International best practices in cutting transport's climate emissions

Low Carbon Vehicle Partnership 7th Annual Conference

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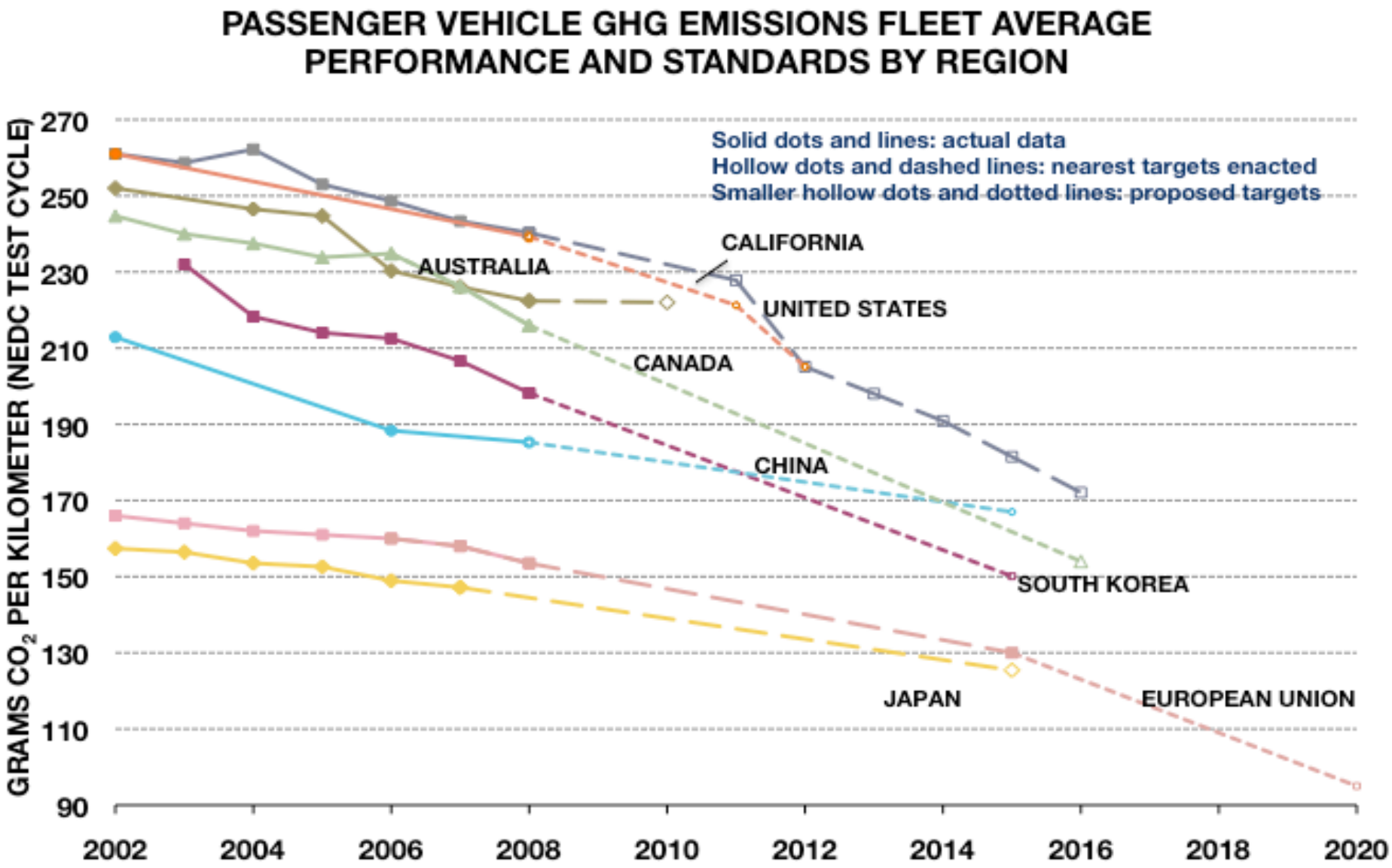
THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION

Outline of Major Points

- Definition of global best practices
  - Europe plays key role
- Policy Case Studies
  - Passenger Vehicle Emission Standards
    - Europe and Japan lead world with best standards
  - Regulatory Design
    - US showing leadership - plus summary of latest study on mass reduction opportunities and cost
  - Commercial Trucks
    - Japan in lead with US and China soon to follow - plus summary of NAS study on technology potential for US trucks
- Our Challenge: Developing best practices and then quickly spreading them across the globe.

Europe a global leader in CO2 emission standards



Source: www.ICCT.org

Vehicle Efficiency Varies with Mass & Engine Size

	Japan	EU	US
New cars fleet Average			
Weight (kg)	1,280	1,253	1,863
Engine Size (l)	1.5	1.6	3.3
Fuel consumption (mpg)	41.5	39.8	26.4
CO_2 emission (g/km)	132	146	208
Representative cars			
	Honda Fit M5, 1.5 Liter	VW Golf M5, 1.6 Liter	Chrysler 300 L4, 3.5 Liter
Weight (kg)	1,250	1,232	1,818
Engine Size (l)	1.5	1.6	3.5
Fuel consumption (mpg)	41.2	35.0	25.8
CO_2 emission (g/km)	133	157	213

Source: ICCT internal analysis

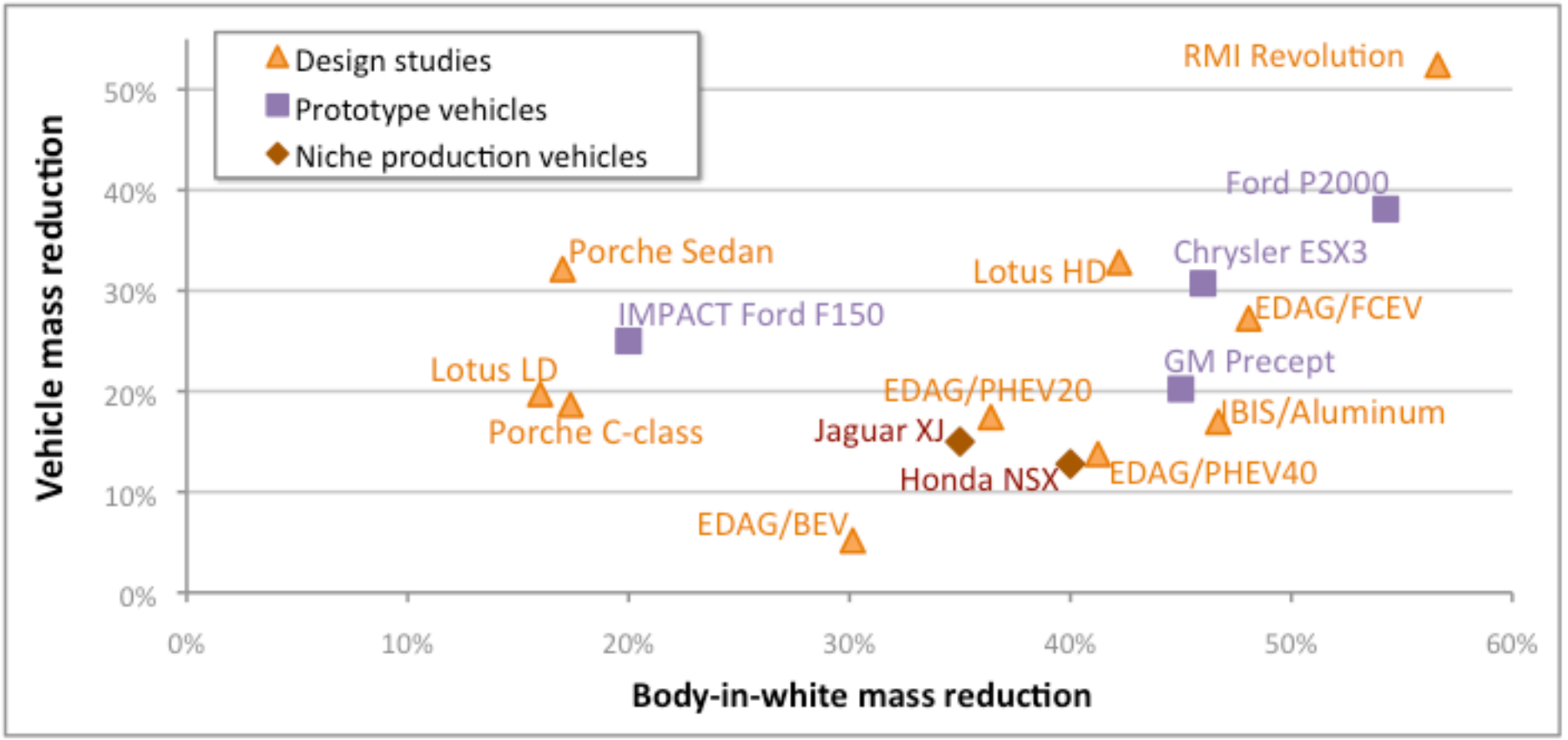
Regulatory Best Practice – Vary Standard by SIZE

→ ~ Half world auto market uses weight-based scaling factors which neutralizes regulatory incentive for mass reduction. US has best practice with size-based "scaling factor".

Country/Region	Automobile 2007 sales in million/year (and world share)	Regulated metric	Form of Standard	Program details, reduction in CO_2-per-distance emissions
European Union	23 (32%)	GHG emission (CO_2e/km)	Weight, continuous	40% reduction, MY 2008-2020 EU NEDC cycle
United States	17 (24%)	Fuel economy (mi/gal)	Size-based, continuous	20% reduction, MY 2011-2016 U.S. FTP testing
		GHG emission (CO_2e/mi)		
Japan	6 (8%)	Fuel economy (km/L)	Weight classes	19% reduction, MY 2010-2015 Japan 10-15 cycle
China	5 (7%)	Fuel consump. (L/100km)	Per vehicle, weight class → Average weight class	12% reduction, MY2008-2015 EU NEDC cycle
California	1.8 (3%)	GHG emission (CO_2e/mi)	Vehicle class	30% reduction, MY 2009-2016 U.S. FTP testing
Canada	1.6 (2%)	Fuel consump. (gal/mi)	Size-based, continuous	Harmonized to U.S. stds U.S. FTP testing
		GHG emission (CO_2e/mi)		
Mexico	1.0 (1%)	TBD	TBD	TBD
Australia	0.9 (1%)	Fuel consump. (L/100km)	Fleet average	10% reduction, MY 2004-2010 EU NEDC
South Korea	0.5 (1%)	Fuel economy (km/L)	Weight-based, split by engine size	13% reduction, MY 2012-2015 U.S. FTP testing
		GHG emission (CO_2/km)		
Taiwan	0.3 (0.5%)	Fuel economy (km/L)	Engine size based	U.S. FTP testing

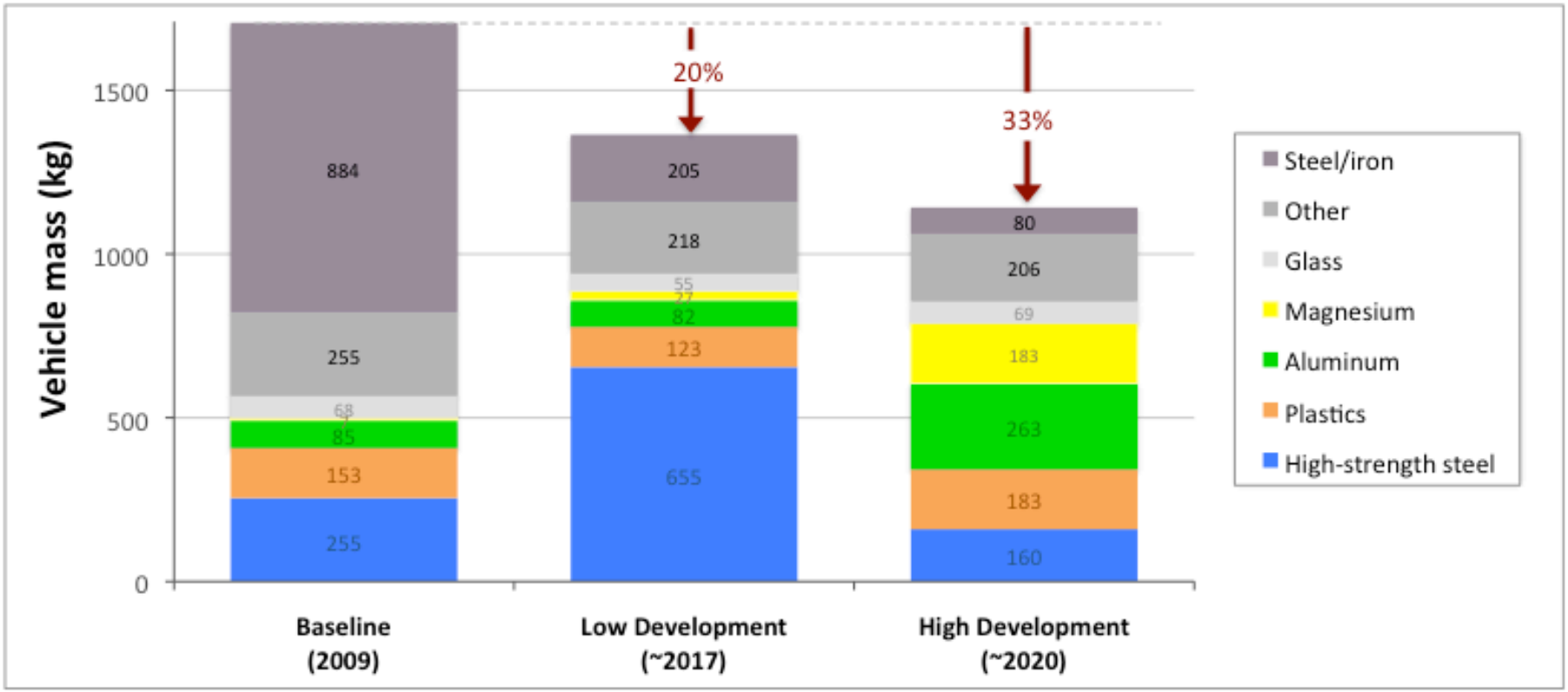
Source: Data compiled by ICCT

Results from mass-optimized vehicles & studies show mid-range of 10 – 40% mass reduction.



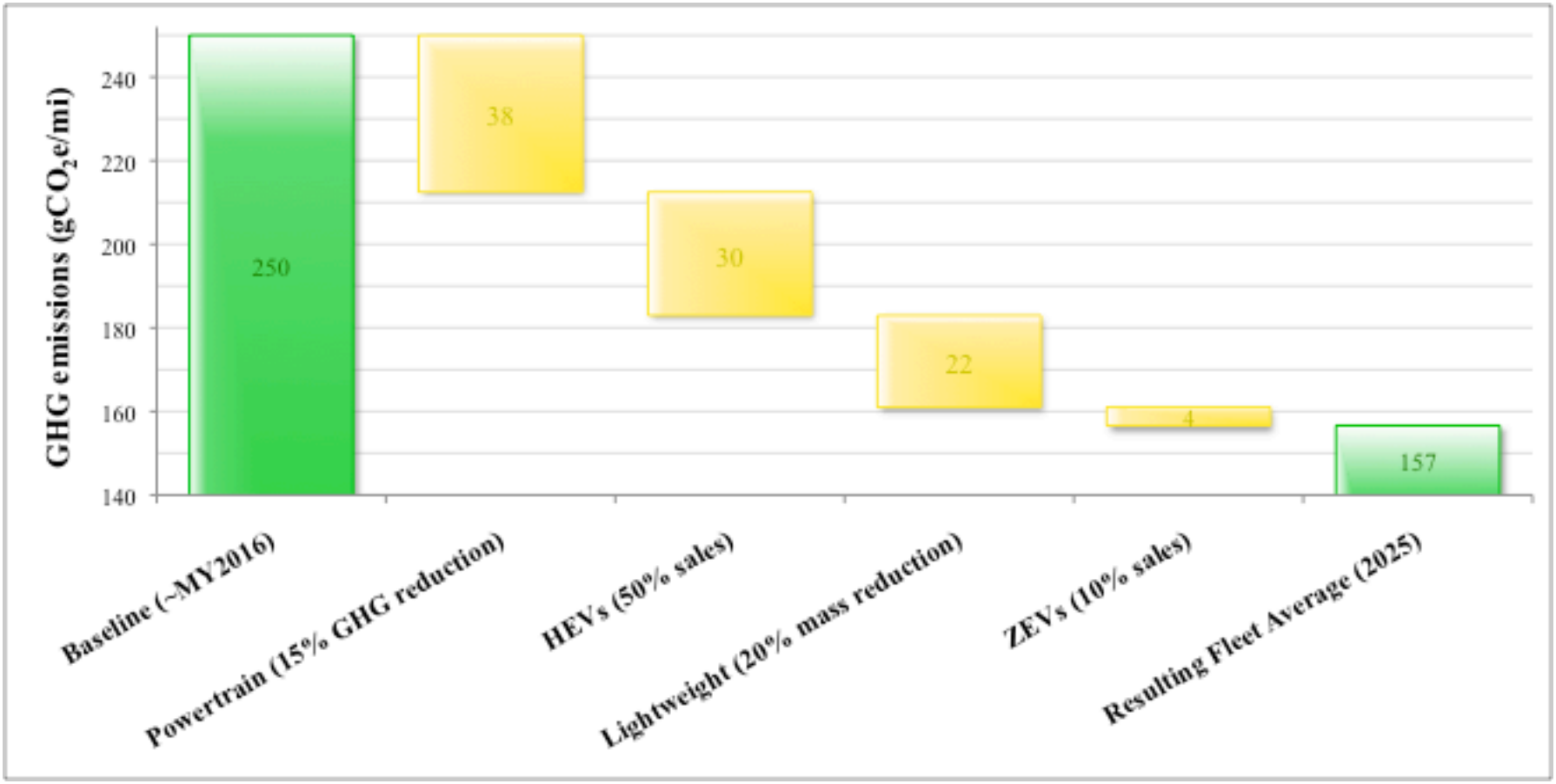
Source: Lutsey, 2010. Review of technical literature and trends related to automobile mass-reduction technology, prepared for California Air Resources Board, Sacramento, CA.

US and EU Studies - Material composition of mass-optimized passenger vehicle body design



Source: Lotus Engineering, 2010. An Assessment of Mass Reduction Opportunities for a 2017 – 2020 Model Year Vehicle Program.
Available at: www.theicct.org.

The Importance of Mass Reduction: Potential improvements in CA market (~2025)



Note: 250 gCO2/mi (US test) is 172 gCO2/km (NEDC) &157 gCO2/mi (US test) is 108 gCO2/km (NEDC)

Source: Internal ICCT Analysis

Best Practices for HDVs are Evolving

Potential Improvements in US HDV Fleet by Vehicle Type

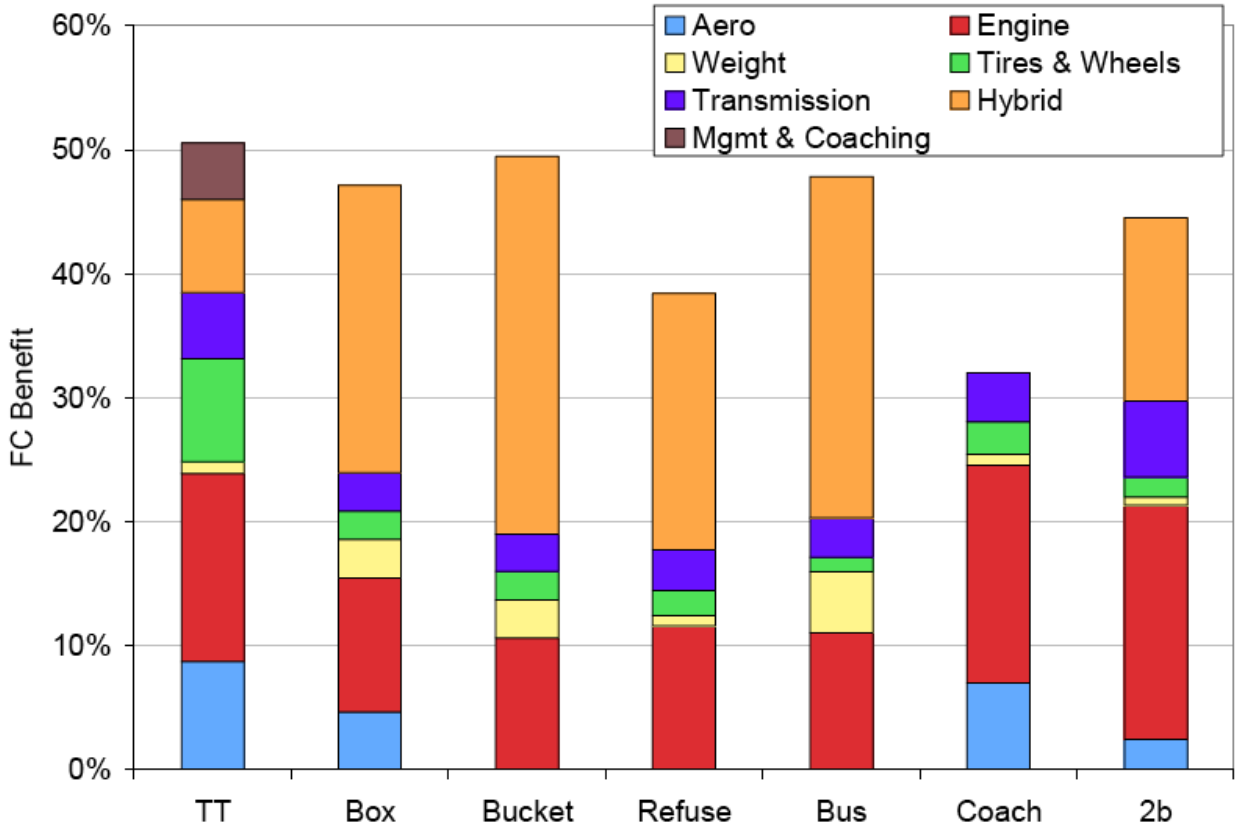


FIGURE S-1. Comparison of 2015-2020 new vehicle potential fuel-saving technologies for seven vehicle types: tractor trailer (TT), Class 3-6 box (box), Class 3-6 bucket (bucket), Class refuse (refuse), transit bus (bus), motor coach (coach), and Class 2b pickups and vans (2b).

National Academies of Science, 2010. Technologies and Approaches to Reducing The Fuel Consumption of Medium and Heavy-duty Vehicles.

Summing up and looking into the future

- To address climate change, all major vehicle markets should adopt the following standards over next ~5 years.
  - GHG standards for all modes (PVs, HDVs).
  - Fiscal policies aligned with GHG emissions
  - Genuine low carbon fuel policies (in need of best practices here).
  - Aviation and marine GHG policies set by international bodies for existing and new fleets.
  - Many other important supporting policies (vehicle labeling, technology R&D, consumer incentives, etc)
- Europe will play a key role in development of global best practices.

The International Council on Clean Transportation (ICCT)

The mission of the ICCT is to dramatically improve the environmental performance and efficiency of cars, trucks, buses, and transportation systems in order to protect and improve public health, the environment, and quality of life.

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