Climate Impact by wrong Fuel Consumption Data and Presentation of own Measurement Results

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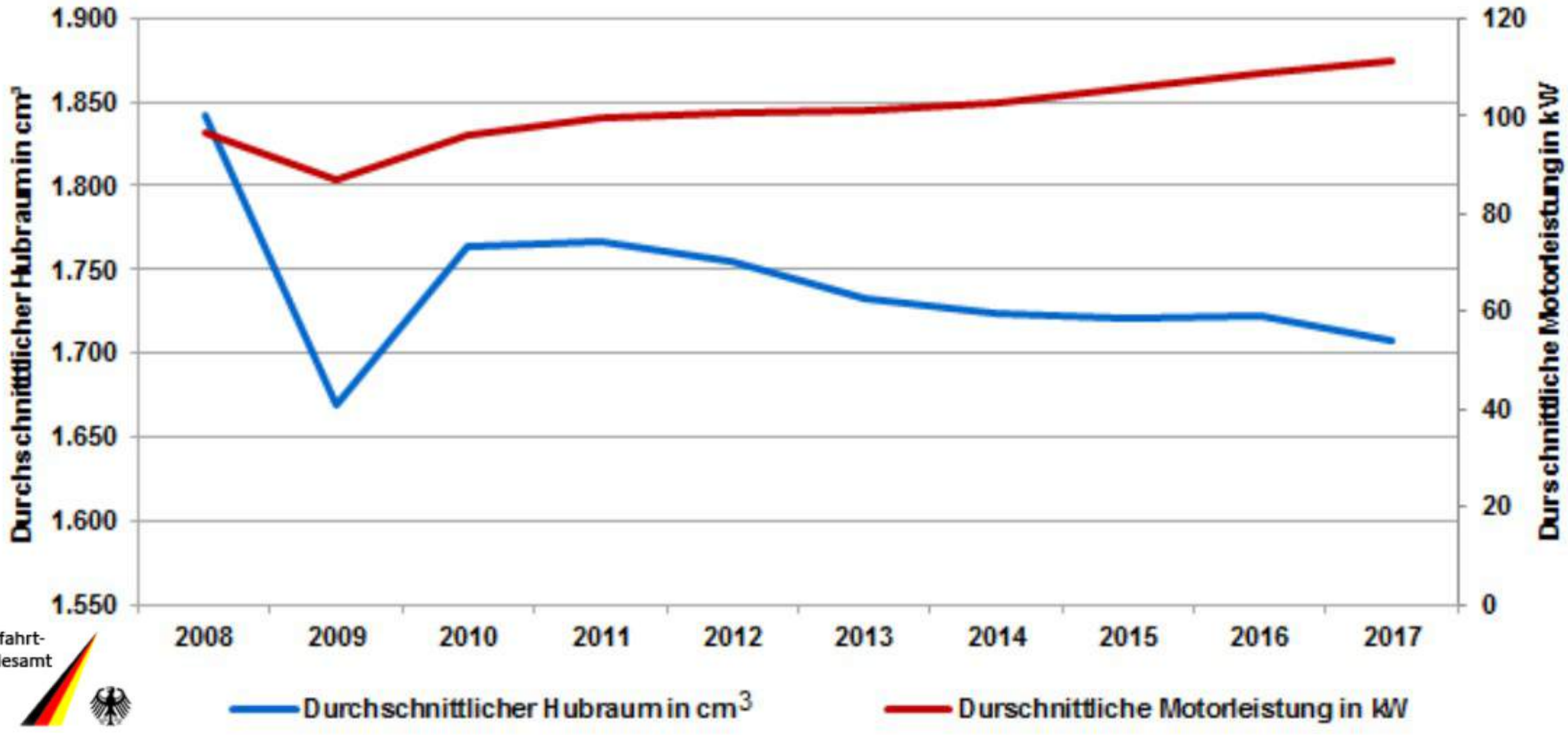
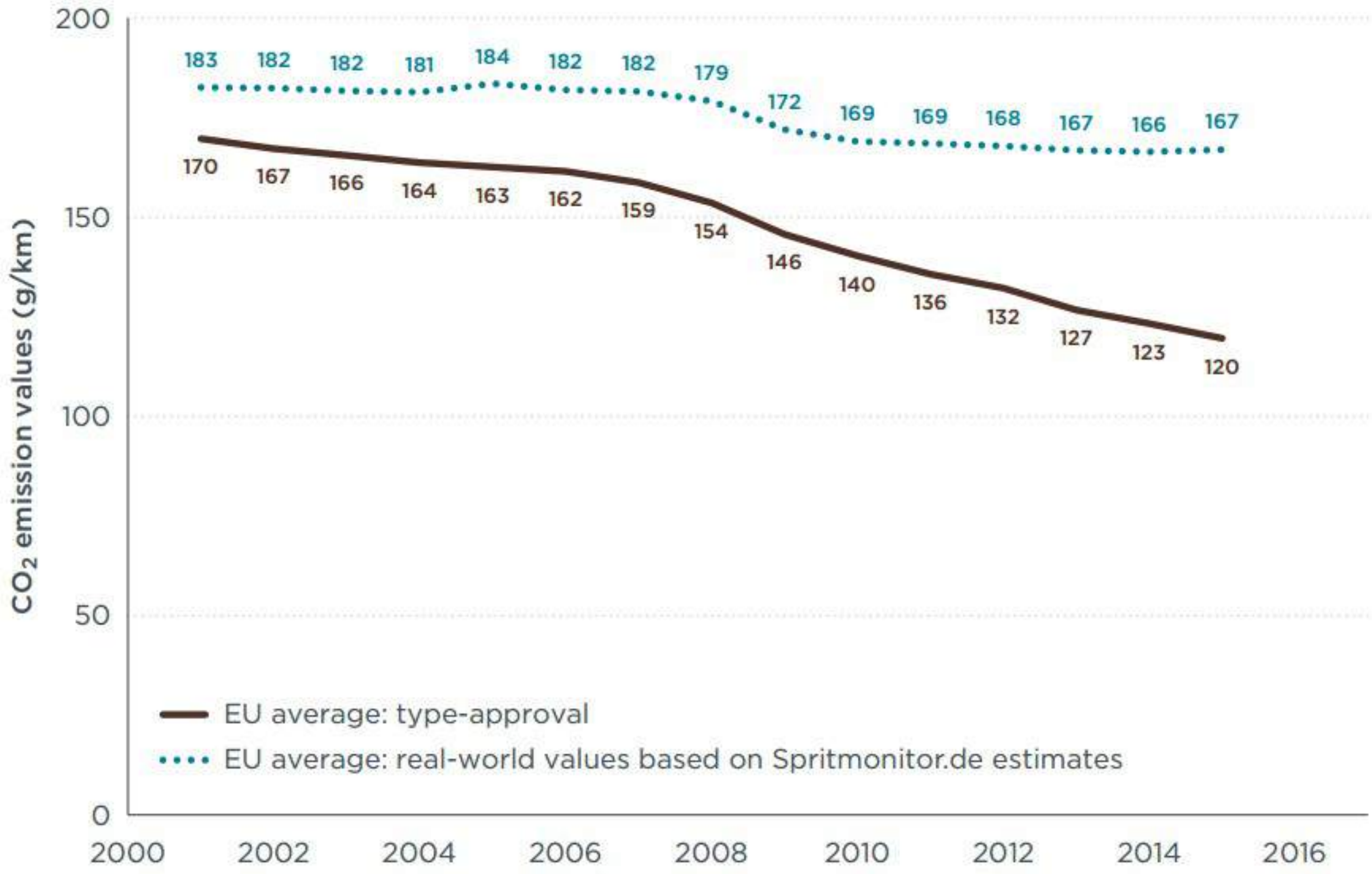
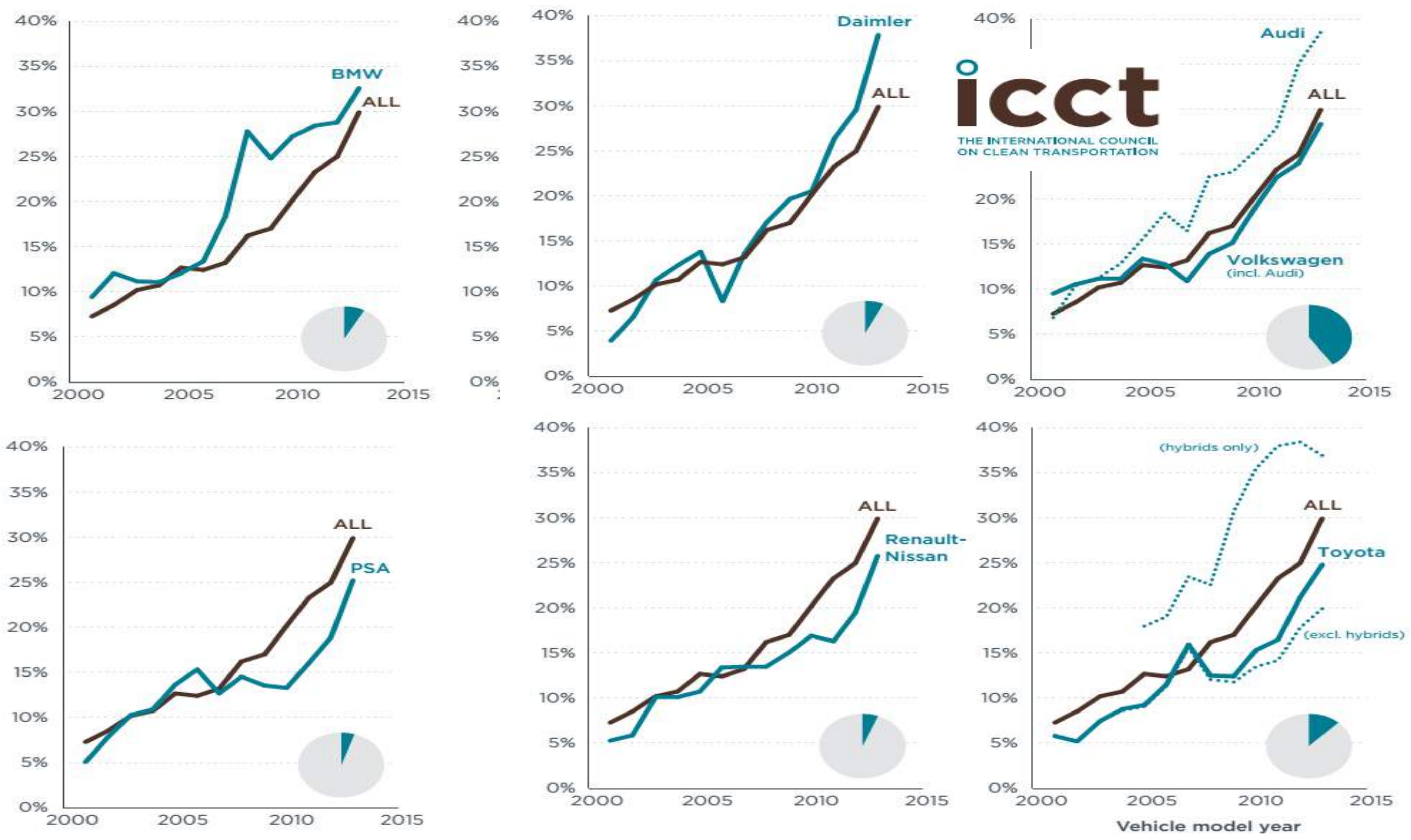
Neuzulassungen von Personenkraftwagen 2008 bis 2017 nach technischen Daten



Kraftfahrt-
Bundesamt



- Real-world vs. type-approval CO2 emission values of new European passenger cars based on Spritmonitor.de estimates and type-approval data from the European Environment Agency (EEA)


40%
35%
30%
25%
20%
15%
10%
5%
0%
2000
2005
2010
2015
BMW
ALL
Daimler
Audi
Volkswagen
(incl. Audi)
PSA
Renault-
Nissan
(hybrids only)
Toyota
(excl. hybrids)
Vehicle model year
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Comparison Manufacturer Data vs. spritmonitor.de, selected Models

Platz Modell	Motorisierung	Normverbrauch (Liter/100km)[1]	spritmonitor.de (Liter/100km)[2]	Mehrverbrauch[3]
1 VW Golf	1.6 TDI, 110 PS (Schaltgetriebe)	3,2-3,9	5,36 (n=35)	51,0%
2 VW Passat	2.0 TDI BMT, 150 PS (Schaltgetriebe/DSG)	4,0-4,7	6,28 (n=51)	44,4%
3 VW Polo	1.2 TSI, 90 PS (Schaltgetriebe)	4,7	6,01 (n=30)	27,9%
4 Mercedes C-Klasse	C220 BlueTec, 170 PS (Automatikgetriebe)	4,3-4,7	6,17 (n=20)	37,1%
5 Audi A3	1.4 TFSI cod ultra, 150 PS (Schaltgetriebe/DSG)	4,7	7 (n=15)	48,9%
6 VW Tiguan	2.0 TDI, 110 PS (Schaltgetriebe)	5,3	6,53 (n=5)	23,2%
7 Skoda Octavia	1.8 TSI, 180 PS (Schaltgetriebe)	6,1	7,5 (n=4)	25,0%
8 Opel Corsa	1.0 ECOTEC DI Turbo, 90 F (Schaltgetriebe)	4,4	6,45 (n=6)	46,6%
9 Ford Focus	1.0l EcoBoost, 100 PS (Schaltgetriebe)	4,3-4,8	6,9 (n=10)	51,6%
10 Opel Astra	1.6 CDTI ecoFlex, 110 PS (Schaltgetriebe)	3,7-4,1	5,71 (n=5)	46,4%
		Durchschnittliche Abweichung:		42%

Anmerkungen:

[1]Herstellerangabe: kombir

[2]Durchschnittswert aller Nutzereinträge (Baujahr 2015) für entsprechende Motorisierung, eingesehen am 04.11.2015

[3]Bei unterschiedlichen Normverbrauchsangaben für die Beispielmotorisierung, bedingt durch verschiedene Modell-/Karosserievarianten, wurde der mittlere Normverbrauchswert zu Vergleichszwecken herangezogen.

Ex. Opel Zafira Tourer vs. Opel Mokka: Very different Efficiency classes but in real Drive practical identical

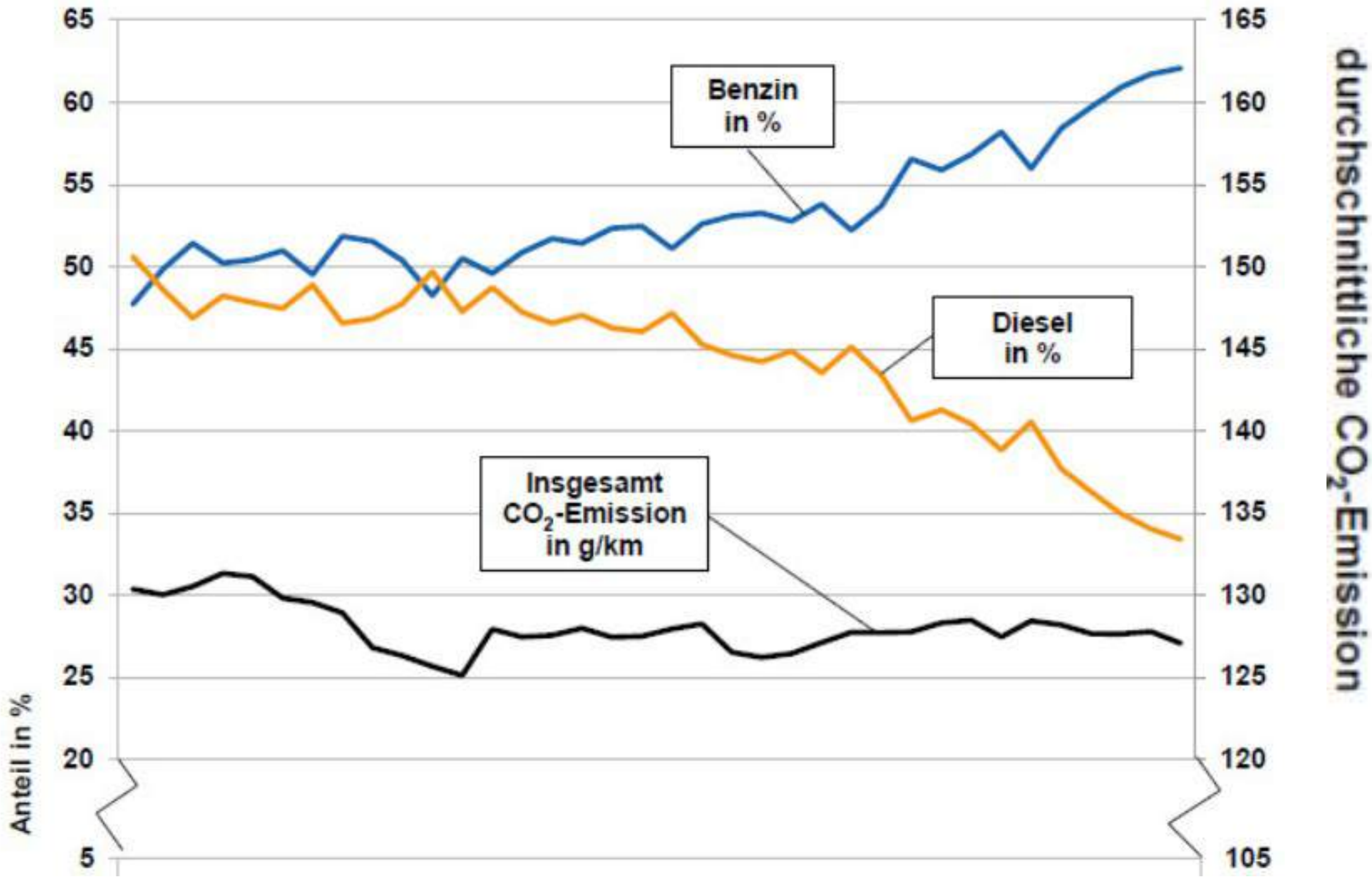
	Opel Zafira Tourer 1.6 CDTi ecoFlex, EZ 2015[1]	Opel Mokka 1.4 Turbo ecoFLEX, EZ 2015[2]
Offizieller CO2-Ausstoß (NEFZ) (g/km)	108	155
CO2-Ausstoß im realen Fahrbetrieb (g/km)	155	158
Abweichung (%)	44%	2%
Masse des Fahrzeugs (kg)	1816	1520
Länge x Breite (m^2)	8,8	7,5
CO2-Effizienzklasse	A+	D

Anmerkungen:

[1]Quelle: Angaben des Fahrzeugscheins und https://www.adac.de/infotestrat/autodatenbank/autokatalog/detail.aspx?mid=239397&bezeichnung=opel-zafira-tourer-1-6-cdti-ecoflex-start-stop-active-13-14 (eingesehen am 24.04.2018)

[2]Quelle: Angaben des Fahrzeugscheins und https://www.adac.de/infotestrat/autodatenbank/autokatalog/detail.aspx?mid=248712&bezeichnung=opel-mokka-1-4-turbo-ecoflex-start-stop-color-edition-4x4-15-16 (eingesehen am 24.04.2018).

Neuzulassungen von Personenkraftwagen 2015 bis 2017 nach Kraftstoffarten und durchschnittliche CO_2-Emission



Kraftfahrt-Bundesamt

Consumption AUDI A5 2,0 l TFSI EU 5
TÜV NORD

AUDI A5 Cabrio
2,0 l TFSI 155 kW Automatik
EU 5, Baujahr 2013
Kilometerstand 15.000 km

TÜV NORD Mobilität

Prüfergebnisse

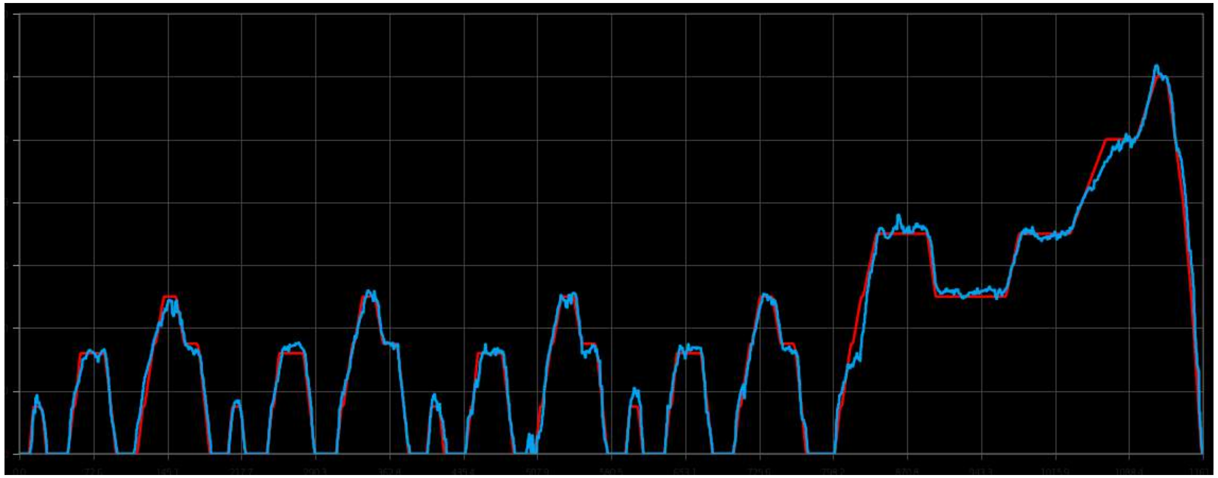
simulierte Schwungmasse **1700 kg**	Kraftstoffverbrauch **Benzin EU5**			CO_2-Emissionen
	[l /100 km]			[g/km]
	innerorts	außerorts	kombiniert	kombiniert
Messwert	**9,5**	**6,3**	**7,5**	**175**
Herstellerangabe laut Blatt 13 der Akte	**7,8**	**5,6**	**6,4**	**149**
Abweichung	**21,8%**	**12,5%**	**17,2%**	**17,4%**

Fuel Consumption Measurement AUDI A5 2,0 l TFSI EU 5
NEDC Road Measurement DUH EKI

The NEDC measurements were performed on the road at a temperature of

+22 bis +25 degree Celsius..

The car didn‘t report any error, no warning signal was shown



The car consumes in the same driving cycle on the road 36 % more than declared from the manufacturer

New Test Procedure:
More realistic Consumption Values but the Truth is on the Road

Parameter	NEDC (Euro 6)	EU WLTP
Testzyklus		
Zyklus	NEFZ	WLTP
Länge des Zyklus	11,03 km	23,27 km
Zeit	19,66 Minuten	30 Minuten
Durchschnittsgeschwindigkeit	34 km/h	47 km/h
Höchstgeschwindigkeit	120 km/h	131 km/h
Standzeitanteil	24%	13%
Schaltung (manuelle Getriebe)	Fixe Schaltpunkte	Fahrzeugspezifisch
Ausrolltest		
Reifenprofiltiefe	50 bis 90%	80 bis 100%
Reifendruck	Nicht definiert	Fahrzeugspezifisch
Fahrzeuggewicht		
Testgewicht	Leergewicht + 100 kg	Leergewicht + 100 kg + Ausstattung + Nutzlast (keine Klimaanlage)
Schwungmassenklassen (Einteilung der Testfahrzeuge nach Trägheitsverhalten)	Festgelegte Klassen	Keine Klassen, fahrzeugspezifisch
Temperatur		
Außentemperatur der Vorkonditionierungshalle und Prüfkammer	20 bis 30°C	14°C / 23°C
Starttemperatur des Motors	Kalt	Kalt
Andere Parameter		
Laufleistung des Testfahrzeugs	Max. 3.000 km	3.000 bis 15.000 km
Ladezustand der Batterie	Nicht definiert	Darf vor dem Zyklus nicht geladen werden

- Basic Problem consists: In spite of the improvements by the introduction of the WLTP: Real driving condition aren‘t reflected completely
- A cycle recognition or the „optimization“ of the test results in the dynometer test is still possible.
- It is likely that WLTP also contains loopholes which can be used by the car manufacture
- It is therefor necessary to estimate the CO2 emissions on the road.

CO_2- Differences between NEDC and WLTP AUDI

Marke	Typ	Treibstoff	Hubraum	CO2- Ausstoß NEFZ (alt)	CO2-Ausstoß WLTP (NEU)	Zunahme Verbrauch Neue Messmethode In Prozent	
AUDI	A5 Cab. 35 TDI	Diesel	1968	118	173	**57.10%**	
AUDI	A4 Lim. 40 TDI	Diesel	1968	118	174	**57.10%**	
AUDI	A4 Lim. 40 TDI	Diesel	1968	120	174	**57.10%**	
AUDI	A4 Lim. 35 TDI	Diesel	1968	110	173	**57.10%**	
AUDI	A5 SB 40 TDI	Diesel	1968	110	174	**57.10%**	
AUDI	A5 SB 40 TDI	Diesel	1968	110	174	**57.10%**	
AUDI	A5 SB 35 TDI	Diesel	1968	110	173	**57.10%**	
AUDI	A4 Lim. 40 TDI	Diesel	1968	114	174	**65.00%**	
AUDI	Q3 35 TFSI	Benzin	1498	110	189	**72.90%**	**Mittel**
						11688.20%	**34.995 %**

Quelle: Bundesamt für Energie / «Kassensturz» 2018, Schweiz

CO_2- Differences between NEDC and WLTP Renault

Marke	Typ	Treibstoff	Hubraum	CO2- Ausstoß NEFZ (alt)	CO2-Ausstoß WLTP (NEU)	Zunahme Verbrauch Neue Messmethode In Prozent	
RENAULT	Koleos	Diesel	1995	163	194	**19.40%**	
RENAULT	Kadjar TCe140	Benzin	1332	137	159	**20.70%**	
RENAULT	Kadjar TCe160	Benzin	1332	137	159	**20.70%**	
RENAULT	Koleos	Diesel	1995	168	203	**21.90%**	
RENAULT	Megane	Diesel	1461	110	129	**22.50%**	
RENAULT	dCi160	Diesel	1997	145	179	**23.60%**	
RENAULT	dCi160	Diesel	1997	145	179	**23.60%**	
RENAULT	dCi200	Diesel	1997	145	180	**25.50%**	
RENAULT	dCi200	Diesel	1997	145	180	**25.50%**	
						1003.30%	**14.754%**

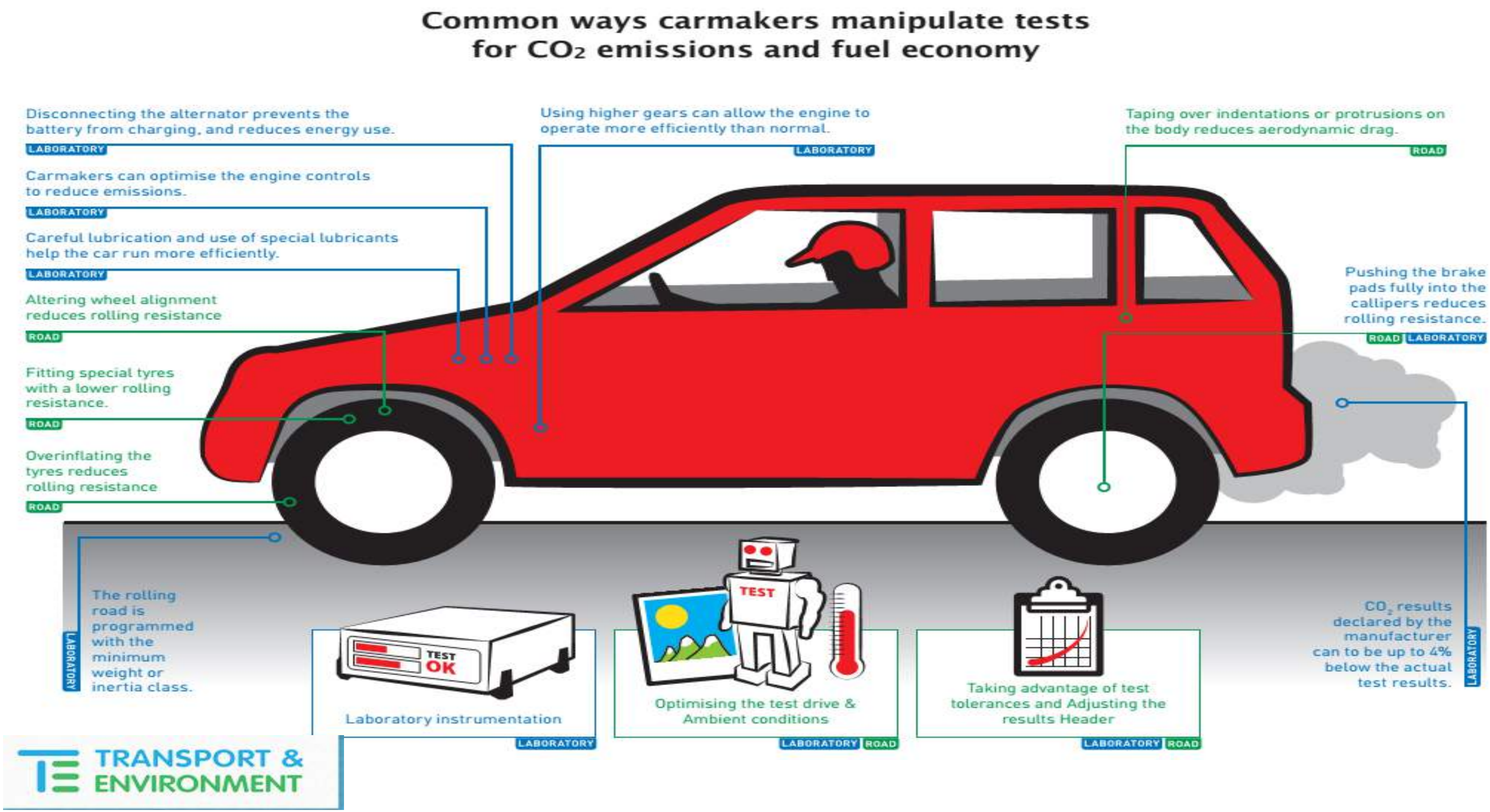
Source: Bundesamt für Energie / «Kassensturz» 2018,Schweiz

Example Toyota Prius 1.8 CVT: Real consumption in Germany, Japan and USA

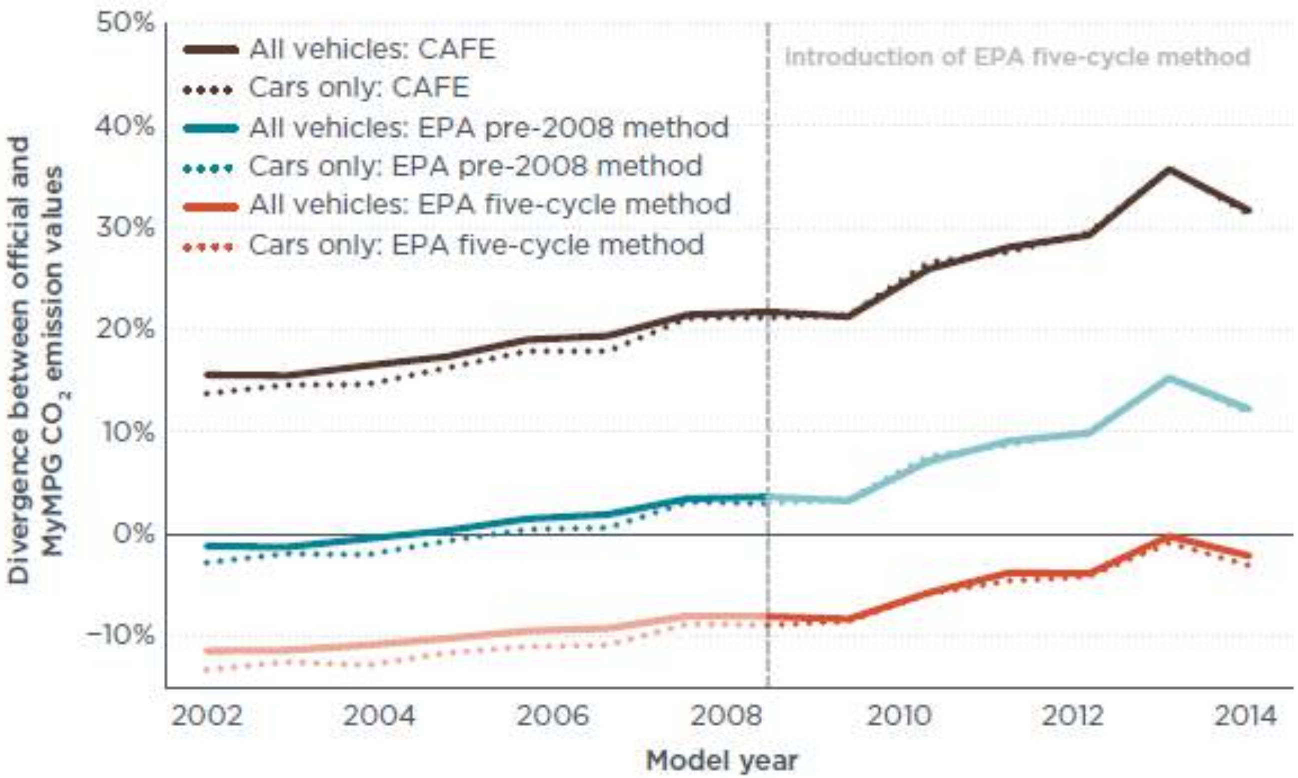
	Germany www.spritmonitor.de	Japan https://e-nenpi.com/	USA www.fueleconomy.gov
Durch. Kraftstoffverbrauch (l/100km)[1]	4,74	4,36	4,03

Anmerkungen:
[1]Quelle Deutschland: https://www.spritmonitor.de/de/uebersicht/49-Toyota/439-Prius.html?fueltype=2&gearing=3&exactmodel=4&powerunit=2 (eingesehen am 20.04.2018); Quelle Japan: https://e-nenpi.com/enenpi/cartype/12574 (eingesehen am 20.04.2018); Quelle USA: https://www.fueleconomy.gov/mpg/MPG.do?action=mpgData&vehicleID=37163&browser=true&details=on (eingesehen am 20.04.2018)
Bildnachweis: toyota-media.de

Euro 6 Benzin- und Benzin-Hybrid-Pkw	**Ø CO_2 g/km**	**Ø NO_x mg/km**	**Faktor Grenzwert-überschreitung**
Toyota Prius 1.8 Hybrid (blau)[2)]	*84*	*5*	*0,1*
Opel Mokka 1.4 ecoFlex	158	11	0,2
Toyota Prius 1.8 Hybrid (weiß)	77	15	0,3


Common ways carmakers manipulate tests
for CO2 emissions and fuel economy
Disconnecting the alternator prevents the battery from charging, and reduces energy use.
LABORATORY
Carmakers can optimise the engine controls to reduce emissions.
LABORATORY
Careful lubrication and use of special lubricants help the car run more efficiently.
LABORATORY
Altering wheel alignment reduces rolling resistance
ROAD
Fitting special tyres with a lower rolling resistance.
ROAD
Overinflating the tyres reduces rolling resistance
ROAD
Using higher gears can allow the engine to operate more efficiently than normal.
LABORATORY
Taping over indentations or protrusions on the body reduces aerodynamic drag.
ROAD
Pushing the brake pads fully into the callipers reduces rolling resistance.
ROAD LABORATORY
The rolling road is programmed with the minimum weight or inertia class.
LABORATORY
TEST
OK
Laboratory instrumentation
LABORATORY
TEST
Optimising the test drive & Ambient conditions
LABORATORY ROAD
Taking advantage of test tolerances and Adjusting the results Header
LABORATORY ROAD
CO2 results declared by the manufacturer can to be up to 4% below the actual test results.
LABORATORY
TRANSPORT &
ENVIRONMENT

Ex. USA: Environment agency (EPA) corrects manufacture numbers in the interest of the consumer information for the car label



Average gap between manufacturer data or label values and real consumption data for new cars in the USA

Quelle: https://www.theicct.org/publications/laboratory-road-intl

- Since 2008 the corrected consumption values are based on total of five test cycles (red linie)
- The gap between label values and the average real consumption doesn‘t exist
- In contrary the gap between the manufacturer values and real consumption is today about 30% in average

Comparison EPA- Label - Numbers vs. fueleconomy.gov selected Models

Platz	Modell	Motorisierung	EPA Fuel Economy (MPG)[1]	fueleconomy.gov (MPG)[2]	Mehrverbrauch
1	Toyota Camry	2.5 L, 4 cyl (Modell 2015, Automatic)	28	27,90 (n=5)	0,4%
2	Toyota Corolla/ Matrix	LE Eco, 1.8 L, 4 cyl (Modell 2015, Automatic)	35	36,30 (n=4)	-3,7%
3	Nissan Altima	2.5 L, 4 cyl (Modell 2015, Automatic)	31	29,00 (n=11)	6,5%
4	Honda Civic	1.8 L, 4 cyl (Modell 2015, Automatic)	33	29,60 (n=5)	10,3%
5	Honda Accord	Hybrid 2.0 L, 4 cyl (Modell 2015, Automatic)	47	43,30 (n=16)	7,9%
6	Ford Fusion	Hybrid FWD 2.0 L, 4 cyl (Modell 2015/16, Automatic)	42	43,63 (n=7)	-3,9%
7	Hyundai Elantra	1.8 L, 4 cyl (Modell 2015/16, Autom/Man.)	32	30,27 (n=4)	5,4%
8	Chevrolet Cruze	1.4 L, 4 cyl (Modell 2015, Automatic)	30	32,00 (n=2)	-6,7%
9	Ford Focus	FWD 1.0 L, 3 cyl (Modell 2015, Man.)	31	35,20 (n=1)	-6,7%
10	Chrysler 200	2.4 L, 4 cyl (Modell 2015, Automatic)	28	30,30 (n=2)	-8,2%
			Durchschnittliche Abweichung:		3%

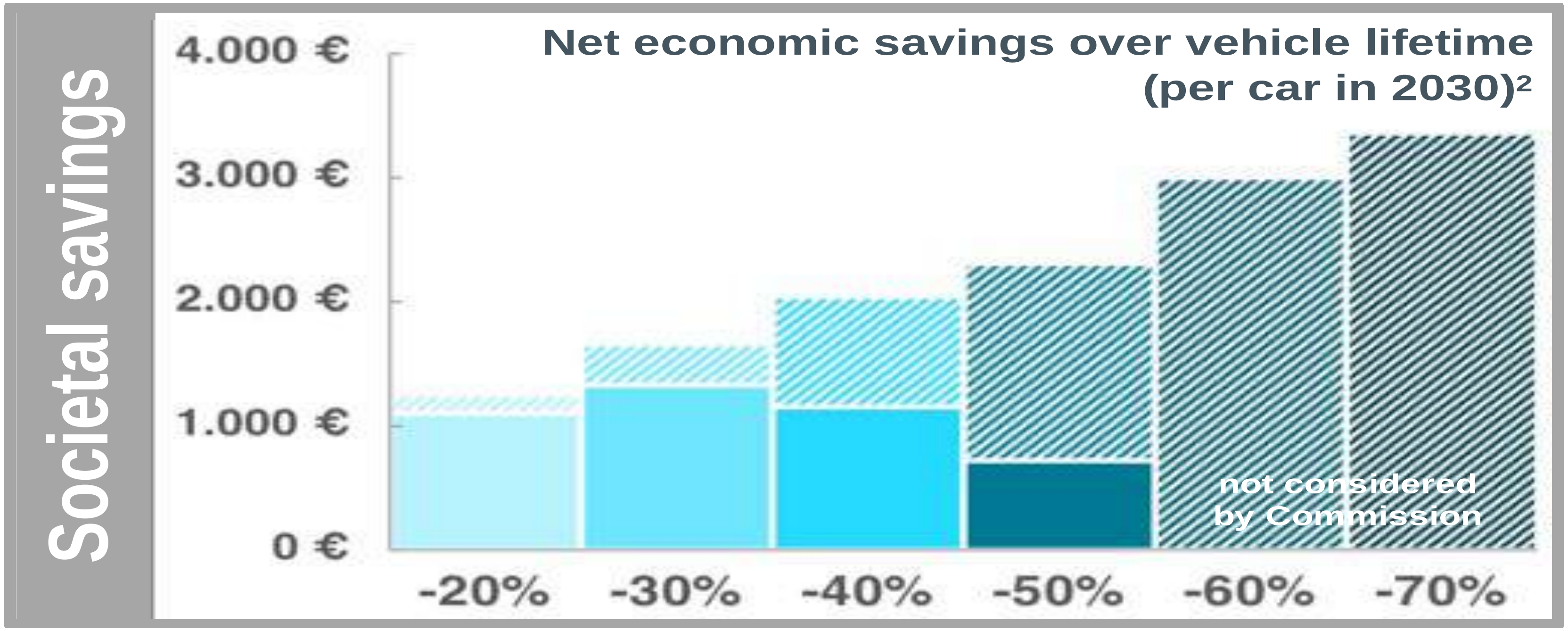
Anmerkungen:

[1]Verbrauchsangabe laut EPA: "adjusted" and "combined" MPG (Miles-per-Gallon); MPG: höhere Werte bedeuten weniger Verbrauch; 30 MPG entsprechen ca. 7,84 Litern Kraftstoff.

[2]Durchschnittswert aller Nutzereinträge auf fueleconomy.gov ("Spritmonitor USA") für entsprechende Motorisierung, eingesehen am 04.11.2015.

More CO_2-Reduction is technical feasible and has economical advantage for the Society

Dataof the EU-Commission:

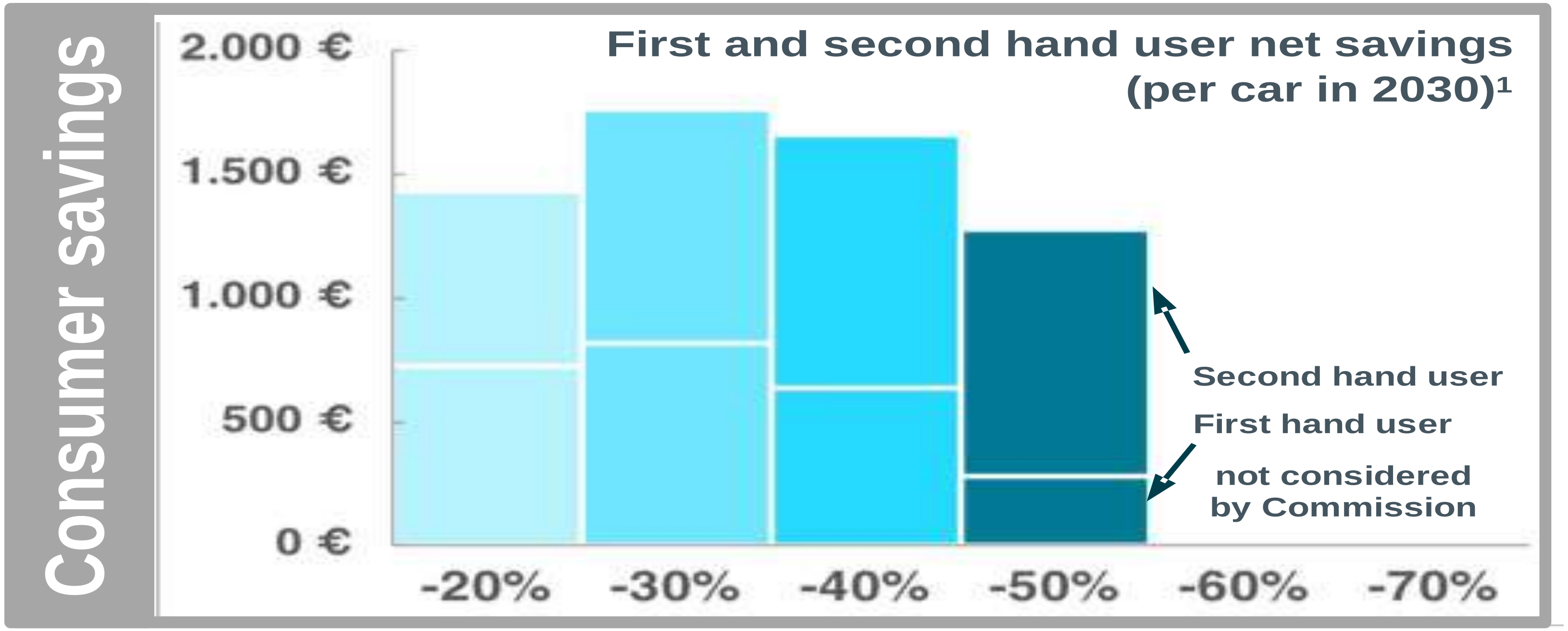


[1]Data taken from European Commission (EC) impact assessment
[2]Data from EC impact assessment, avoided CO_2 costs included, dashed bars use ICCT technology data
[3]Data from EC impact assessment, assuming battery cells manufactured in the EU

Quelle: https://www.theicct.org/blog/staff/no-regrets-eu-co2-std-2025-2030-20180404

A higher CO_2- Reduction has an Advantage for the User of new and used Vehicles

Data EU-Commission:



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[3]Data from EC impact assessment, assuming battery cells manufactured in the EU

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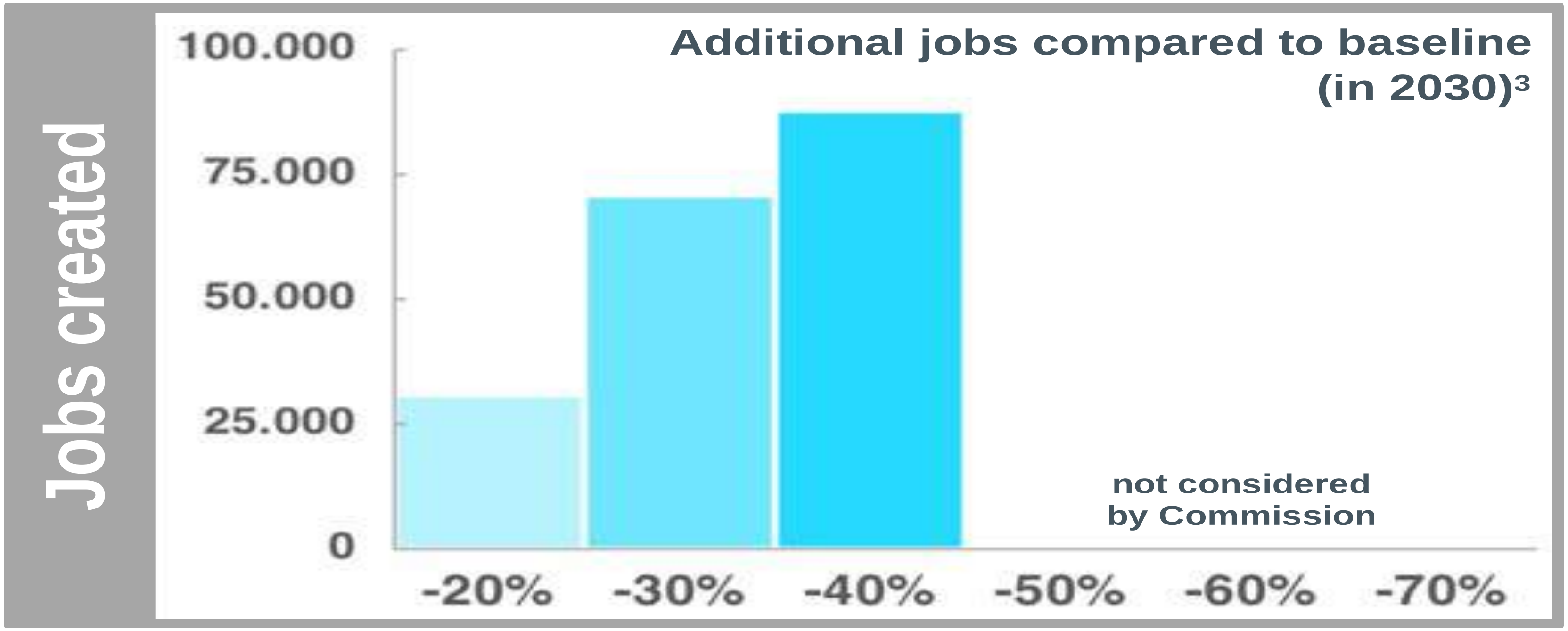
Quelle: https://www.theicct.org/blog/staff/no-regrets-eu-co2-std-2025-2030-20180404

Innovative Technologies lead less Oil- Imports and more Investments / Jobs in Europa

Data der EU-Kommission:



[1]Data taken from European Commission (EC) impact assessment
[2]Data from EC impact assessment, avoided CO_2 costs included, dashed bars use ICCT technology data
[3]Data from EC impact assessment, assuming battery cells manufactured in the EU

icct THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION

Quelle: https://www.theicct.org/blog/staff/no-regrets-eu-co2-std-2025-2030-20180404

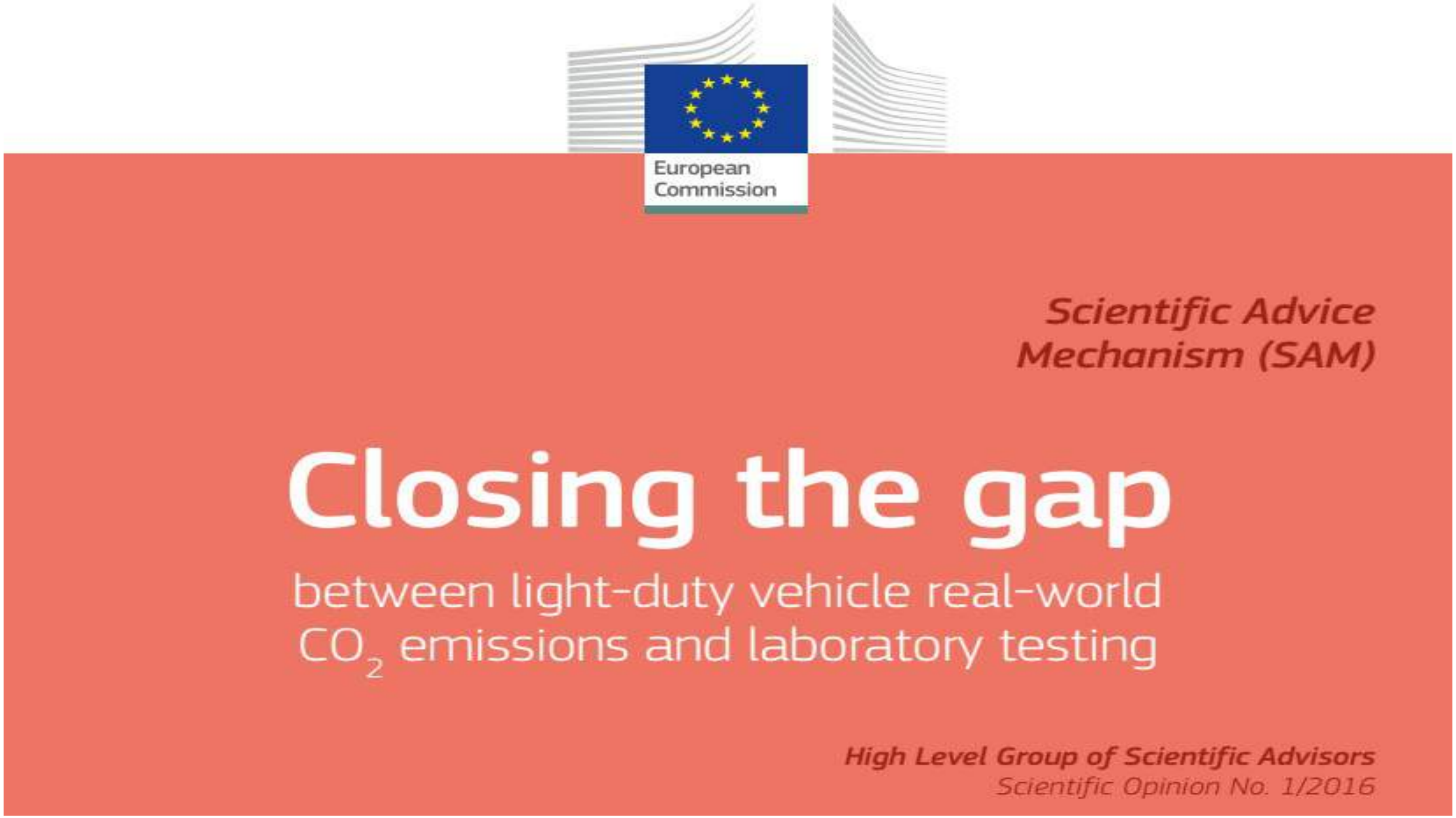
Bosch Boss blames Auto Industry

The boss of the automotive supplier Bosch demands from the German car manufacturers more use for the climate protection.

Bosch boss Volkmar Denner has called for a greater commitment of the automotive industry to the environment. "The automotive industry can do more for climate protection than it has to," wrote Denner in a guest contribution for the "Handelsblatt". The Bosch boss also criticized the federal government for its exit from the 2020 climate targets: "This strange serenity in the face of a global threat seems almost incomprehensible."

http://www.manager-magazin.de/unternehmen/autoindustrie/bosch-fordert-mehr-klimaschutz-von-vw-und-co-a-1232647.html

Consumer can‘t trust Consumption data anymore



Conclusion of the High Level Group of Scientists (1)

- In order to ensure the representativeness of the type approval test, a framework for the monitoring of real driving CO2 emissions is required. This should consist of an exploitation of CO2 data obtained from real driving emissions testing for pollutants using Portable Emissions Measurement Systems (PEMS), the development of a targeted *ex-post* Real Driving Emissions (RDE) methodology for CO2, and the introduction of a formal reporting of fuel consumption from on-board vehicle diagnostic systems.
- In order to grow the trust of the consumer in the regulatory system and the car industry, and to guarantee a level playing field for car manufacturers, a number of framework conditions must be met.

Conclusion of the High Level Group of Scientists (2)

- These include in particular the strengthening of regulatory oversight

and technical capacity in Europe, and increased transparency of the whole process.

- Legislation on CO2 emissions from road transport should be designed in a way that stimulates innovation and is able to adapt to the increasing take-up of new technologies such as plug-in hybrid and electric vehicles.
- The assumption that CO2 emissions measured with the WLTP will be closer to real-world emissions is reasonable. However, while the WLTP has the potential to become a common reference globally, its further development is recommended with a formal review every five years to ensure that the gap between laboratory and real-world emissions is not growing

Effort Sharing Regulation:
High Cost for the State Budget at Non Compliance of the Targets

Mandatory national annual GHG budgets for non-ETS sectors (mainly traffic, building sector, agriculture, waste)

- Coverage for not compliance through trade with other EU member states
- Expectation: from 2021 changed market situation; Market price is at least equal CO_2 avoidance costs in non-ETS sectors (eg EUR 33.5 - 100 / t CO_2)

● Annual cost savings for every million tonnes of avoided CO_2 would be at Non-compliance with the GHG budget is € 33.5 - € 100 million.

● The scenarios of the projection report 2017 lead to a cumulative missed target (2021 to 2030) between 150 - 300 million t CO_2

- Costs of carbon offsetting of EUR 5 - 30 billion

A higher level of ambition can significantly reduce the cost of the state budget,if the annual national GHG budgets of non-ETS sectors are not met.

Öko-Institut e.V.

Conclusions

1. The CO2 limits for passenger cars in the EU are well below the necessary CO2 reductions.

2. Technically, much more is possible with a positive effect for motorists and society.

3. The E-car regulation allows the increase in CO2 emissions of conventional vehicles.

4. The still used reference vehicle mass is an incentive to sell heavy vehicles.

5.The conversion from NEDC to WLTP can be abused by manufacturers.

It is obvious that, according to the current state of knowledge, the climate goals of the Paris Agreement can not be achieved with today's limits.

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Small is beautiful