A better frame for regulating CO2 from vehicles and fuels

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CEPS workshop

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Carbon footprint of transport =

traffic volume (km)

x

energy use of vehicles (MJ/km)

x

carbon footprint per unit of energy (CO_2eq/MJ)

How far is current system removed from this ideal ?

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1
imperfections in measuring and regulating carbon footprint of fuels

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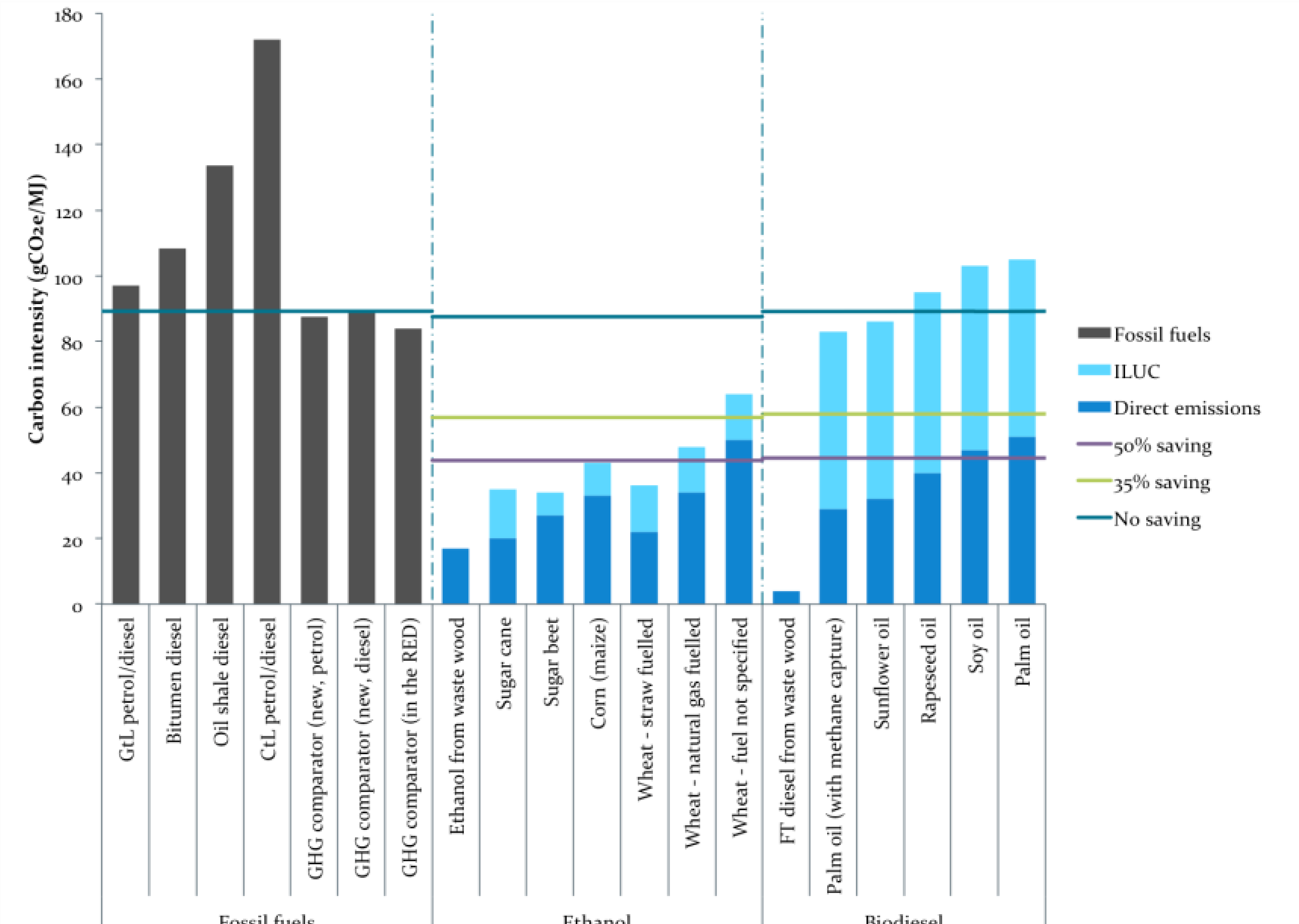
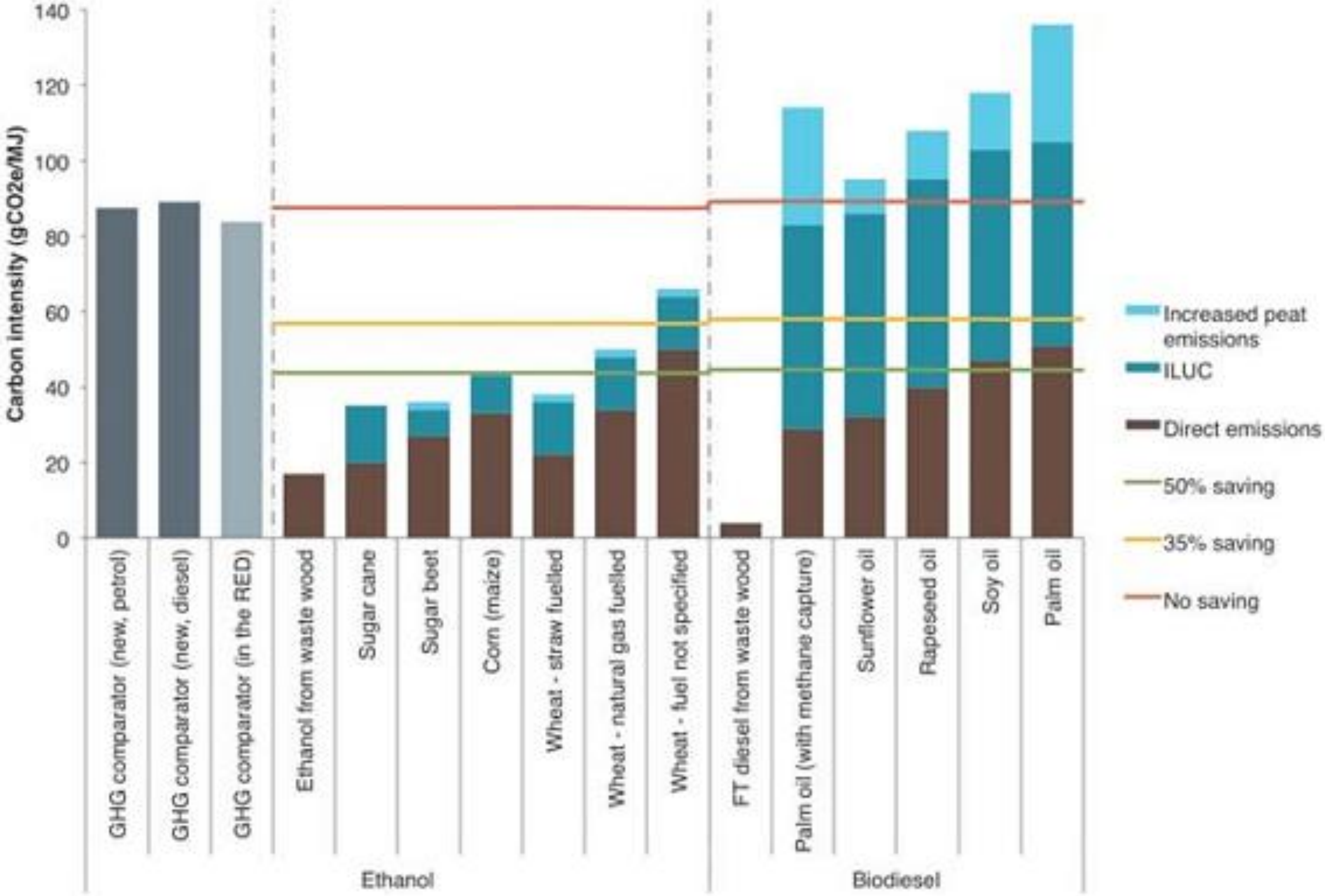
Carbon footprint of fuels



Carbon footprint of fuels



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JRC: ILUC science is as good as science on direct impacts (which are enshrined in EU law)

European Commission

CONCLUSIONS

- ILUC is a reality: models and historical-based approaches all give estimates of ILUC>0!
- Models give different iLUC results mainly because they use different assumptions on yield and food consumption: once these are "fixed" results are similar

The knowledge of models is now advanced enough to estimate ILUC factors with the same order of uncertainties as for direct emissions

- In economic models, reduction in food consumption give major reductions in ILUC
  ....in this case the biofuels which still save emissions often do so only because people eat less.

11

11 February 2013

Joint Research Centre

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The biggest issues on carbon footprinting of fuels in the next years

- Accounting for extra carbon from ILUC
- Accounting for extra carbon from unconventional fossil fuels
- Ditching quantity targets (as in Renewable Energy Directive) …..
- …. in favour of quality target: CO_2eq/MJ target (as in Fuel Quality Directive)

2
imperfections in measuring and regulating vehicle efficiency, in MJ/vkm

2a
Imperfections in test vs reality

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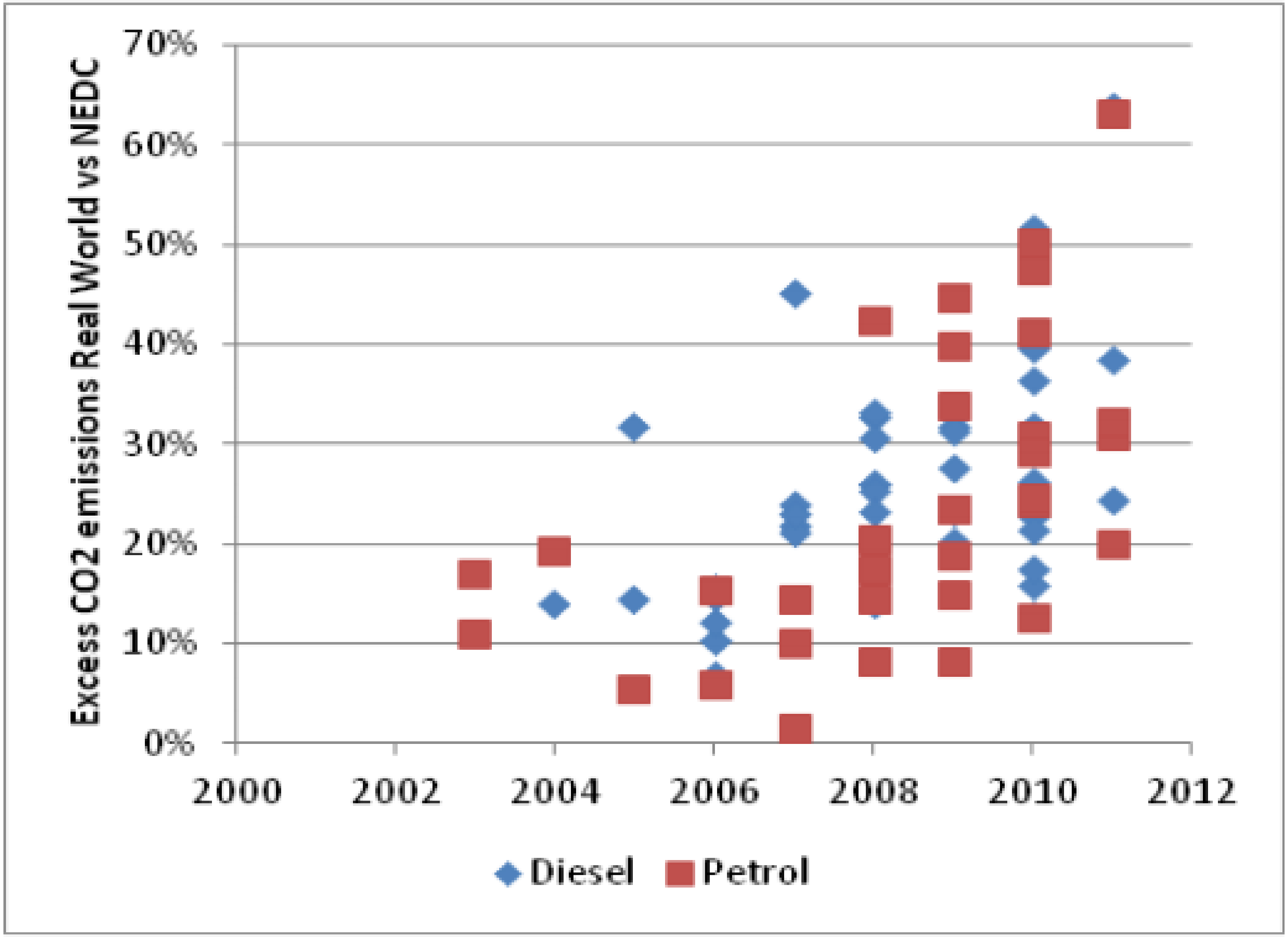
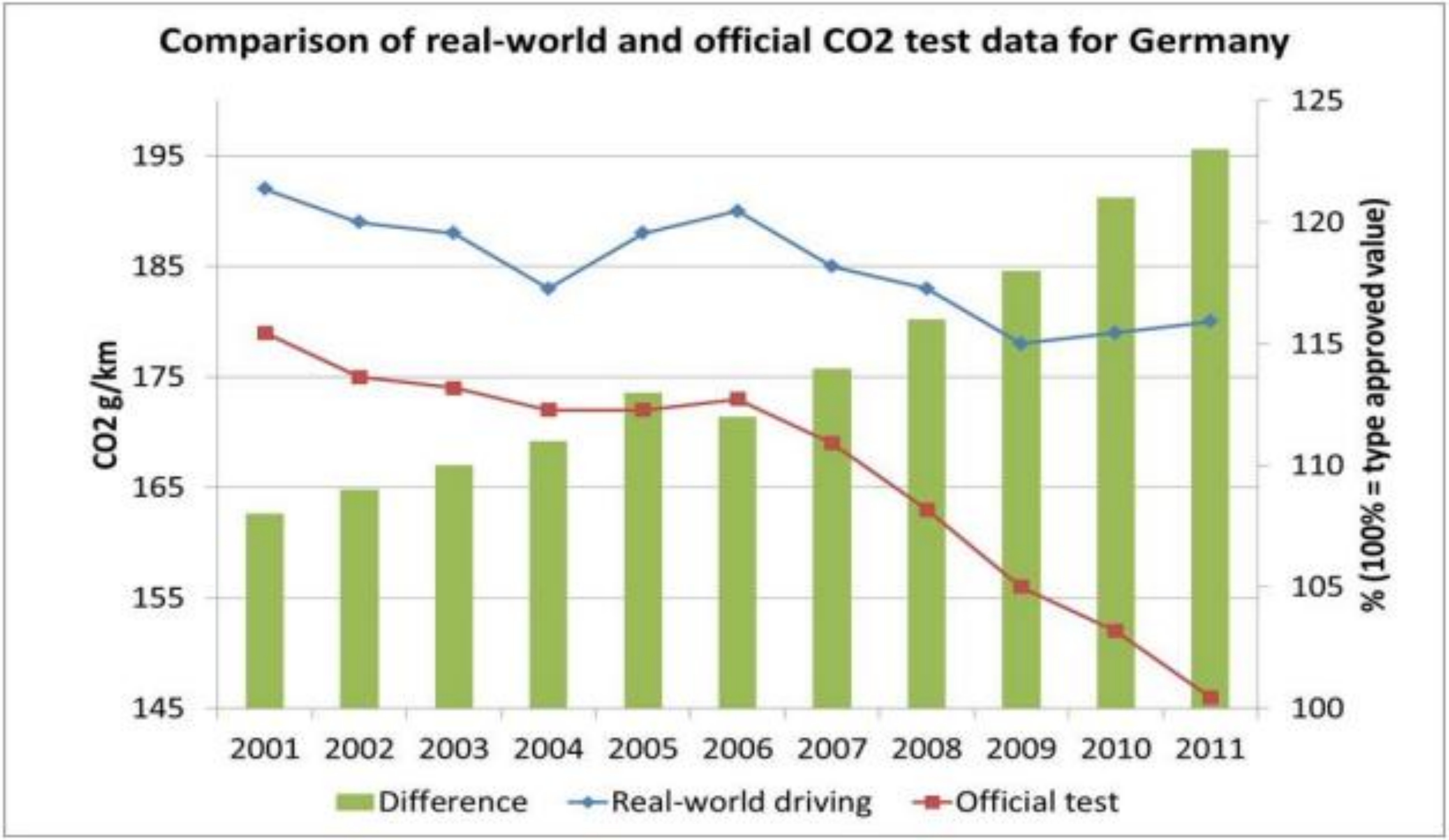
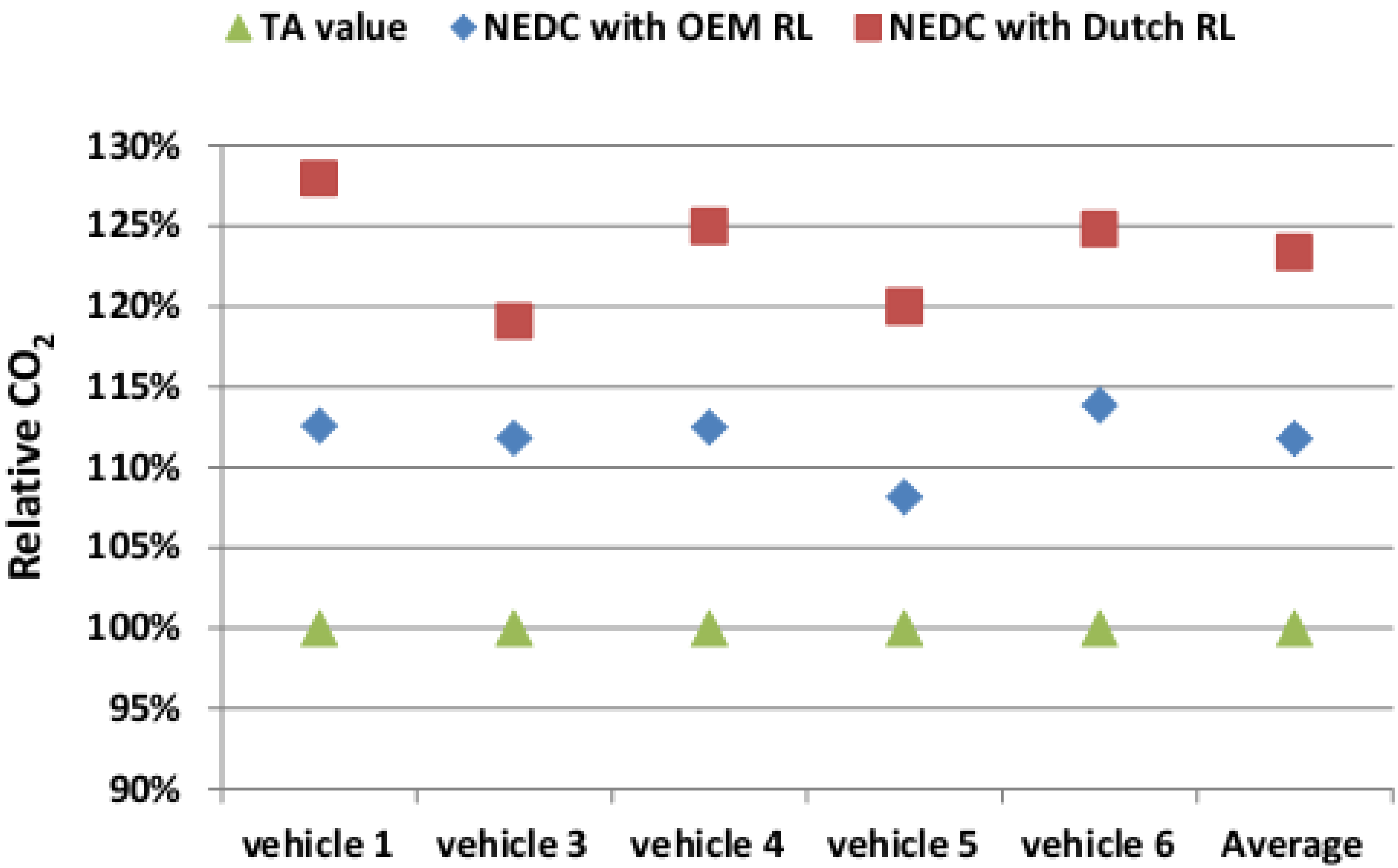
There are significant variations between individuals models in the extent to which real-world emissions exceed test values



The average gap between real-world and test results has grown from 7% (2002) to 23% (2011)



‘Real’ vehicles in ‘no-loopholes’ NEDC testing score …. 23% (19-28%) higher CO2 than ‘official’ values



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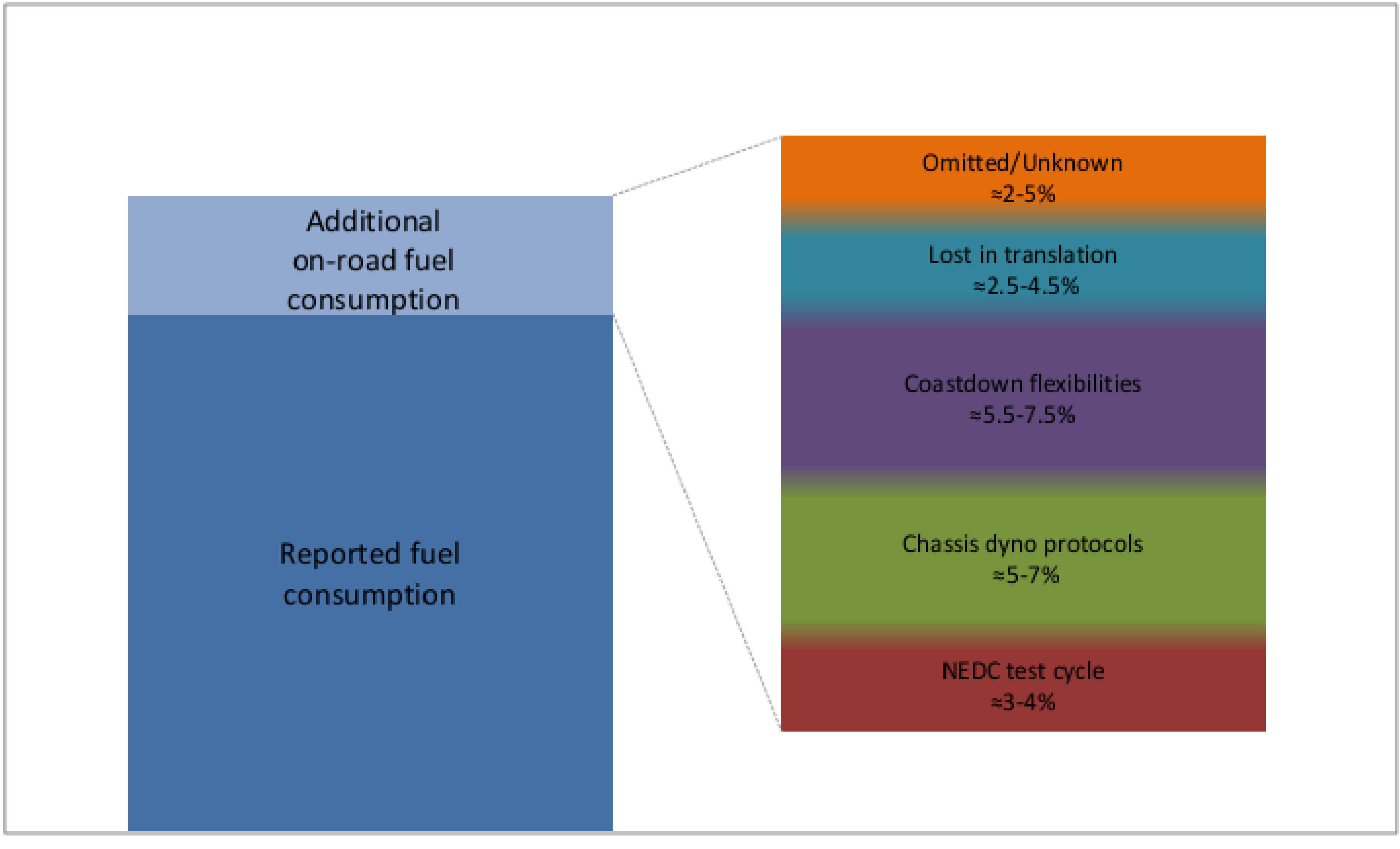
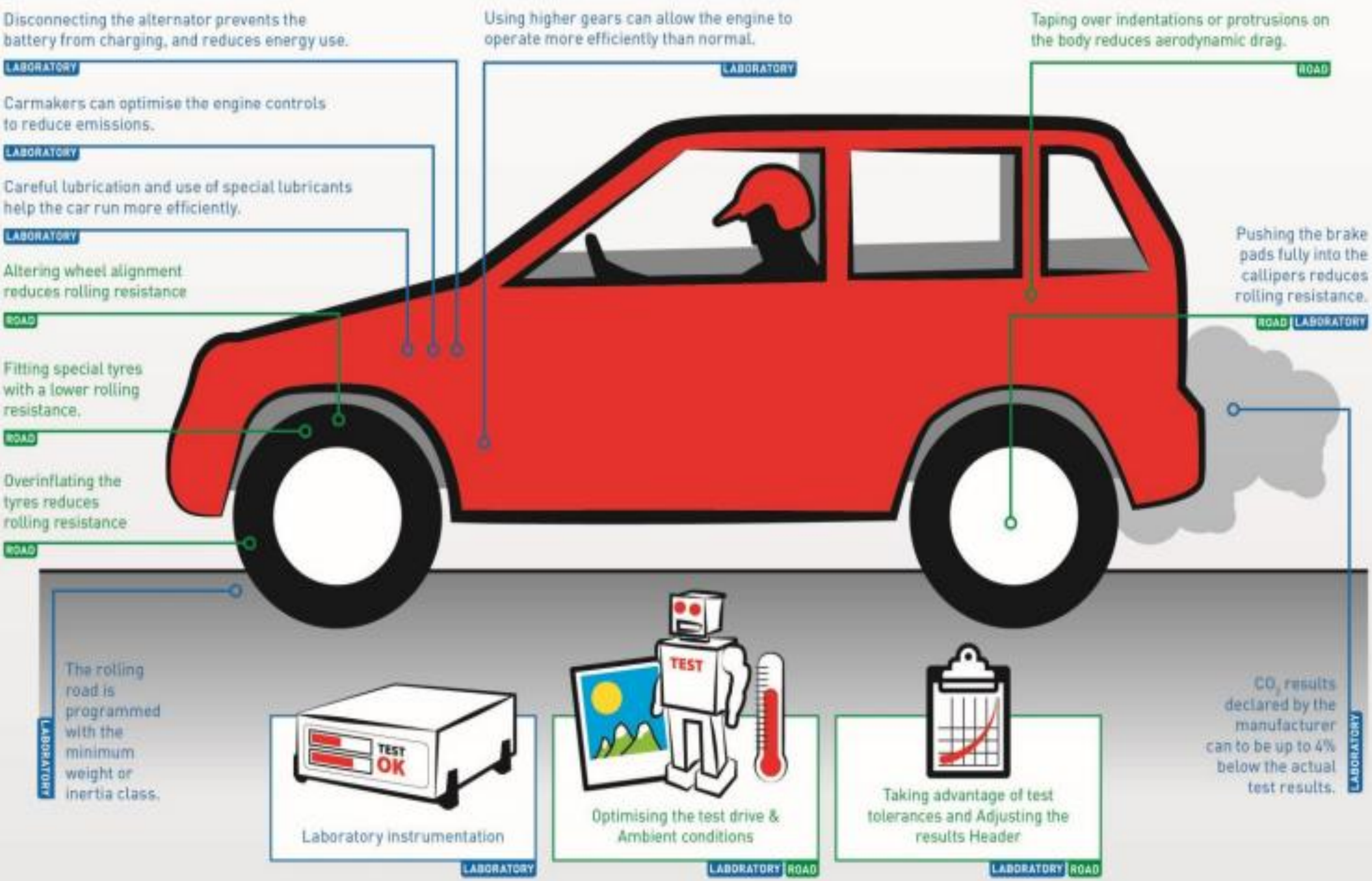
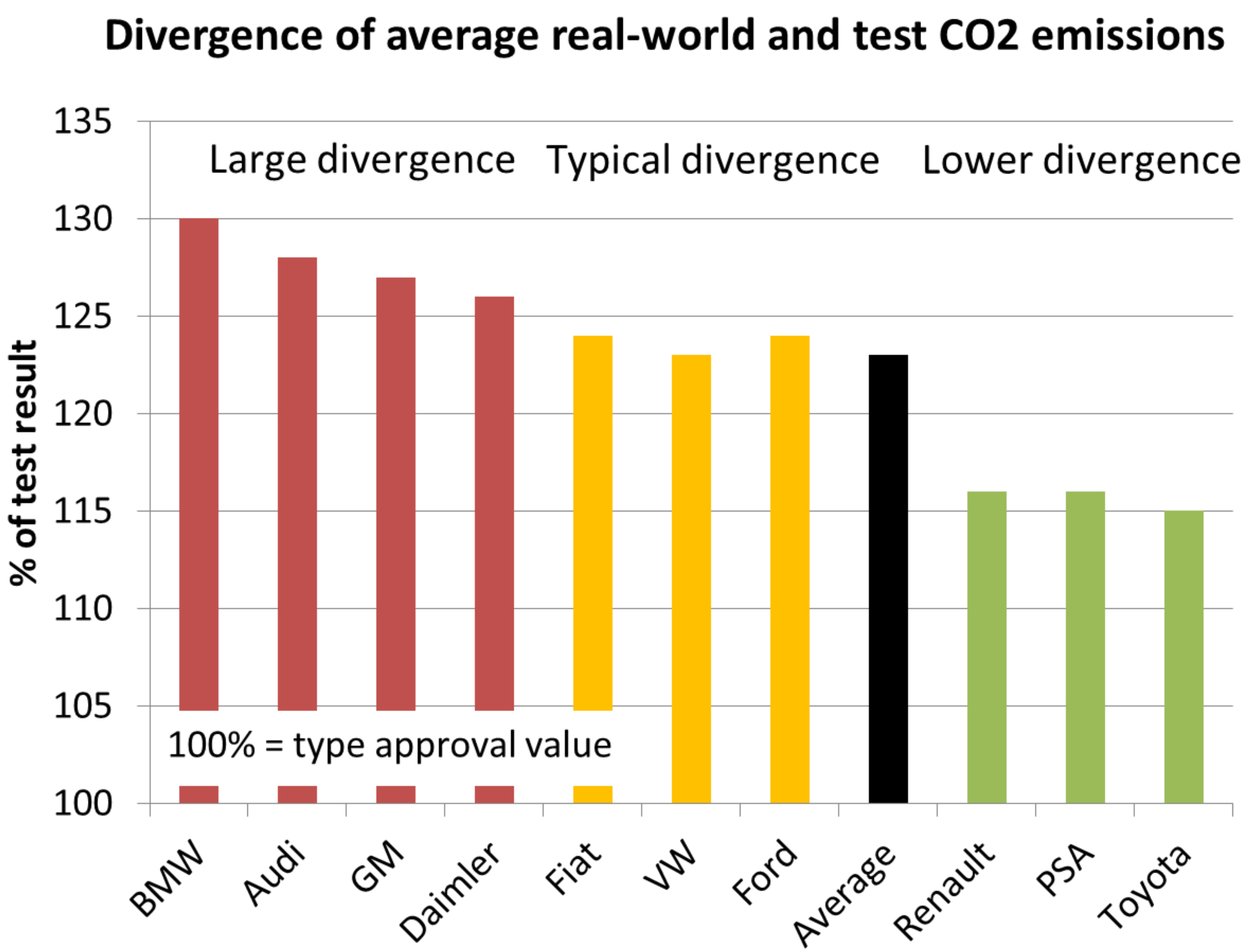
There are 5 principal reasons for the growing gap



Common ways carmakers manipulate tests for CO_2 emissions and fuel economy



Some brands are worse than others….



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ICCT, 2012

2b

Imperfections in Incentivising efficiency

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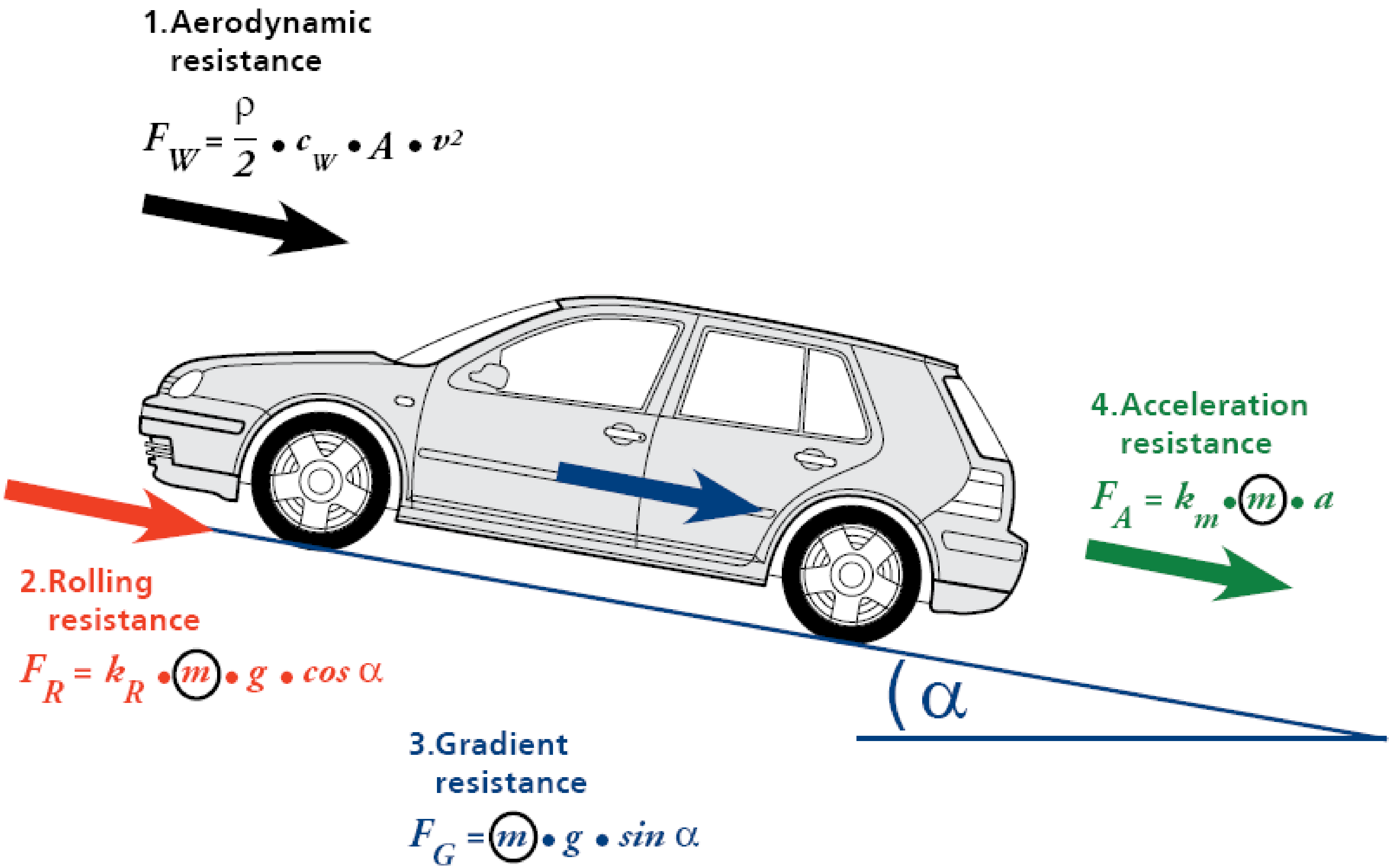
Heavier cars increase CO2 in 3 ways



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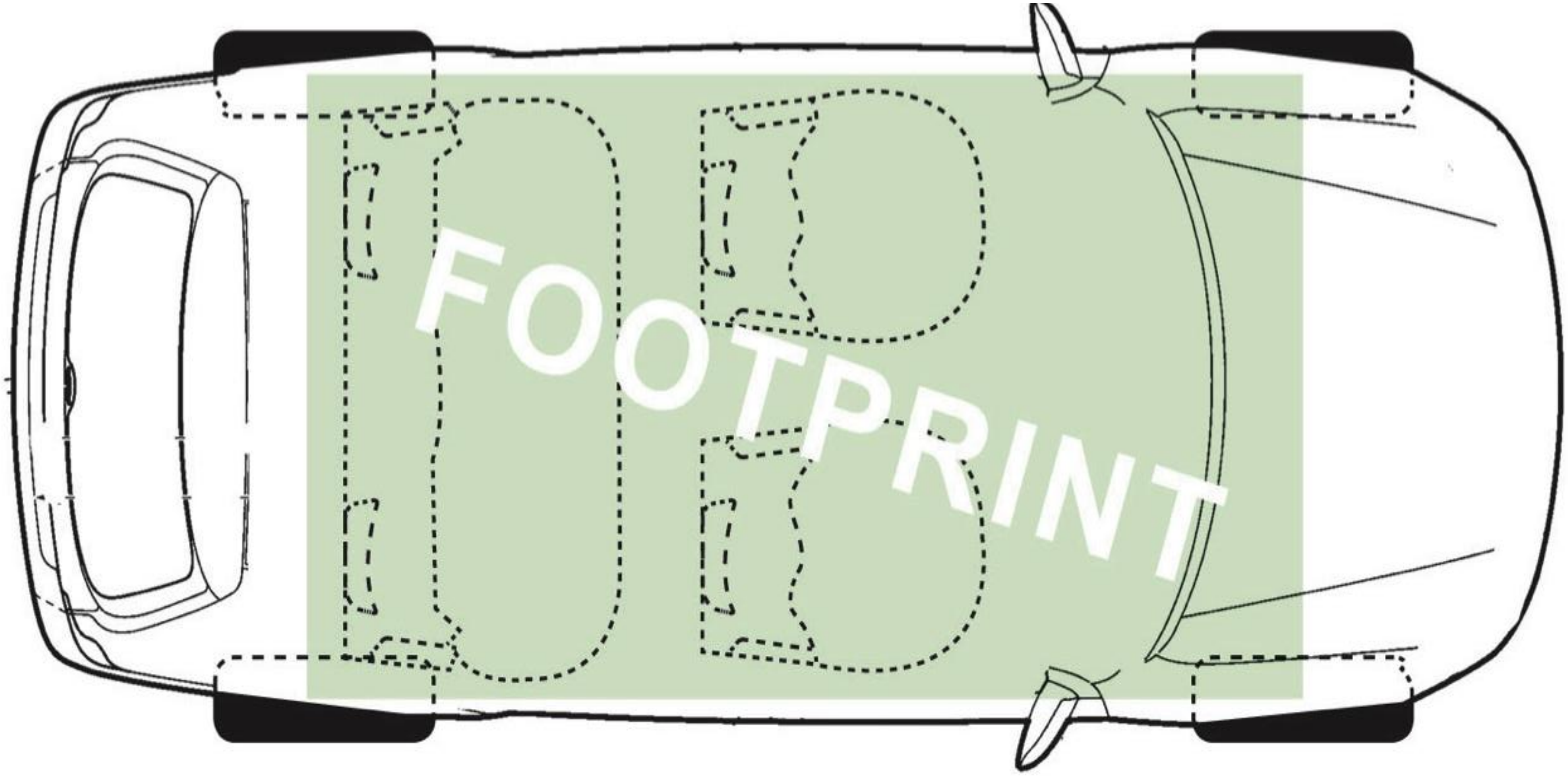
Larger-footprint ones only in one way: bigger frontal area



95 g/km compliance costs with 0% crediting of lightweighting: €1,220 per car

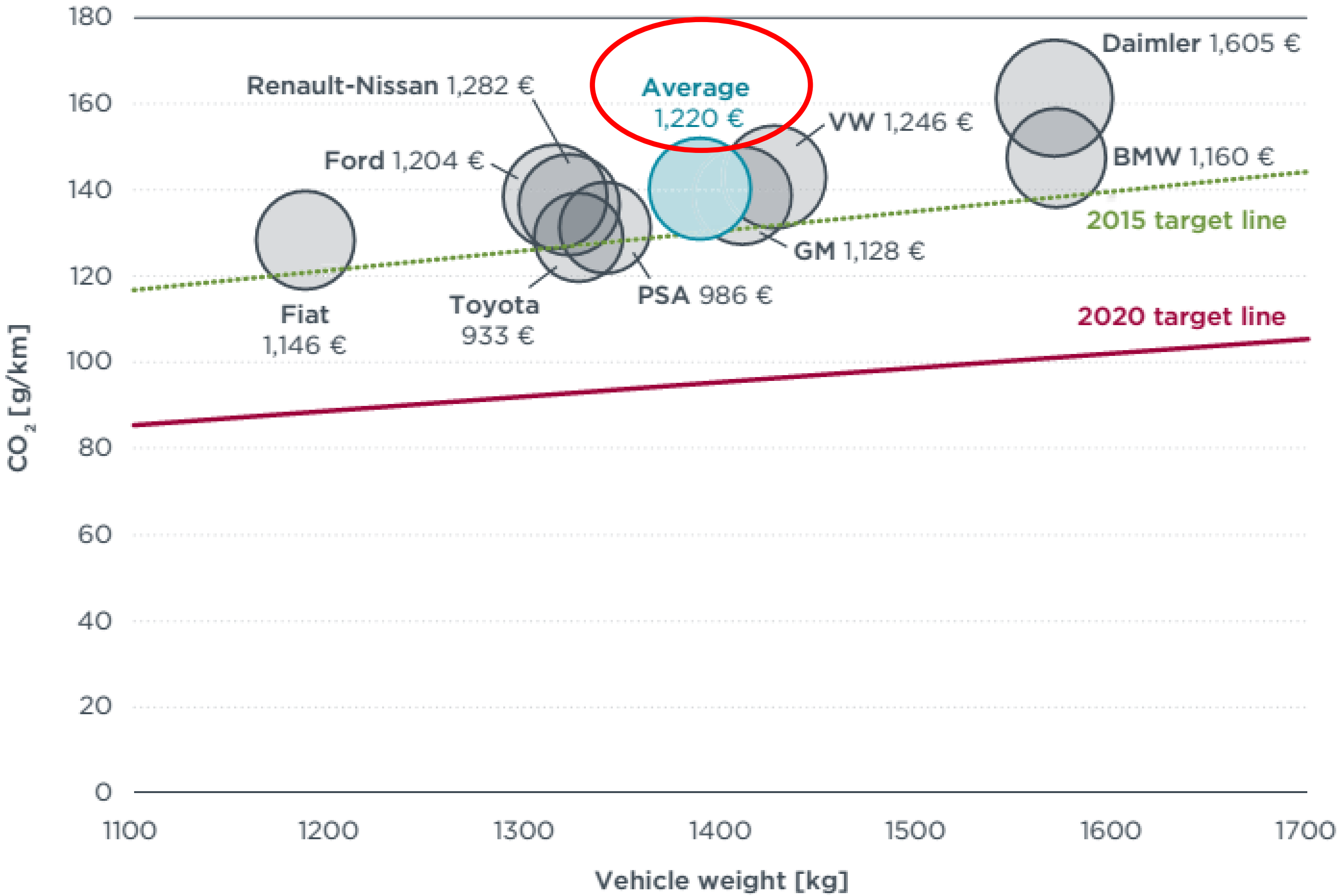


Figure 19. 2011 CO_2 and 2011-2020 Compliance Costs by Manufacturer for a Weight-Based System Fully Discounting Mass Reduction

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95 g/km compliance costs with 100% crediting of lightweighting: twice as low

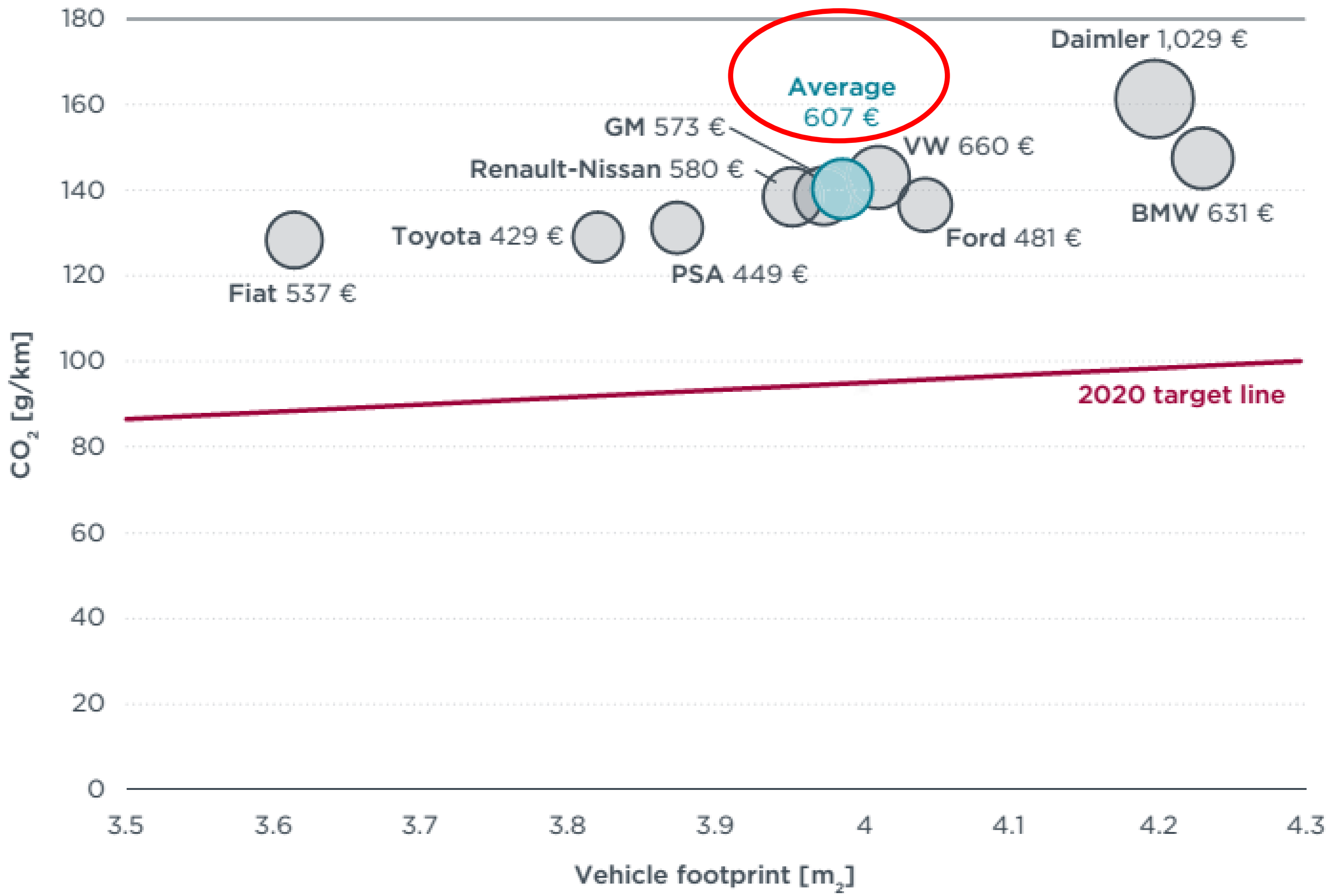

Figure 20. 2011 CO_2 and 2011-2020 Compliance Costs by Manufacturer for a Size-Based System Fully Crediting Mass Reduction

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We do not count energy use of

- EVs and FCEVs
- Energy embedded in vehicles

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Is that a big problem ?

- Supercredits are the biggest deal; getting them out is biggest priority
- Market share in energy use will stay limited over next decade
- We do not count the other 99+% of energy use fully either: ILUC / unconventional fuels…

The biggest issues on vehicles in the next years

- Real world delivery
- Parameter: not weight.
  - Either flat slope, or modestly based on footprint not weight
- Ending supercredits

Conclusions

- "Vehicle efficiency * fuel carbon footprint": sensible approach
- Such policies have been established in 2009 – in principle:
  - car CO2 regulation
  - Fuel Quality Directive
- Fuels – biggest issue is political implementation of upstream emissions
- Vehicles – biggest issues for next years are
  - real world fuel consumption
  - Weight-based CO2 standards
  - supercredits
- Getting rid of 0 counting of EVs and FCEVs is very important, and will have to be dealt with, but other issues seem more pressing in the next years

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Lifecycle CO2 of vehicle

Life Cycle Assessment of Passenger Cars – Baseline Data from Literature

Vehicle	Description	Lifetime Mileage [km]	Life Cycle Total CO_2e [tonnes CO_2]	Life Cycle [%]			Source
				Production	In-Use	Disposal	
VW Polo	Diesel 1.6L TDI, 55 kW (un-laden weight 1157 kg)	150,000	23	20.6%	79%	0.4%	VW (2009)
VW Polo	Gasoline 1.4L MPI, 63 kW (un-laden weight 1104 kg)		29.5	~17%	~83%	<1%	VW (2009)
VW Passat Estate B6	Diesel 2.0L TDI, 103 kW (un-laden weight 1510kg)		32.4	19%	80%	1%	VW
VW Passat Estate B6	Gasoline 1.6L FSI, 85 kW (un-laden weight 1403kg)		38.2	18%	81%	1%	VW
Toyota Prius	Hatchback 1.8L VVTi V (un-laden weight 1420kg)	150,000	-	26%	71%	3%	Toyota
Mercedes-Benz A-Class	A150 Gasoline 1.5L, 70 kW, with ECO start-stop system	300,000	32	16%	83%	<1%	Mercedes-Benz (2008)
Mercedes-Benz E-Class	E 220 CDI BlueEFFICIENCY Diesel 2.1L, 125 kW		48	18%	82%	1%	Mercedes-Benz (2009a)
Mercedes-Benz S400 Hybrid	Gasoline 3.5L V6 205 kW 15 kW motor, Li-ion battery		78	14%	85%	<1%	Mercedes-Benz (2009b)

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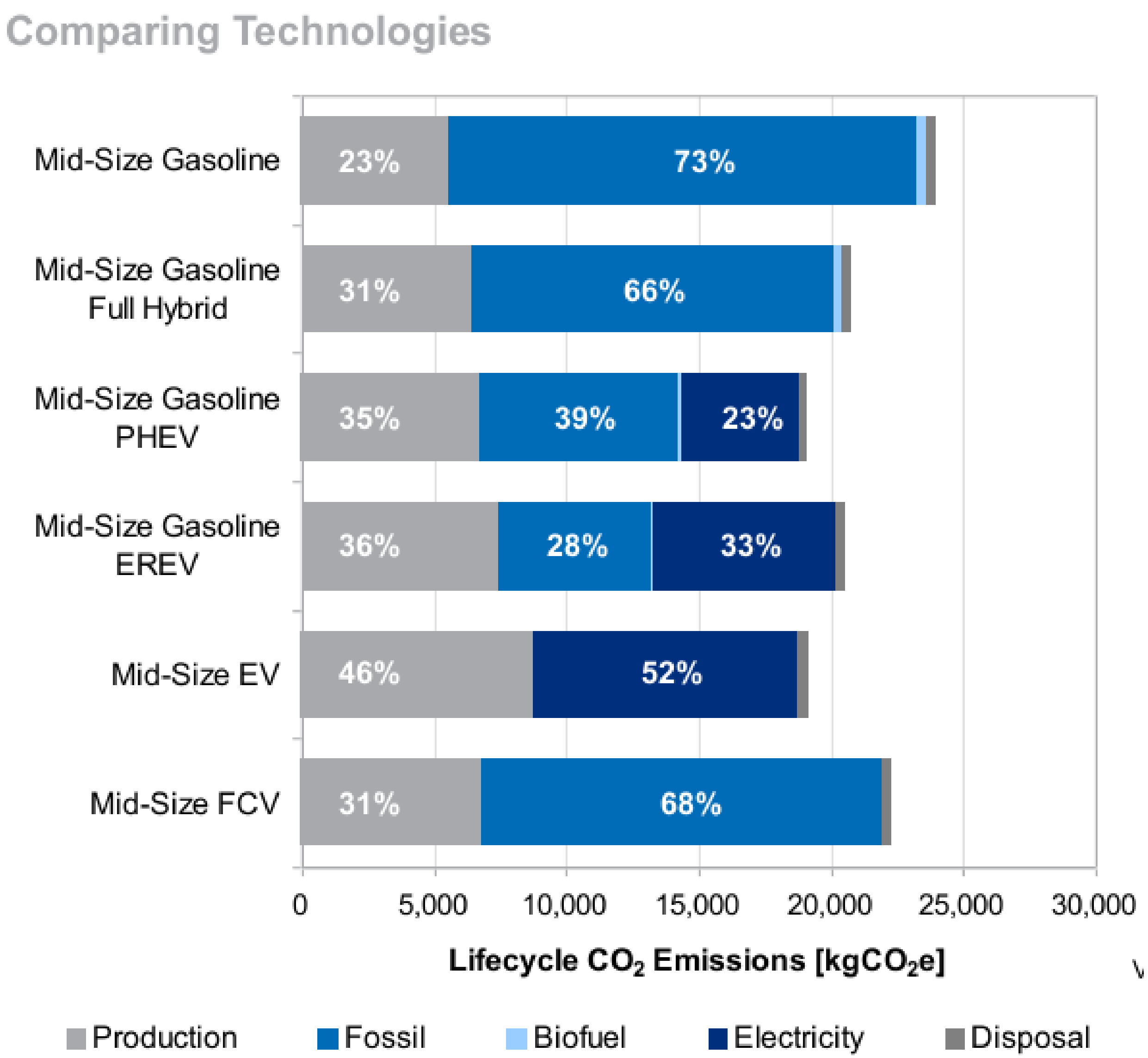
Lifecycle CO2 of vehicle



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