PERSPEKTIVEN FÜR UMWELT & GESELLSCHAFT umweltbundesamt

Passenger Car Emissions: Standard and Real-World Fuel Consumption

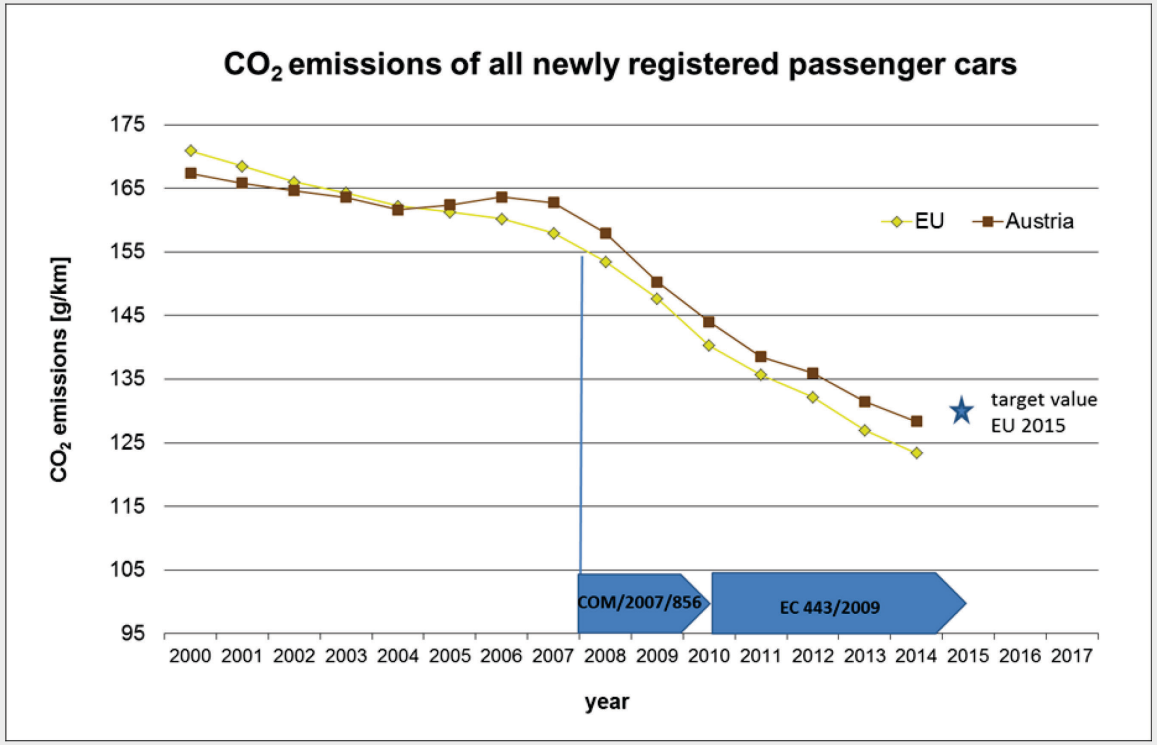
DI Günther Lichtblau, Environment Agency Austria

Study Content

- Commissioned by the Vienna Chamber of Labour (*AK Wien*)
- Europe-wide measurements show that there is an ever increasing gap between measured type approval consumption and real world data (e.g. ICCT)
- Study examines divergence the between real-world consumption and type approval data in Austria's new cars
- Fuel Consumption data of the 30 models with the highest number of registrations in Austria from 2000 to 2013 were analysed

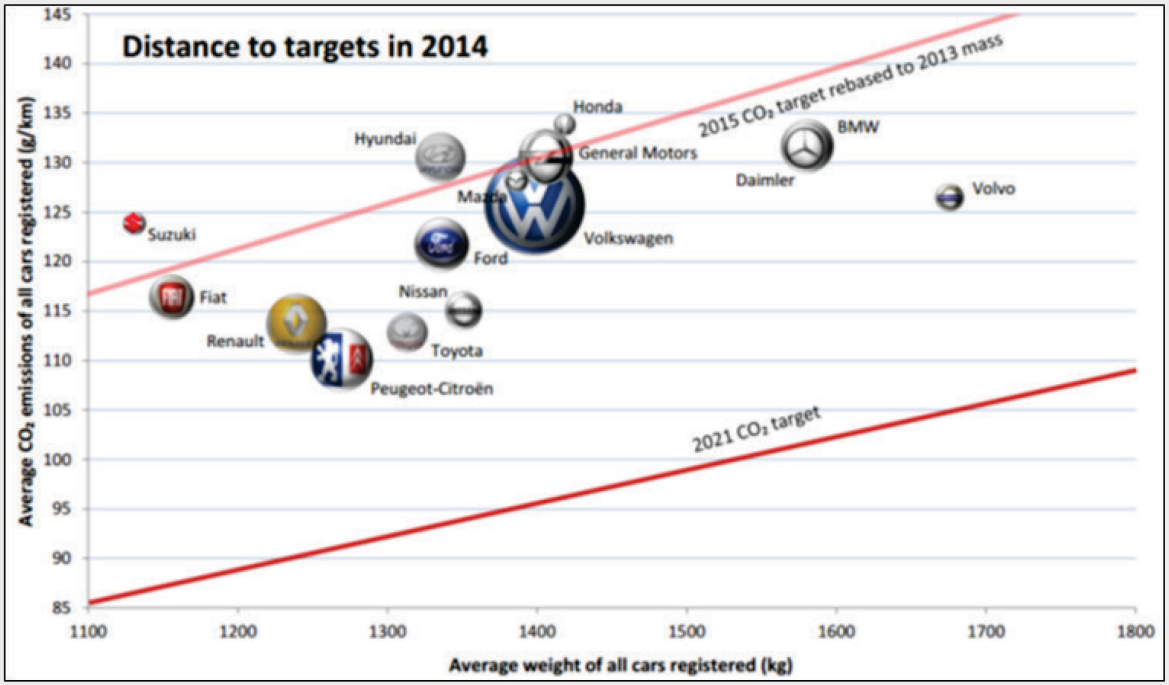
CO2 Emissions PC type approval data

- In Austria approximately constant 2000 - 2007
- Since 2008 remarkable reduction



CO2 emissions PC type approval data 2014

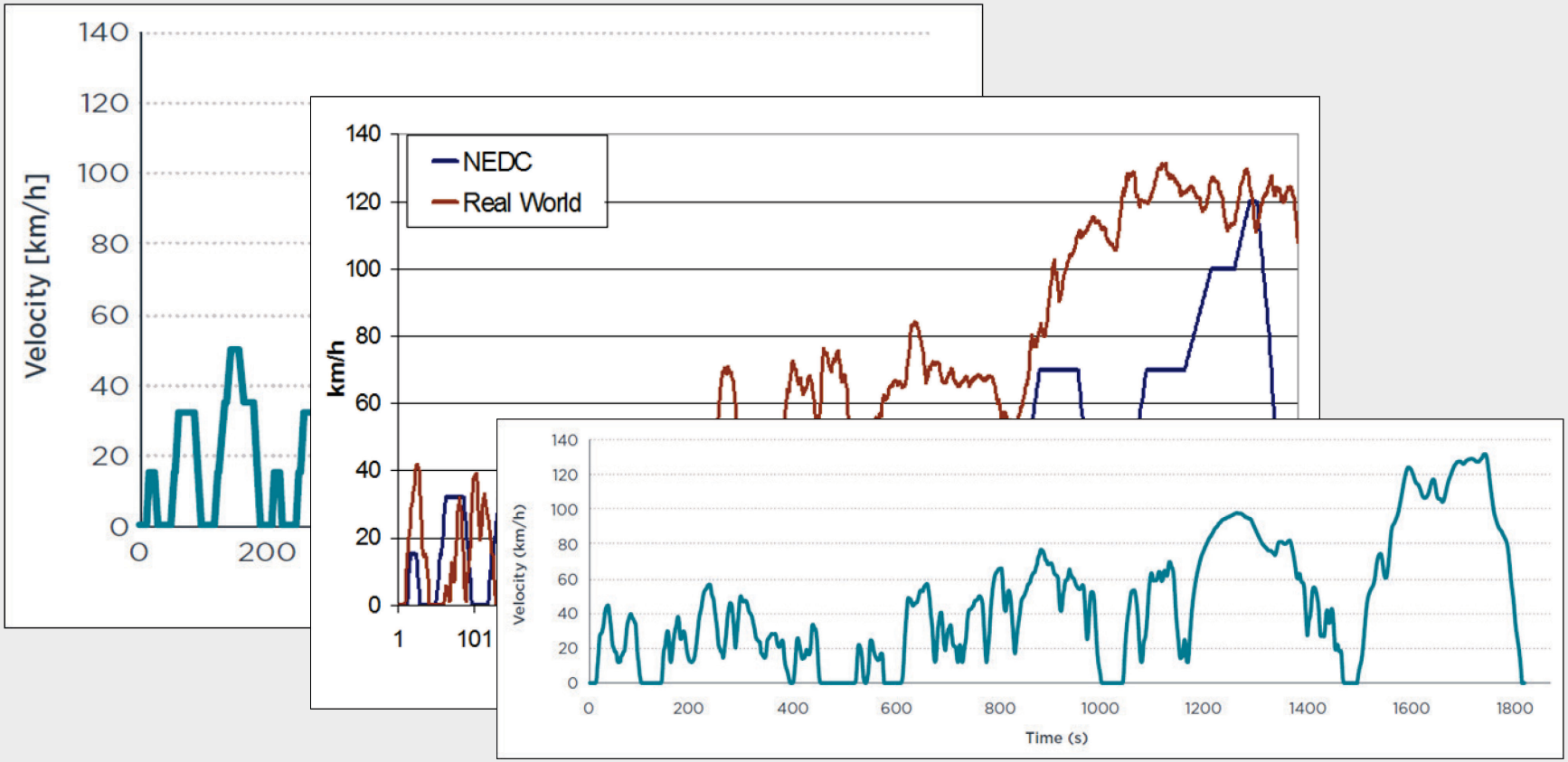
- Compliance with the limit of 130g CO_2/km in 2015 does seem likely for the Austrian fleet
- Some manufacturers clearly undercut the binding targets for 2015 ahead of schedule



FC/CO2 test procedure

- Actual test: NEDC
- Shows low maximum speed (for a very short duration 120 km/h), long standing times and significantly low dynamics
- Fuel consumption stated by the manufacturers does not comply with figures observed in real-world driving
- Vehicles are conditioned to show low fuel consumption (and pollutant emissions…) in the test
  - Real world test procedures developed (e.g. CADC cycle) to calculate national emission inventories for GHG/pollutant emissions
  - New test procedure WLTP to be introduced in 2017

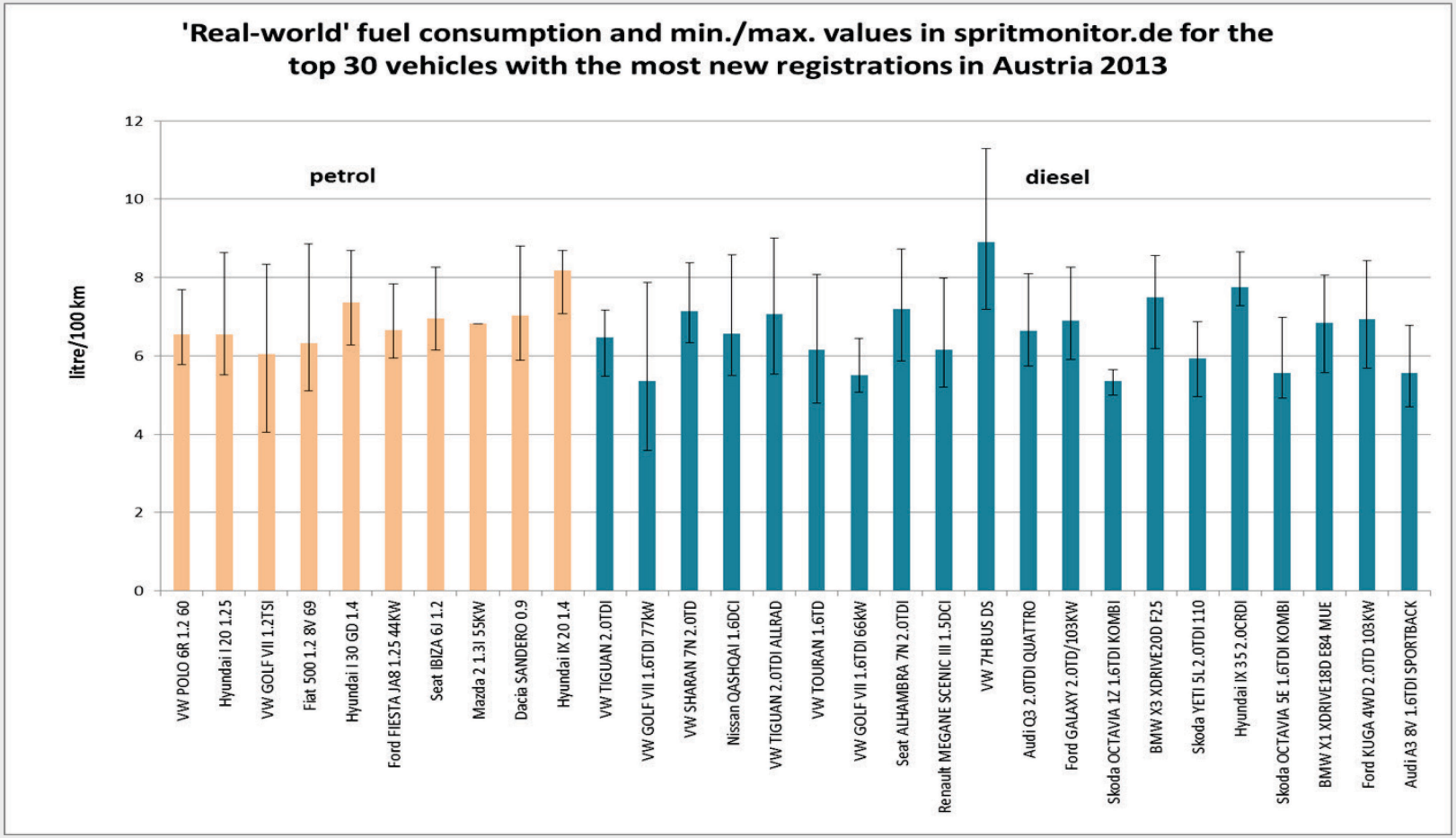
Test Procedures: NEDC, CADC, WLTP…



Study design

- Consumption figures stated by the manufacturers of the 30 models with the highest number in registrations between 2000 and 2013
- Compared to their real-world consumption data
- The real-world consumption data based on the database "spritmonitor.de", a publicly available database with most data entered by private users
- Data sources are subject to inaccuracies regarding exact model specifications and features (e.g. automatic transmission, air conditioning, etc.).
- Results compared with
  - international studies (ICCT)
  - data of emission calculation models (Handbook Emission Factors for Road Transport)
  - Austrian Air Emission Inventory – based on fuel sold data

Spritmonitor data 2013

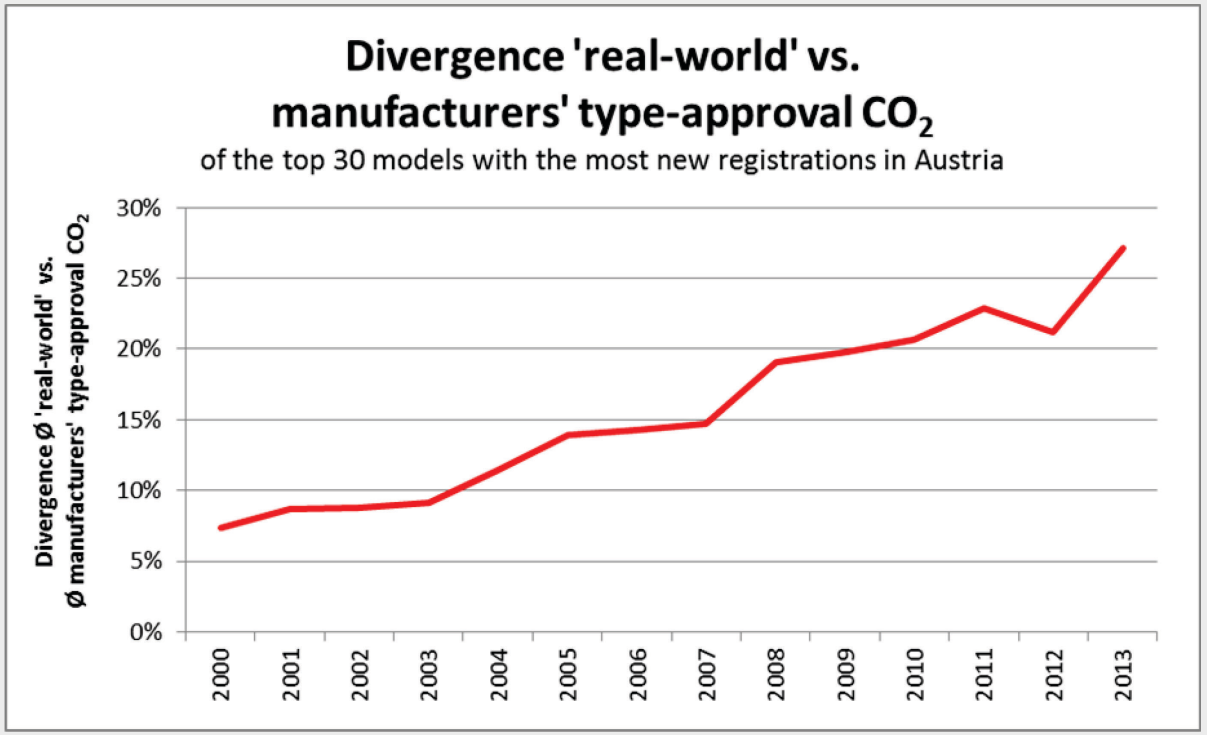


Manufacturers data 2000 - 2013

Make	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Audi	12% (1)	14% (1)	12% (3)	8% (2)	15% (2)	12% (2)	15% (2)	15% (2)	31% (3)	18% (2)	22% (1)	32% (1)	29% (2)	28% (2)
BMW	13% (1)	-	-	-	-	16% (1)	-	-	19% (1)	-	-	27% (2)	27% (1)	27% (2)
Chrysler	-7% (1)	-	-	-	-	-	-	-	-	-	-	-	-	-
Citroen	-	-	14% (1)	10% (1)	-	-	11% (1)	22% (1)	25% (1)	20% (1)	19% (1)	19% (1)	17% (1)	-
Dacia	-	-	-	-	-	-	-	-	-	20.13%	10% (1)	-	-	37% (1)
Fiat	8% (2)	10% (1)	13% (1)	12% (2)	9% (1)	14% (2)	-	31% (1)	27% (2)	21% (4)	15% (3)	22% (3)	23% (3)	24% (1)
Ford	11% (2)	14% (2)	9% (2)	9% (3)	13% (3)	14% (1)	-	17% (1)	28% (1)	28% (3)	24% (3)	26% (3)	22% (3)	20% (3)
Hyundai	-	-	-	-	-	21% (1)	15% (2)	22% (1)	17% (1)	21% (2)	27% (4)	25% (2)	26% (3)	33% (4)
Kia	-	-	-	-	-	-	32% (1)	-	-	-	-	-	-	-
Mazda	0% (2)	-2% (1)	-3% (1)	3% (2)	9% (2)	8% (2)	15% (2)	11% (2)	21% (1)	20% (1)	23% (2)	12% (1)	14% (1)	28% (1)
Mercedes	-	-2% (1)	3% (2)	-	-	-	-	20% (1)	-	-	-	-	-	-
Mitsubishi	-	-	-	-	-	-	-	3% (1)	11% (1)	-	-	-	14% (1)	-
Nissan	-	-	-	-	-	-	-	-	-	-	-	-	34% (1)	34% (1)
Vauxhall	2% (4)	9% (3)	9% (2)	9% (2)	11% (3)	16% (4)	10% (3)	15% (3)	15% (3)	16% (3)	15% (3)	19% (3)	-	-
Peugeot	-4% (2)	13% (2)	-	29% (1)	16% (1)	14% (1)	-	-	-	22% (1)	-	-	-	-
Renault	16% (1)	8% (1)	7% (2)	3% (2)	12% (2)	-	14% (1)	10% (1)	-	-	26% (1)	27% (1)	21% (1)	25% (1)
Seat	-	14% (1)	14% (1)	17% (1)	18% (1)	9% (1)	21% (1)	-	23% (2)	16% (3)	19% (1)	18% (2)	13% (2)	15% (2)
Skoda	2% (4)	-1% (4)	13% (3)	5% (3)	2% (3)	11% (3)	12% (2)	12% (1)	15% (2)	15% (2)	22% (1)	18% (1)	17% (1)	25% (3)
Suzuki	-	-	-	-	-	-	25% (1)	25% (1)	19% (1)	-	-	-	-	-
Toyota	5% (2)	6% (2)	5% (2)	-6% (1)	14% (1)	10% (2)	4% (2)	11% (2)	-	-	12% (1)	-	-	-
Volkswagen	12% (8)	11% (11)	11% (10)	11% (10)	13% (11)	15% (10)	15% (12)	14% (12)	16% (11)	20% (7)	21% (8)	24% (10)	21% (10)	28% (9)
Weighted divergence petrol	9% (7)	9% (4)	11% (4)	14% (3)	11% (4)	13% (11)	13% (9)	14% (10)	17% (11)	19% (22)	19% (18)	22% (14)	19% (14)	26% (10)
Weighted divergence diesel	7% (23)	9% (26)	8% (26)	9% (27)	12% (26)	14% (19)	15% (21)	15% (20)	20% (19)	20% (8)	23% (12)	23% (16)	23% (16)	28% (20)
Weighted divergence sum total	**7% (30)**	**9% (30)**	**9% (30)**	**9% (30)**	**11% (30)**	**14% (30)**	**14% (30)**	**15% (30)**	**19% (30)**	**20% (30)**	**21% (30)**	**23% (30)**	**21% (30)**	**27% (30)**
Legend	<5%		5% to <10%		10% to <15%		15% to <20%		20% to <25%		25% to <30%		≥30%	

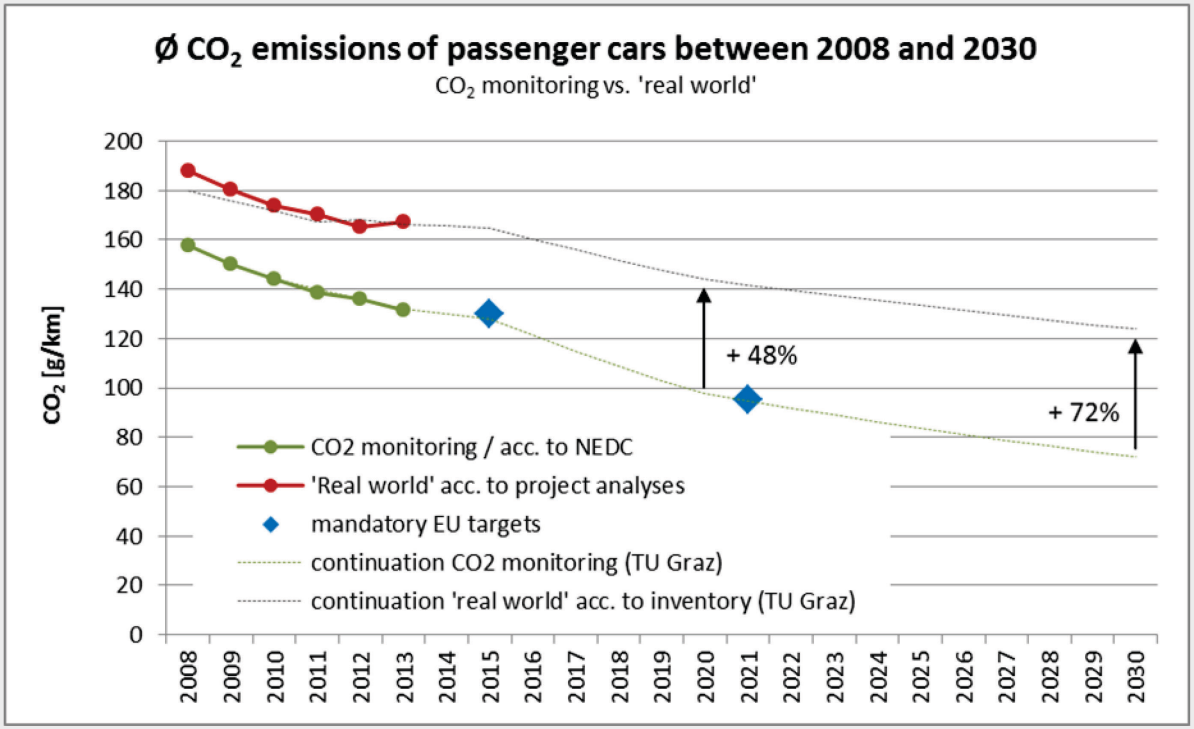
Manufacturers data 2000 – 2013 weighted divergence

- Divergence real world vs. type approval data increasing over time
  - 7% in 2000
  - 27% in 2013



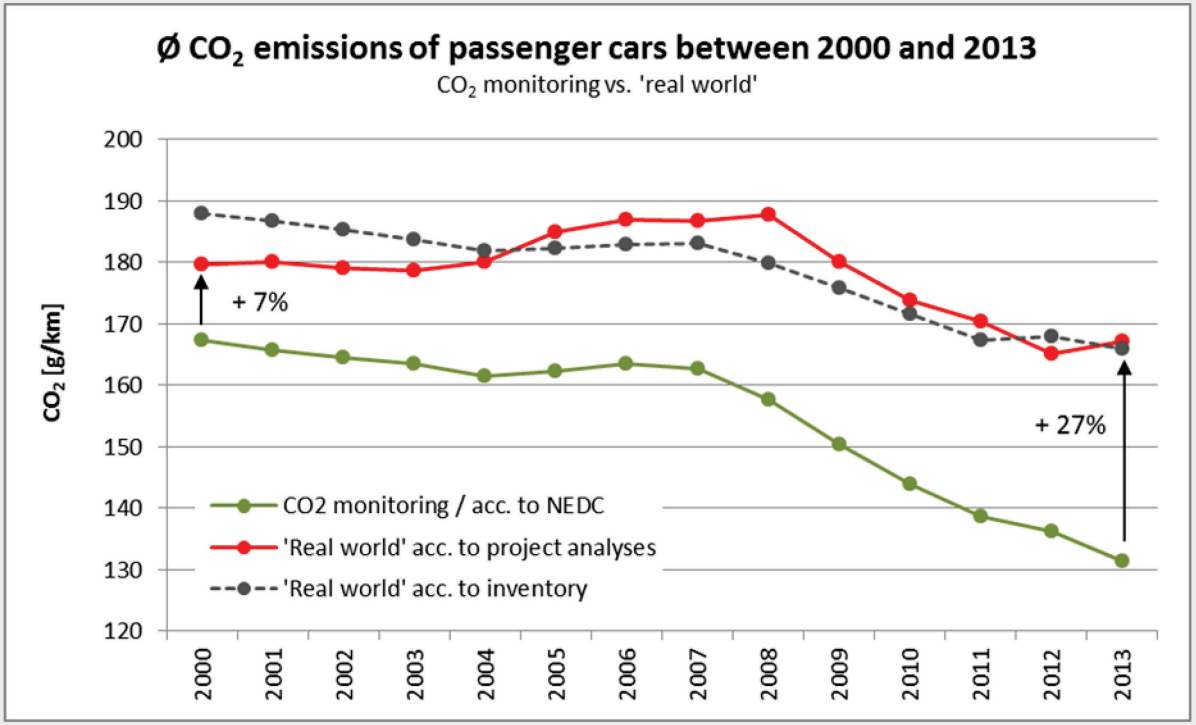
Projection 2030

- Increasing divergence real world vs. type approval fuel consumption
- Especially advanced drivetrains with integration of electric systems complex to cover



Correlation study result – emission inventory data

- Real world fuel consumption data for the Austrian vehicle fleet in line with the study results
- Austrian Emission inventory data based on robust fuel sold data



Findings/Suggestions

- Study proved divergence between real-world consumption and type approval data
- Consumption figures for the 30 models with the highest number of registrations in Austria between 2000 and 2013 show an increasing divergence from 7 % to 27 %
- Divergence is lower then data from EU wide analyses
- New test procedure will – in best case – slightly improve the situation, but not solve the problem

- ➢ New procedures to measure fuel consumption beside standardised testing under defined conditions should be put in place
- ➢ Independent laboratories shall, also in cooperation with manufacturers, perform real world fuel consumption and emission measurements and publish data