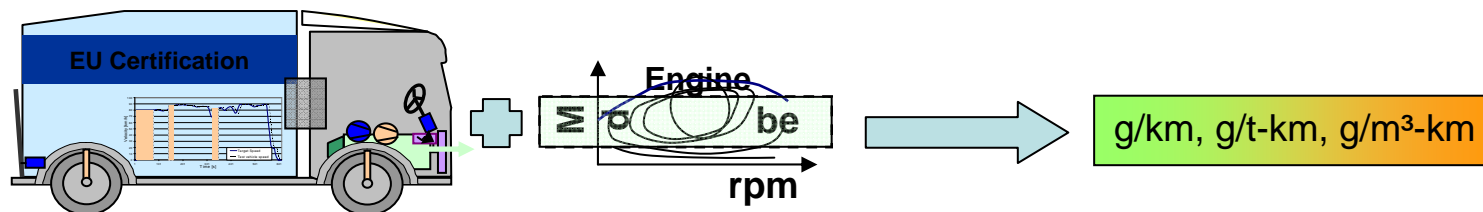
Fuel represents about 25-30% of operating costs

Developing a CO₂ measurement

The approaches so far in LOT2 explored are:

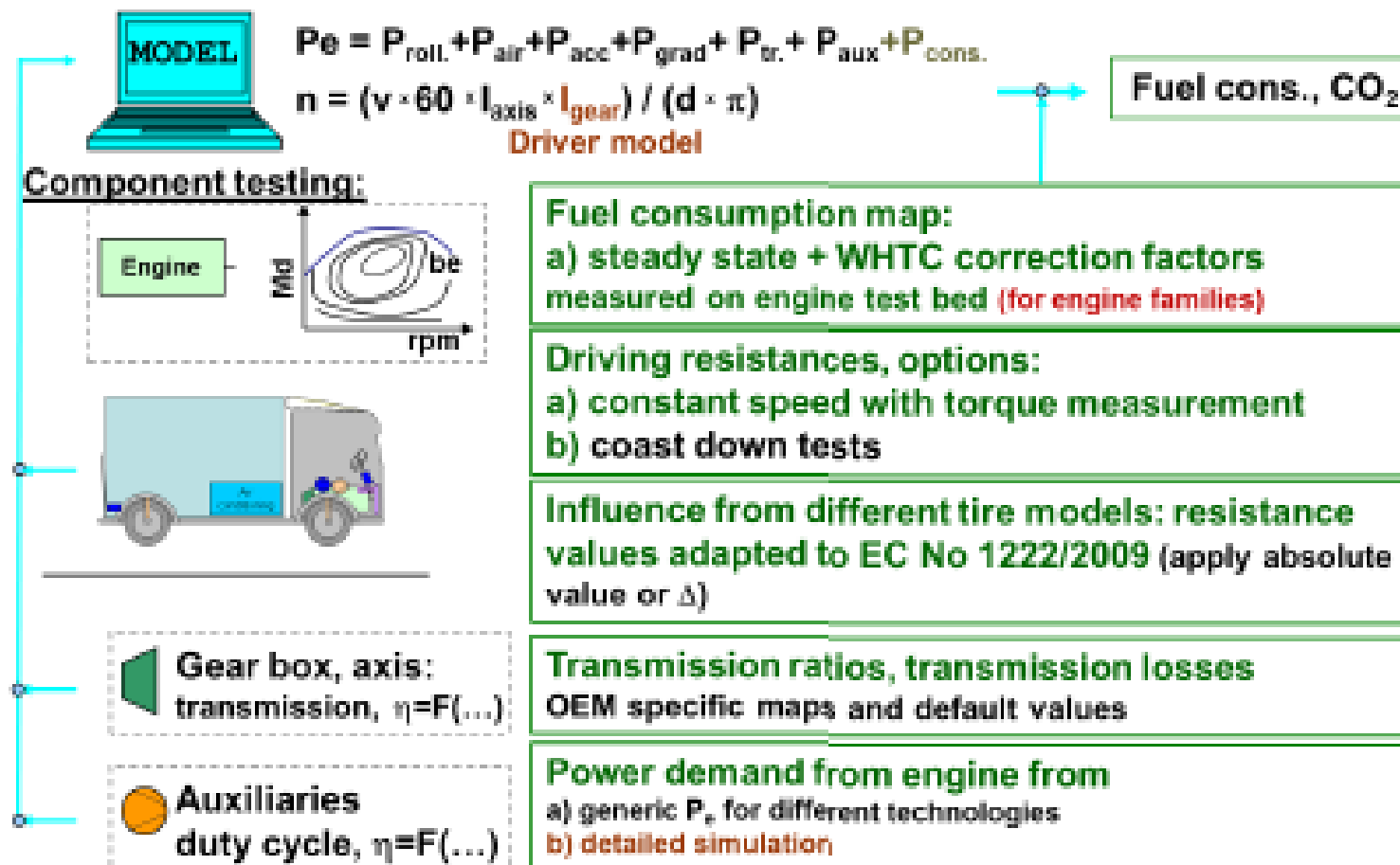
measurement on chassis dynamometer
measurement with PEMS
model simulation

Preferred option is component testing and model simulation
with post-verification via measurement



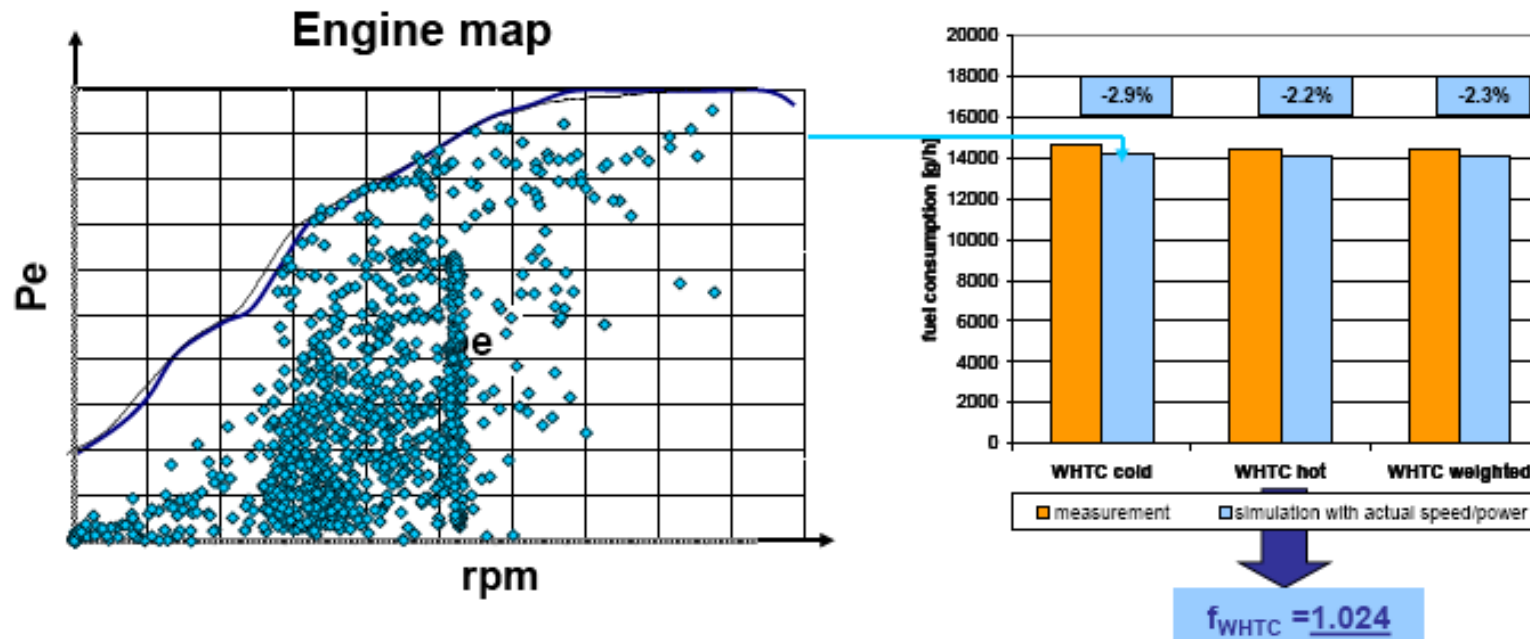
Objectives of ongoing work as one element of EC policy:
Development and testing of a measurement methodology for
CO₂ emissions and fuel consumption of HDV

Overview of the test procedure



Engine fuel consumption map – derived from existing test cycles

Correction for transient driving conditions by WHTC-correction factor
 Interpolation of WHTC fuel consumption from the engine map in 1 Hz

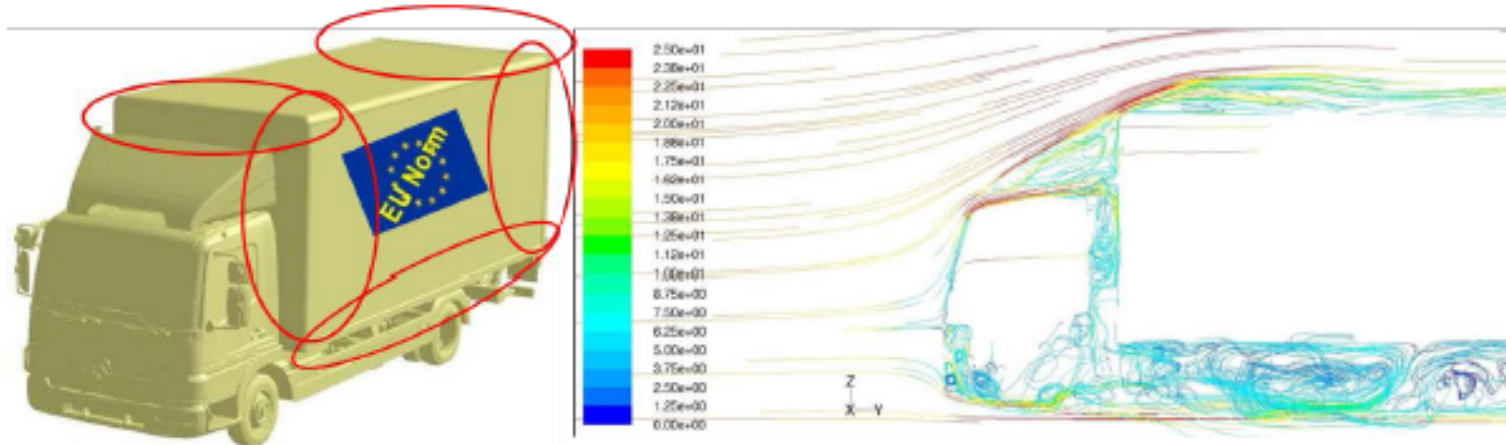


To be decided: cold start to be considered? Load dependency to be considered?

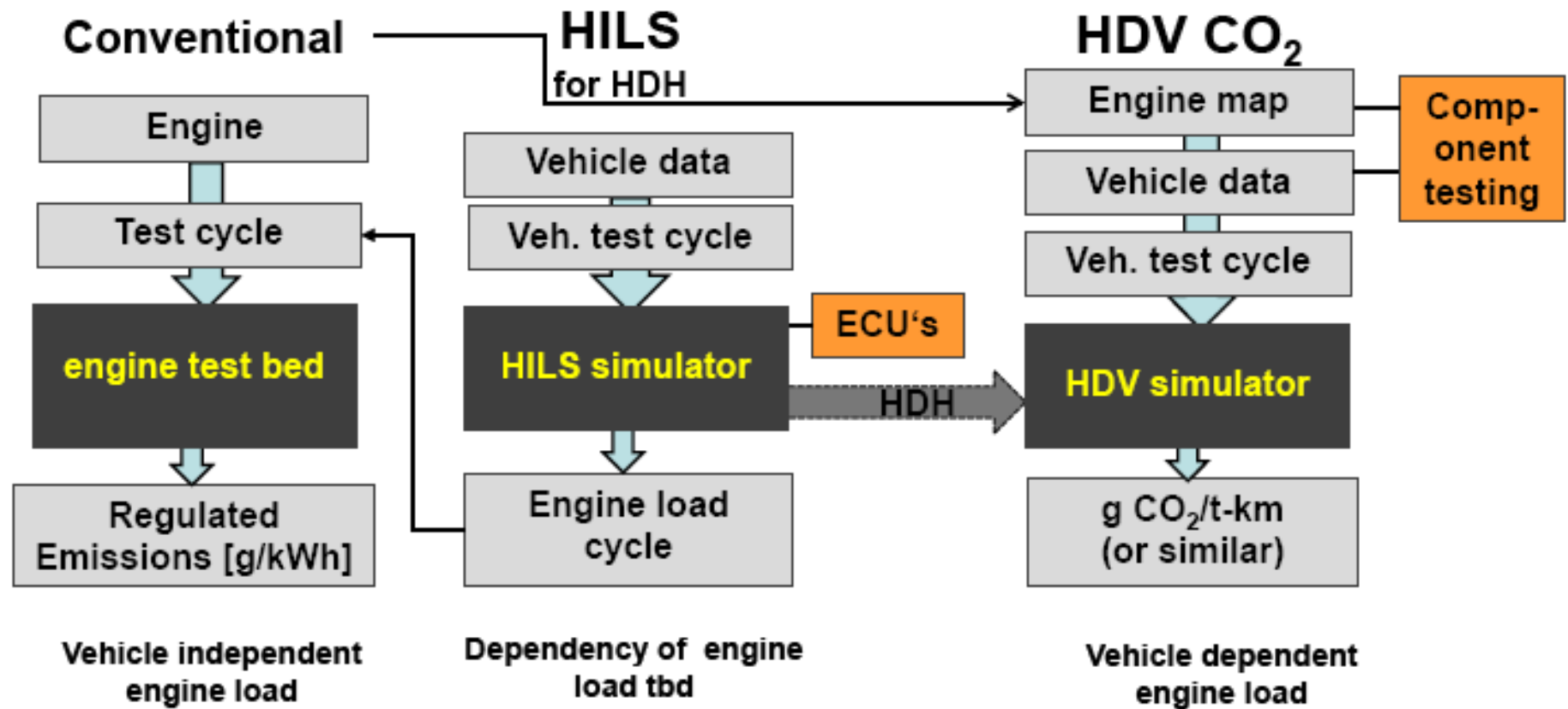
Importance of aerodynamics

Bodies and trailers have high influence on aerodynamic drag.

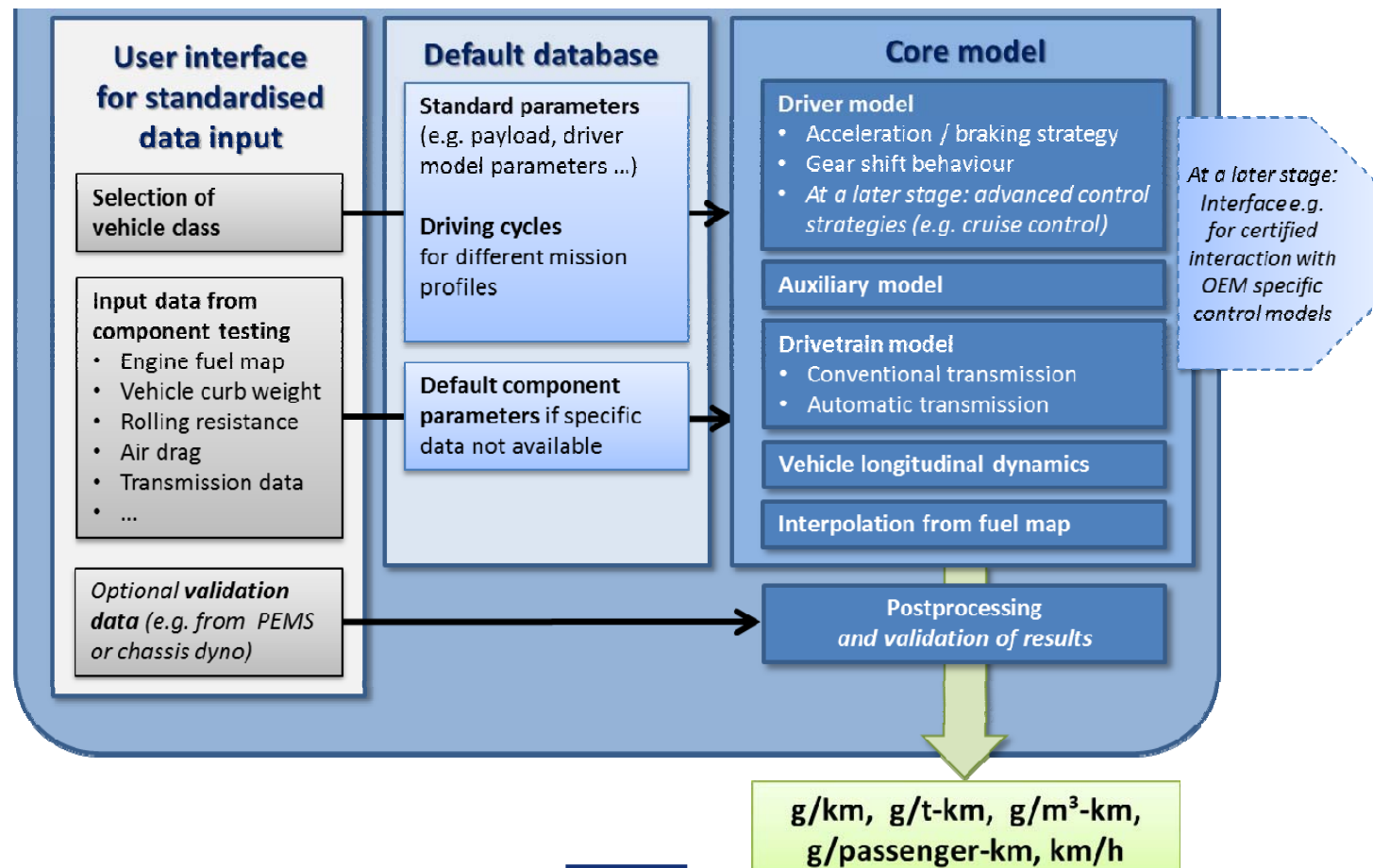
→ To make chassis and tractors comparable, standard bodies and trailers have to be defined. For alternative bodies and trailers $\Delta (C_d \cdot A)$ against standard shall be measured.



Simulation in context with other procedures



Model of the simulation programme





Summary for the measurement/simulation

- Including all components in one simulation with realistic test cycles is expected to give best incentives to optimise entire vehicle
- Elaboration of test procedure made good progress but further development is needed
- Developing standardised methods and improving the accuracy to reach a reliable ranking between products is an evolutionary process which need time and is still on-going
- Automatic gear boxes and auxiliaries are most difficult tasks. No final decision of method in detail yet
- Collection of data to establish default values (all components with no data sets) needs to be coordinated with OEM's, further work to be done
- Demo Simulator shall be elaborated in 2012 to support next test phase



Timeline HDV CO₂ emissions strategy

- Public consultation : September – December 2011
- Stakeholders' meetings : 22 February 2012 and June/July 2012
- Ongoing Impact Assessment: launched in September 2011, to be concluded by end 2012
- HDV CO₂ emissions Strategy adoption by Commission : first half of 2013 (tentatively)



Possible new policy actions aiming at reducing HDV CO₂ emissions

- CO₂ Measurement + reporting tool
- HDV Labelling
- Establishment of emission reduction objectives
- Economic instruments (carbon market, taxes, road user charges)
- Design/ performance requirements for components
- Measures targeted at HDV purchase and use