

Measuring emission performance of Autogas cars IN REAL DRIVING CONDITIONS

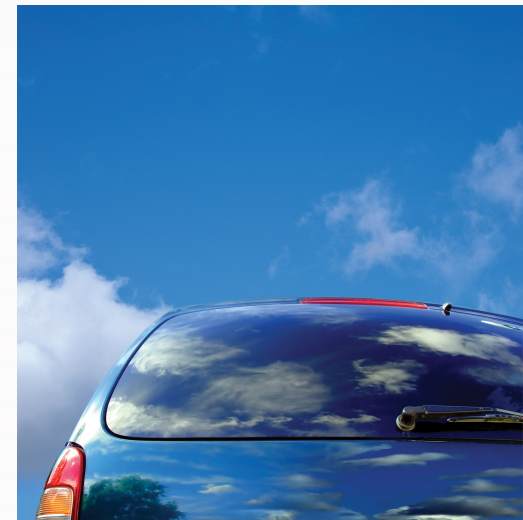


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LPG proven benefits for climate and air quality

- ✓ Up to **16% CO2 emissions saving** compared to petrol;
- ✓ If 10% of the car fleet in Europe was LPG, would result in **350 million tonnes of CO2 avoided**, and a reduction in external cost (e.g. medical treatment, premature deaths, etc.) of pollutant emissions of over **20 billion euros**;
- ✓ From a **well-to-wheel** perspective (including emissions from production and distribution of fuels, in addition to tail-pipe emissions), GHG footprint respectively **21% and 23% lower than petrol and diesel** - cf the EU Fuel Quality Directive;
- ✓ Up to **96% less NOx (Nitrogen Oxide) than diesel and 68% less than petrol**
- ✓ **Almost no particulate matters and black carbon**, contrary to diesel whose fumes were classified as carcinogenic by the World Health Organisation in 2013;



40p
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WEDNESDAY 23 SEPTEMBER 2015

Toxic scandal on our roads

Millions may be driving UK vehicles that breach pollution targets

Transport Secretary demands EU-wide inquiry into car industry

VW sorry after world's largest car-maker is caught rigging tests



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Volkswagen in meltdown after faked diesel tests

rivers face mass recall as share price crashes

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hundreds of thousands of Volkswagens in Britain are facing a mass recall of their vehicles after the scandal affecting the carmaker spread around world yesterday.

German companies admitted that fleet of its cars worldwide were "cheated" the testing of its diesel cars for toxic emissions.

VW Group suffered a heavy blow on Frankfurt stock exchange, with its share price falling by 20 per cent for the first consecutive day. A total of \$10bn has now been wiped off the value of the company since the start of the scandal.

The commission said that it was waiting for the outcome of an investigation by the German government into VW and some of the country's other manufacturers. It confirmed, however, that it would reform the EU emission testing regime early next year.

"VW has announced that it is to set aside €8.5 billion to correct emission 'discrepancies', potential fines from regulators and possible legal claims from customers or rivals.

The company's British operation said that it had not received orders from global headquarters in Wolfsburg over how it should be communicating with its customers or whether three world-

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Volkswagen emission test cheating rocks Europe's car manufacturers

VW shares drop 20% with investigations set to widen • Industry faces 'Libor moment'

Chrysler drops plans to acquire PSA

Chrysler has abandoned plans to buy PSA Peugeot Citroën, the French carmaker, after the US firm's board rejected the deal.

Obama to challenge China's rise

President Obama will challenge China's rise in the Pacific region, according to a senior administration official.

EU set to vote on whether to build US

The European Commission is set to vote on whether to build a new transatlantic trade agreement with the US.

EU to cut 600 jobs as scandal hits

The European Commission is set to cut 600 jobs as a result of the Volkswagen scandal.

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Dirty secrets of the car industry



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The European LPG industry's response

Clarify Autogas vehicles' performance in terms of CO₂ and pollutant emissions

- ✓ Proactive testing programme undertaken by the LPG industry, as a commitment to transparency and accuracy
- ✓ Overcome the limits of tests in laboratories by reproducing real driving conditions
- ✓ Based on state-of-the-art test procedures, RDE and WLTP, to become mandatory in the EU in September 2017
- ✓ Make it possible to compare the environmental performance of Autogas with traditional fuels (diesel and gasoline)
- ✓ Measure simultaneously a number of GHG and pollutants: CO₂, CO, NO_x, HC, particle number

RDE: Real Driving Emissions, ruled by
Commission Regulation (EU) 2016/646

WLTP/C: Worldwide harmonized Light vehicles
Test Procedures/Cycle

CO₂: Carbon Dioxide
CO: Carbon Monoxide
NO_x: Nitrogen Oxides
HC: Hydrocarbons

A diverse set of vehicles tested



Skoda Octavia: Euro 6 homologated; LPG system retrofitted (Port Injection); mileage of 74,000 km



Alfa Romeo Mito: Euro 5 homologated; LPG system retrofitted (Port Injection); mileage of 65,000 km



Opel Astra: Euro 5 homologated; original LPG vehicle from manufacturer (Dual injectors); mileage of 71,000 km + Diesel Euro 6



Fiat 500L: Euro 6 homologated; original LPG vehicle from manufacturer (Port Injection); mileage of 6,300 km



Kia Sportage: Euro 5 homologated; LPG system retrofitted (Direct Injection); mileage of 27,000 km

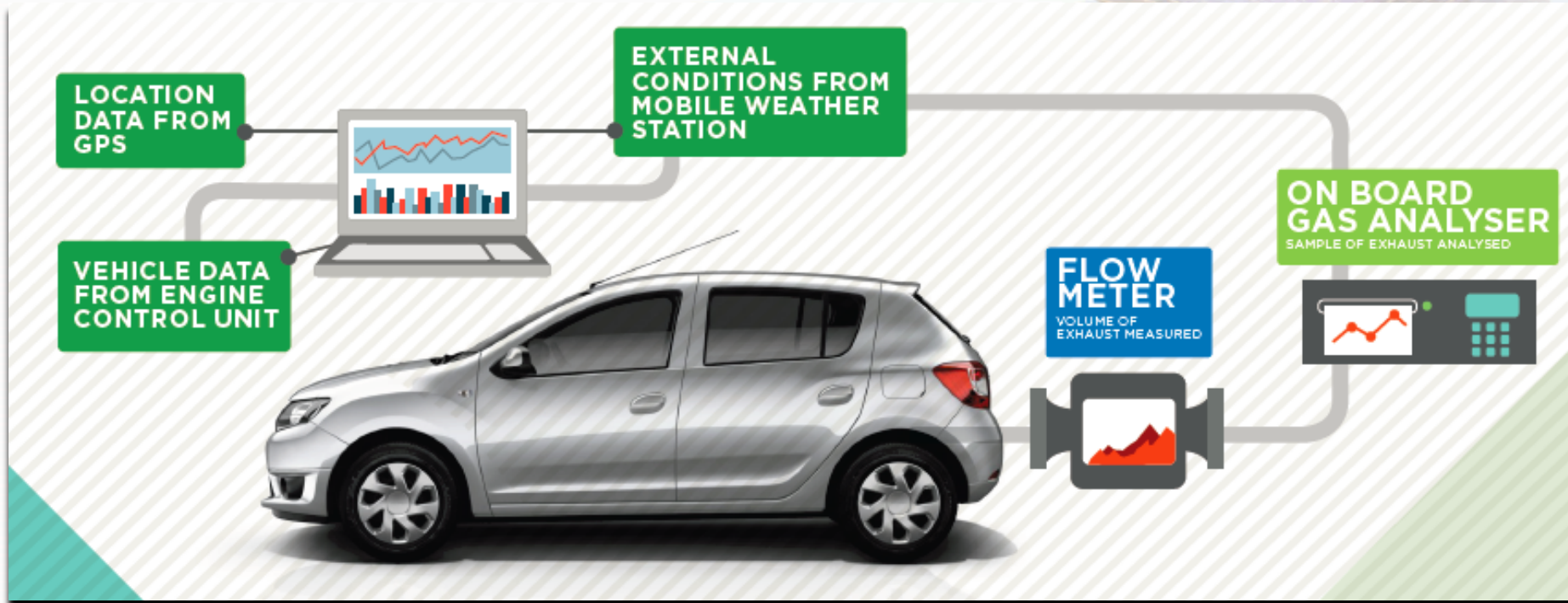
Methodology (1)

- ✓ Tests undertaken by independent experts in two different countries: the University of Applied Sciences in Saarbrücken, Germany, and the engineering consultancy V-Motech in France
- ✓ Emission data collected by a Portable Emission Measurement System (PEMS) fitted on the cars



- ✓ Series of at least three tests on each model and in each fuel mode (LPG, gasoline and diesel) to guarantee quality, according to the provisions of the RDE Regulation, following a specific route with urban, rural and motorway segments
- ✓ Series of tests on WLTP/C for comparison purposes

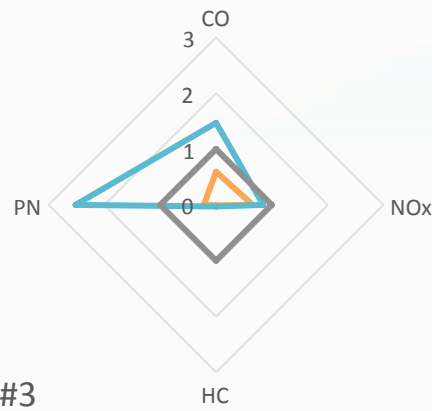
Methodology (2)



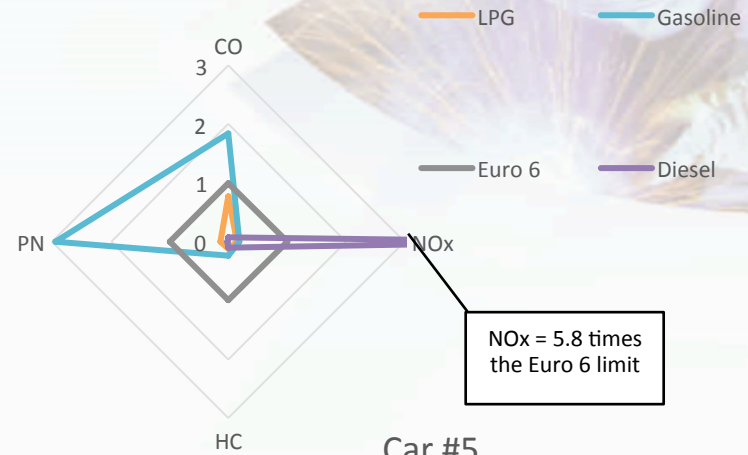
Results overview vs. Euro 6 limits



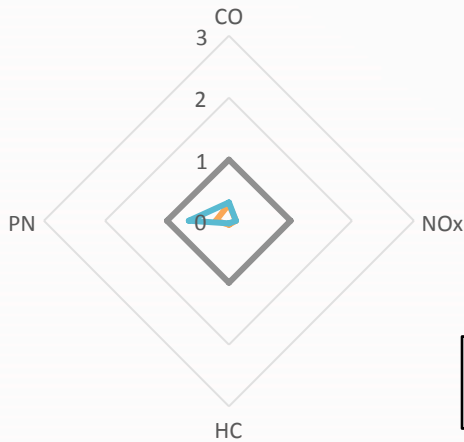
Car #1



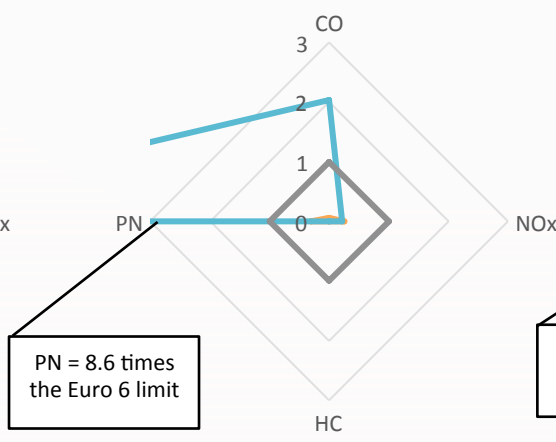
Car #2



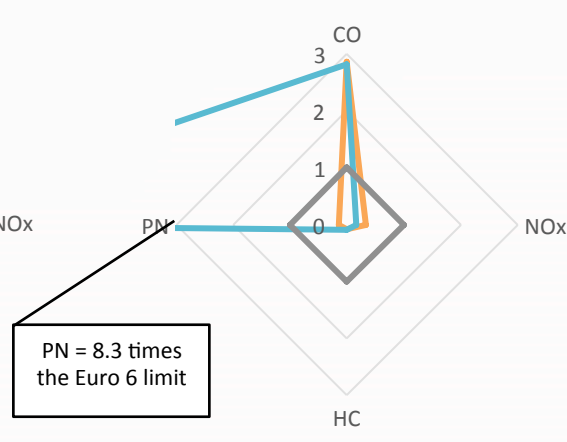
Car #3



Car #4



Car #5



Conclusion on RDE tests

Autogas vehicles, even older converted cars, bring significant reductions in NOx and particles emissions when compared to equivalent diesel and gasoline models respectively

- ✓ The WHO's air quality guidelines clearly identify NOx and particles emissions from transport as causes of negative health effects
- ✓ In addition, Autogas cars also bring a 10-20% CO2 gain compared with gasoline equivalents, helping Europe reaching its climate change objectives

Key results for the Autogas vehicle compared to gasoline

CO2	CO	NOx	HC	PN
-13%	-45%	Similarly low	Similarly low	-90%

- ✓ Similar emission profile as modern diesel (i.e. low on CO2 and several pollutants) but -98% NOx emissions!!