

EcoTest as a Basis for a Global Green Labelling –

Discrepancies between manufacturer's specifications and actual fuel efficiency

GFEI Workshop on In-use Fuel Economy

Session 1 – Current status and recent findings in measuring inuse fuel economy

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ADAC Technik Zentrum

- ADAC is the worlds 2nd largest automobile club with more than 18.9 m members enjoying the status of a consumer protection organisation
- ADAC Technik Zentrum: Test centre of the European FIA clubs
- Emission tests, car reviews, crash tests, product tests, total cost of ownership, etc.
- What does consumer protection mean?
 - no commercial interest in products
 - neutral publication
 - focus on product improvement





Example: European Test Consortium for Child Restraint Systems





ADAC emissions lab and low-temperature dynamometer



Emissions lab

- Temperature range: -10°C to +40°C
- max. speed 200 kph
- Simulation of uphill sections (up to 20%)
- CO, HC, CH₄, THC, NMHC, NO_x, NO, NO₂, PM, PN, CO₂
- official type approval lab



Low-temperature dynamometer

- Temperature range: -25°C to +30°C
- Horsepower up to 2 x 260 kW (2 x 350 hp)
- max. speed up to 260 kph
- OBD data interface
- Variable wheelbase: between 2.36 and 3.36 m

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ADAC EcoTest



- Since 2003 comprehensive consumer information regarding the eco-friendliness of vehicles
- Assessment of fuel consumption (CO₂ emissions) and pollutant emissions
- Based on specially developed real-life driving cycles, which go beyond the mandatory type approval test cycles
- Objective: innovation, light-weight design and fuel efficiency across all vehicle classes
- Manufacturers use EcoTest as a standard and include the test label in their advertising
- Adjustment of the test and rating criteria as from April 2012:
 - Inclusion of the WLTP cycle (the coming world-wide test cycle)
 - Well-to-wheel assessment for better comparability of electric vehicles
 - Electric cars are assessed on the basis of the energy consumed (kWh) incl. self-discharge and the CO₂ emissions from power plants based on the German (D) electricity mix (Source: Federal Environment Agency, UBA) and renewable energies
 - Stricter CO₂ limits
 - Adjustment of pollutant assessment to Euro 6 (petrol engines)
 - Measurement and assessment of the particle number



EcoTest rating is more than CO₂ and fuel consumption





EcoTest rating – 5-star rating system





EcoTest test cycles

NEDC cold

Initial assessment; testing for pollutants such as HC, CO, NO_x , particulate matter and NEW! the particle number of diesel and direct-injection petrol engines; NEW! daytime running lights (if present) or low beams are on during test; CO_2 testing

WLTP

"World cycle" replaces NEDC hot; with air conditioning on and NEW! daytime running lights (if present) or low beams are on during test; CO_2 testing

ADAC Motorway test

With air conditioning on and NEW! and daytime running lights (if present) or low beams on during test; testing for pollutants such as HC, CO, NO_x , particulate mass; CO_2 testing









EcoTest test cycles

- Petrol and diesel vehicles
 No special sequence
- LPG/CNG vehicles
 NEW! EcoTest is run only on LPG/CNG drive
- Hybrids

Battery state of charge (SOC) 60-70 %

Plug-In-hybrids

Measurement of full battery and measurement of empty battery – standard averaging;

measurement of the charge (energy input) in

kWh and calculation of CO₂ emissions (1 kWh= 563 g/kWh; Source: UBA; this value is corrected as needed)

Electric vehicles

Measurement in electric vehicle cycle (all three cycles back to back) until SOC < 50 %; measurement of the charge (energy input) in kWh and calculation of CO_2 emissions (1 kWh= 563 g/kWh; Source: UBA; this value is updated as needed); power plant emissions are not relevant





ADAC EcoTest

Polutants rating – thresholds



All types of drives or fuels are equal in ADAC EcoTest.

Unlike under current legislation	- no bonus for diesel engines applies in ADAC EcoTest
- particulate emissions of petrol DI	 test of aggressive driving emissions (Motorway / off-cycle)



ADAC EcoTest

CO₂ rating – thresholds, well-to-wheel



*) Biofuel quota not taken into account

CO₂ ratings are based on a system of relative class-dependent scales.

The ADAC EcoTest offers consumers useful information for comparing vehicles of the same size and vehicle class and considers the source of the fuel (well-to-wheel).



CO₂ rating – vehicle classes and sample cars

No.	Vehicle class	Examples
1	Microcar	Smart
2	City	Fiat 500, Peugeot 107, VW up!
3	Supermini	Ford Fiesta, Peugeot 208, VW Polo, Audi A1
4	Small family	Mercedes A-Class, Toyota Auris, VW Golf
5	Family	3-series BMW, Mazda 6, Opel/Vauxhall Insignia, Toyota Avensis
6	Executive	Audi A6, 5-series BMW, Mercedes E-Class, Volvo V70
7	Luxury	Audi A8, 7-series BMW, Mercedes S-Class

A family will seek for the cleanest and most efficient car in the category Small Familiy, a single person in a large city will seek for the cleanest and most efficient Microcar, etc.

Well-to-Tank (WTT) – CO₂ emissions in energy generation per unit of energy



For Global NCAP we need to develop a conclusion for energy sources in different countries to drive clean vehicle technology (efficient, clean), as well as clean energy production and energy supply.

Well-to-Wheel (WTW) – CO_2 emissions in EcoTest vs. manufacturer's specifications



The EcoTest CO₂ results of electric cars may considerably depart from manufacturers' specifications due to energy generation and driving cycles.

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ADAC EcoTest – Results



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Limits and tolerances in fuel efficiency specifications

- Discrepancies between manufacturer's specifications and actual fuel efficiency has been a frequent reason for litigation between consumers and manufacturers.
- When it comes to fuel consumption, we must distinguish between
 - manufacturer's specifications based a test cycle (NEDC New European Driving Cycle) in line with EU Reg. 715/2007 (type approval)
 - the fuel consumption of a specific vehicle in real-life use in traffic
 - the fuel consumption of the specific vehicle in cause measured in a test cycle (NEDC New European Driving Cycle) in line with EU Reg. 715/2007
- Whereas manufacturers' fuel efficiency specifications are verified under defined conditions in a lab, the fuel consumption observed by the motorist depends on personal driving styles, the speed profile, weather conditions, vehicle payload etc.

The fuel consumption observed in real-life traffic <u>cannot</u> be compared with manufacturers' fuel efficiency specifications.

Fuel consumption in EcoTest vs. manufacturer's specifications



Fuel consumption in EcoTest vs. manufacturer's specifications – Classified by fuel type



Fuel consumption in EcoTest vs. manufacturer's specifications – Classified by vehicle class



Fuel consumption in EcoTest vs. manufacturer's specifications – Classified by fuel type and vehicle class



Conclusion

- EcoTest measurements show an increased consumption in comparison to the manufacturer's informations
- The largest deviations are indicated for vehicles with electric and hybrid drive
- EcoTest is suitable to provide a basis for the GreenNCAP

- With the exception of EcoTest, all popular eco-friendliness car ratings are based on manufacturer's specifications and thus do not reflect actual fuel consumption.
- EcoTest offers more realistic emission and fuel consumption data for consumers and can be used as a basis for the new Green NCAP protocoll and roadmap

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Global NCAP Cars, EcoTest Results in Detail





Ford Figo 1.0 Trend



Suzuki Alto 1.0 Basic



VW Polo 1.2 Trendline



Tata Nano



Hyundai i10 1.1 Classic



Global NCAP Cars, EcoTest Results in Detail

Vehicle	Power [kW]	Engine /fuel	FC [l/100km]	CO2 EcoTest	Pollution Score	CO2 Score	EcoTest Score	EcoTest Stars
Ford Figo 1.0 Trend	48	Gasoline	8,14	210,94	25	4	29	*
Hyundai i10 1.1 Classic	51	Gasoline	6,85	186,00	43	10	53	***
Suzuki Alto 1.0 Basic	50	Gasoline	5,70	151,69	31	21	52	***
Tata Nano	28	Gasoline	4,30	120,95	49	34	83	***
VW Polo 1.2 Trendline	51	Gasoline	7,12	195,78	43	11	54	***



Global NCAP Cars, EcoTest Results in Detail



The best vehicle is the Tato Nano with 83 points in the EcoTest, the fuel consumption is 4.30 l/100 km or 25.32 mpg (US), resulting in CO2emissions of 121.0 g/km (WTW)

The worst vehicle is the Ford Figo with 29 points in the EcoTest, the fuel consumption is 8.14 l/100 km or 47.93 mpg (US), resulting in CO2emissions of 210.9 g/km (WTW)

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Green NCAP: Requirements from FIA

- Green NCAP is a common Project of the Global New Car Assessment Program (GNCAP) and the Gobal Fuel Economy Initiative (GFEI).
- <u> Aim:</u>
 - Setting a more stringent test procedure for environmental performance of cars similar to NCAPs which already do this for crash tests and successfully rate safety features of vehicles.
 - Development of a new rating system to assess and quantify environmental performance of cars based on
 - » tailpipe emissions (CO₂, CO, NO_x, PM₁₀, PM_{2.5} and HC in g/km or μ g/km)
 - » energy efficiency (in MJ/km)
 - » noise (in dB).



EcoTest as a Phase-in for a Green NCAP Roadmap

NCAP

	Cars per Year	Emissions	NEDC (cold)	ADAC Highway (warm)	WLTP (warm)	WLTP (cold)
EcoTest Data from ADAC	ADAC: 150 European cars	CO2, HC, CO, NOx, PM	for cross check	for off cycle banning	for real world driving	no
Global Green Label from GreenNCAP	ADAC: 150 Europ. + Latin NCAP, Global NCAP	CO2, HC, CO, NOx, PM	Phase 1	Phase 1	Phase 1	Phase 2
Global Green Label from GreenNCAP	GNCAP Labs (European, Transatlantic)	CO2, HC, CO, NOx, PM				Phase 3
Global Green Label from GreenNCAP	Further development stages like Euro NCAP	further Roadmap within GNCAP				+ ()

Examples for GreenNCAP Label

GREEN

GREEN

GreenNCAP

NCAP



Thank you very much for your attention!