CO2 Emissions from Cars: New Policy Measures and Research Activities in Europe

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Where does the JRC fit in the European Commission?

President Barroso

27 Commission Members

Commissioner Potočnik

Science and Research

Joint Research Centre (JRC)

Research DG (RTD)

Research-Based Policy Support

JRC - Robust Science for Policy Making

As a Directorate-General of the European Commission, the JRC provides customer-driven scientific and technical support to Community policy making

Supporting citizen's security, health and environmental protection, safety of food and chemicals, alternative energies, nuclear safety, econometrics, prospective technologies…

The European Climate Change Programme

- The European Climate Change Programme (ECCP) was established in 2000 to help identify the most cost-effective EU measures that could enable the EU to meet its target under the Kyoto protocol.

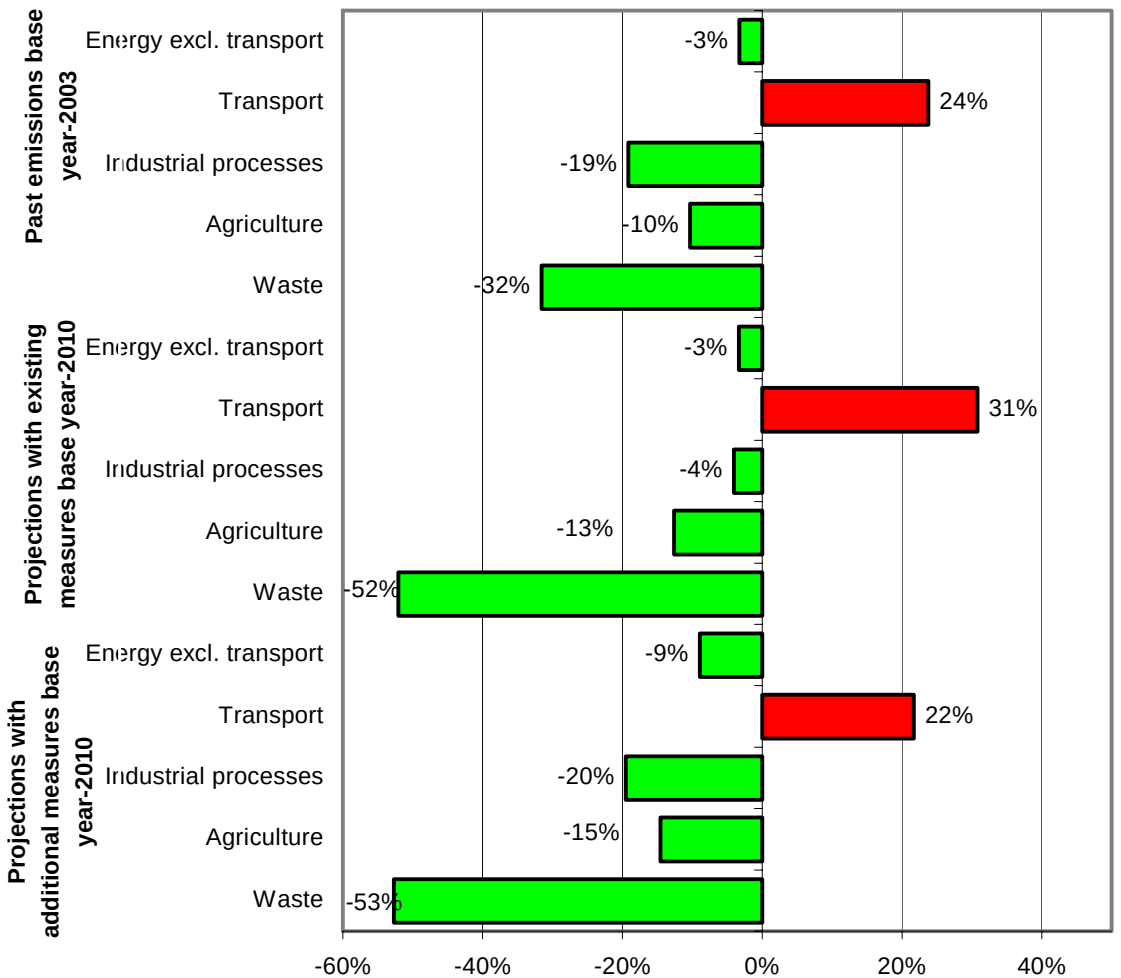
- The Second European Climate Change Programme (ECCP) II was launched in October 2005 with the objective of exploring further cost-effective options for reducing greenhouse gas emissions.

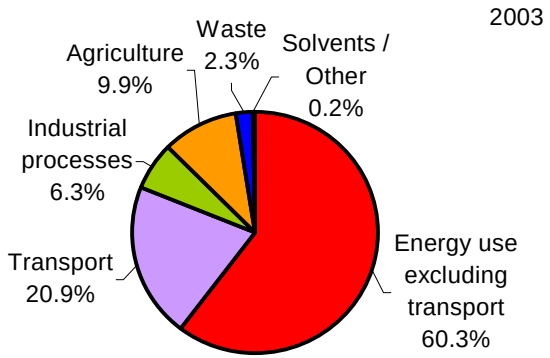
European Climate Change Programme Findings

- Transport is the second largest sector of GHG emissions accounting for 19% of EU-25 emissions in 2003.
- Road transport is the biggest transport emission source (94% share).
- Passenger cars alone are responsible for around 12% of EU CO2 emissions.
- Without further measures domestic transport GHG emissions could increase for the EU-15 by almost 31% by 2010 (compared to 1990) and up to 50% by 2020.

Reducing CO2 emissions from new cars is a key priority of EU climate change policy.

Change in EU-15 GHG emissions by sector base year to 2003, sector projections "with existing" and "with additional measures" base year to 2010





"Old" EU strategy on CO2 and cars

EU objective: To achieve a fleet average of new passenger car of 120 g CO2/km by 2012 (equivalent to 4.5 l/100 km diesel or 5l/100km gasoline)

- Three pillars strategy:
  - Agreements with car industry
  - Consumer information : EU Directive 1999/94/EC requires the display on each new car of a label showing its fuel consumption and CO2 emissions
  - Fiscal measures: the Commission has proposed EU legislation aimed at including a CO2 element in national car taxes.

Agreement with manufacturers

- Commitments have been concluded with the European (ACEA), the Japanese (JAMA) and Korean (KAMA) automobile industries.

- Same CO2 emission objective: 140 gCO2/km
  (to be achieved by 2009 by JAMA and KAMA and by 2008 by ACEA).

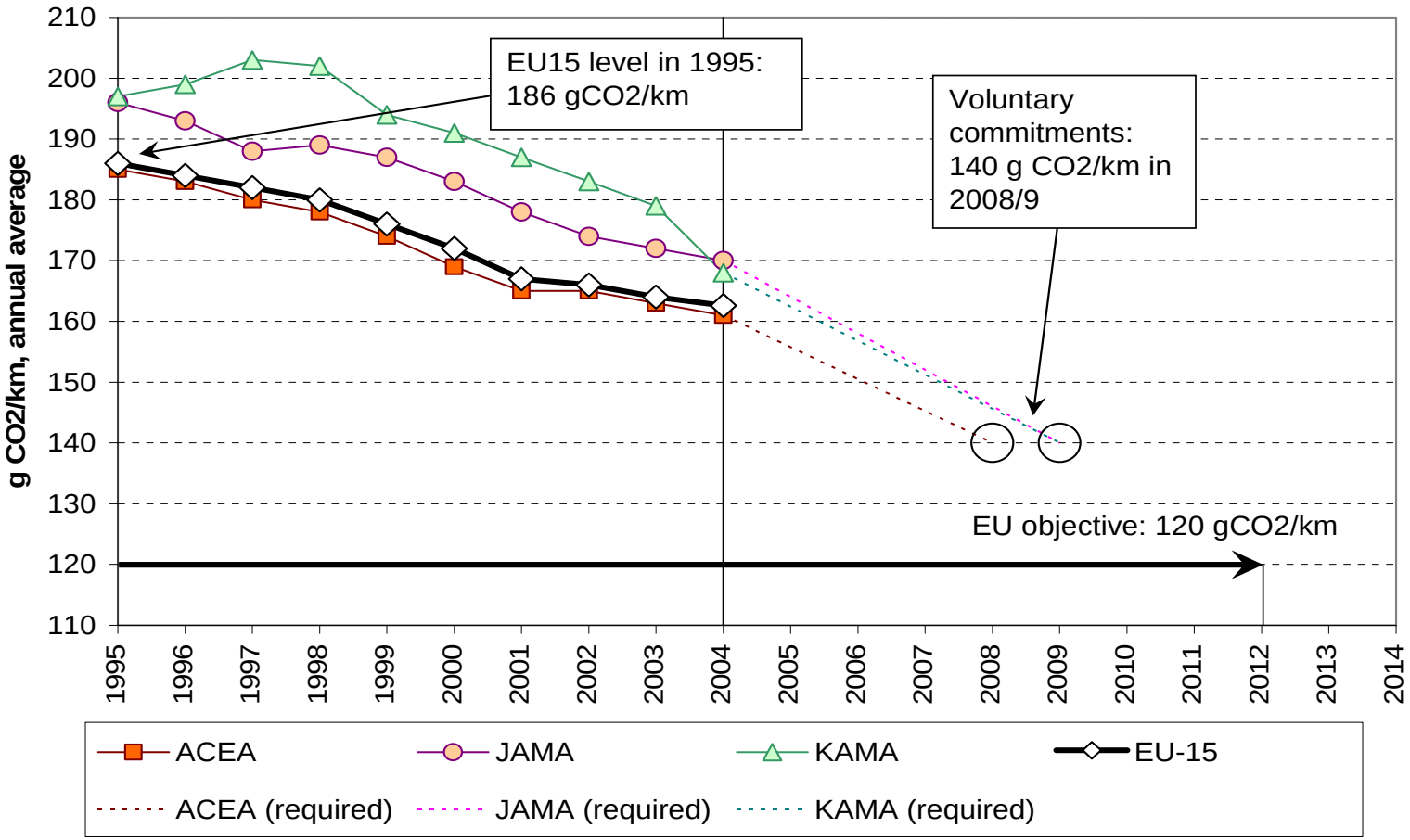
- Means of achievement: achievement of the CO2 target 'mainly' by technological developments.

Progress so far…

- During the period 1998 to 2004, the car industry associations (ACEA, JAMA and KAMA) substantially met all the obligations stated in their commitments
- The reduction in CO2 emissions has been overwhelmingly achieved by technological developments (in particular diesel)
- The impact of the measures taken under the other two pillars (labelling/taxation) has been limited

Voluntary Commitments: major efforts still needed…

12.4% reduction in 2004 compared to 1995, out of total 25% required by 2008/9…

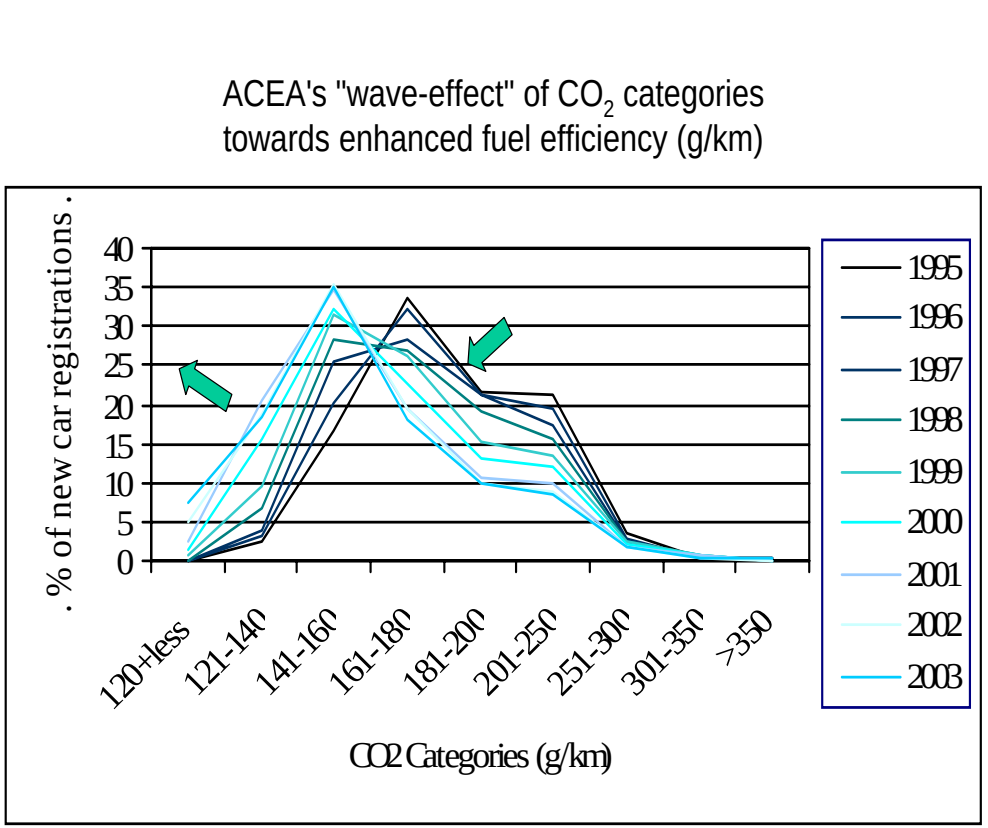


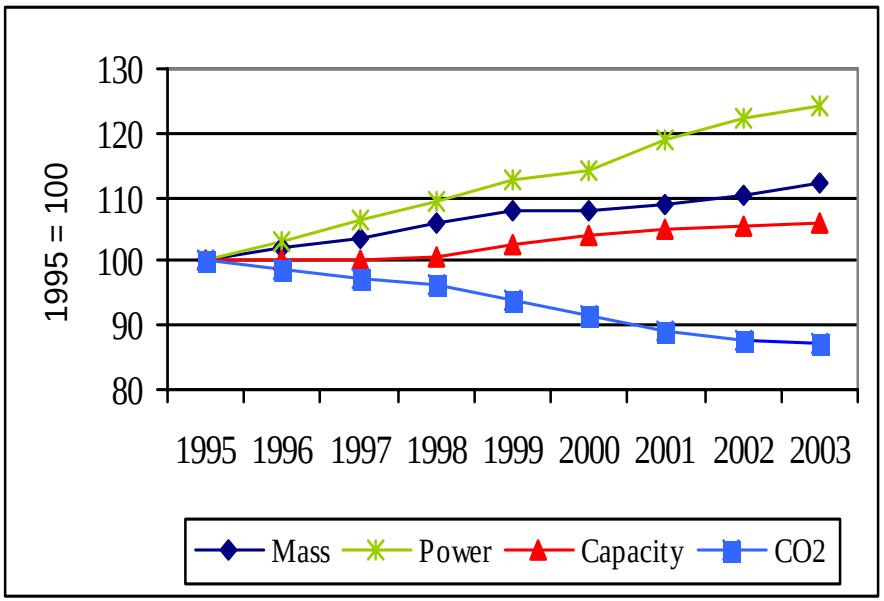
"Old" EU strategy on CO2 and cars

Results

- The strategy has brought only limited progress towards achieving the target of 120g CO2/km by 2012.
- Between 1995 and 2004 average emissions from new cars sold in the EU-15 fell by 12.4%, from 186g CO2/km to 163g CO2/km.
- Over the same period new cars sold in the EU became significantly bigger and more powerful.

Fleet evolution





Physical ACEA Fleet Characteristics (1995=100)

(source: Commission/ACEA joint report on CO_2 and cars, reporting year 2003)

Review of the EU strategy (2005-06)

- As part of the European Climate Change Programme, in the last years the Commission carried out a review of the strategy
- The conclusion of the review is that the voluntary approach has delivered a solid CO2 reduction but has not been as successful as hoped.
- Given the slower than expected progress to date, the 120g CO2/km target will not be met by 2012 without additional measures

Revised EU strategy on CO2 emissions from cars

"Revised" EU strategy on CO2 and cars

Main measures (1):

- EU legislation to reduce CO2 emissions from new cars and vans.
- Target: : 120g CO2/km by 2012 (average emissions from new cars sold in the EU-27)
- Improvements in motor technology would have to reduce average emissions to no more than 130g/km, while complementary measures (more efficient MAC, low rolling resistance tyres,…) would contribute a further emissions cut of up to 10g/km.
- For vans, the fleet average objectives would be 175g by 2012 and 160g by 2015, compared with 201g in 2002.

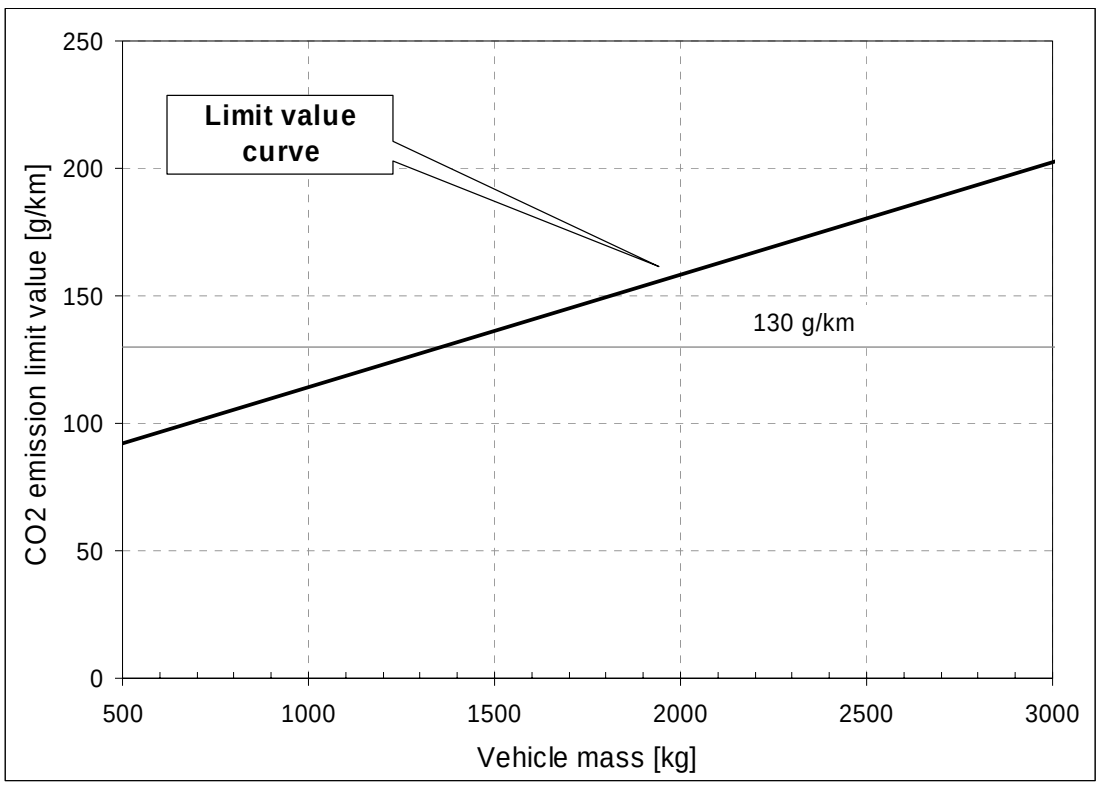
“Revised” EU strategy on CO2 and cars

Main measures (2):

- Support for research efforts aimed at further reducing emissions from new cars to an average of 95g CO2/km by 2020.
- Measures to promote the purchase of fuel efficient vehicles (amendment to the car labelling directive to make it more effective and by encouraging Member States that levy road tax to base it on cars' CO2 emissions.)
- An EU code of good practice on car marketing and advertising to promote more sustainable consumption patterns.

The proposed new regulation

- The draft legislation defines a limit value curve of permitted emissions of CO2 for new vehicles (from 2012) according to the mass of the vehicle.



Permitted specific emissions of CO2 =

$$130 + a \times (M - M0)$$

Where:

M = mass in kg

M0 = 1289.0

a = 0.0457

The proposed new regulation

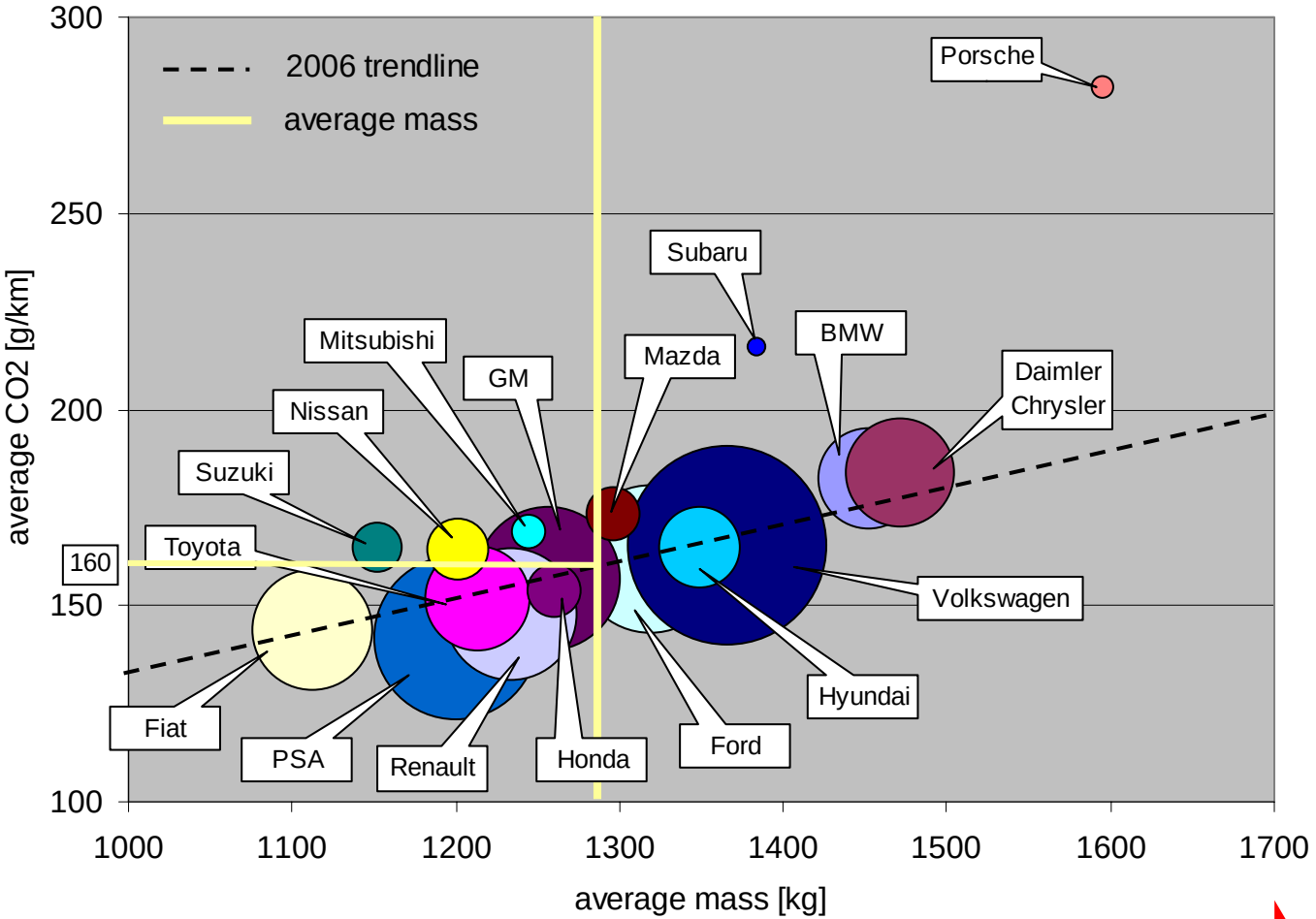
- Manufacturers will still be able to make cars with emissions above the limit value curve provided these are balanced by cars which are below the curve.

- Manufacturers can group together to form a pool in order to meet the emissions targets

- Excess emissions premium if the average emission levels are above the limit value curve.
  - Number of grams per kilometre (g/km) that an average vehicle sold by the manufacturer is above the curve, multiplied by the number of vehicles sold by the manufacturer. A premium of €20 € per g/km has been proposed for the first year (2012), rising to €35 in 2013, €60 in 2014, and €95 in 2015 and thereafter.

How are the manufacturers placed in relation to their targets?

Average CO2 emissions of new cars manufactured in 2006.



Further progress required to attain the targets (g/km)

PSA Peugeot-Citroen	16
Renault	20
Fiat	22
Honda	25
Toyota	25
GM	28
Ford	30
Volkswagen	31
Hyundai	32
Nissan	38
Suzuki	41
Mitsubishi	41
Mazda	43
BMW	45
DaimlerChrysler	46
Subaru	81
Porsche	138

Additional measures: the fuel quality directive proposal

Article 7a

Greenhouse Gas emission reduction

- From 1 January 2009, monitoring and report the life-cycle greenhouse gas emissions from transport fuels.

- From 1 January 2011, suppliers of fuels for road transport and non-road mobile machinery have to reduce the emissions of greenhouse gas emissions from those fuels.
  - The reduction shall equal an additional 1% of the emissions in 2010 per year for each calendar year up to and including 2020. The level of life-cycle greenhouse gas emissions per unit of energy reported in 2020 shall be no greater than 90% of the level reported in 2010.

Additional measures: bioenergy strategy

Brussels, 23.1.2008
COM(2008) 19 final

DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
on the promotion of the use of energy from renewable sources

Article 3
Targets for the use of energy from renewable sources

- ….
- 3. Each Member State shall ensure that the share of energy from renewable sources in transport in 2020 is at least 10% of final consumption of energy in transport in that Member State.

On-going research activities at the JRC

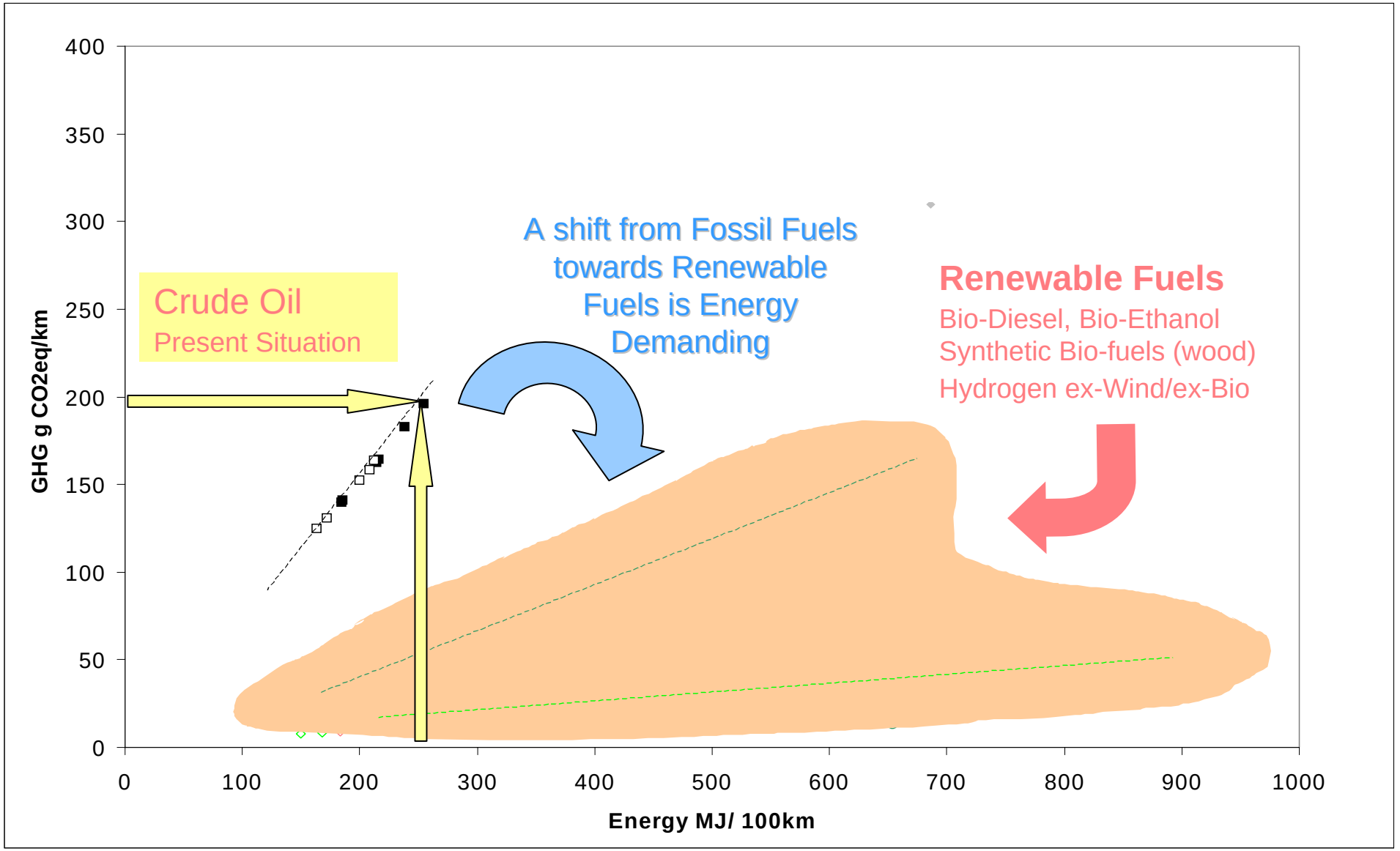
Well-to-Wheels analysis of future automotive fuels and powertrains in the European context

A joint study by EUCAR / JRC / CONCAWE

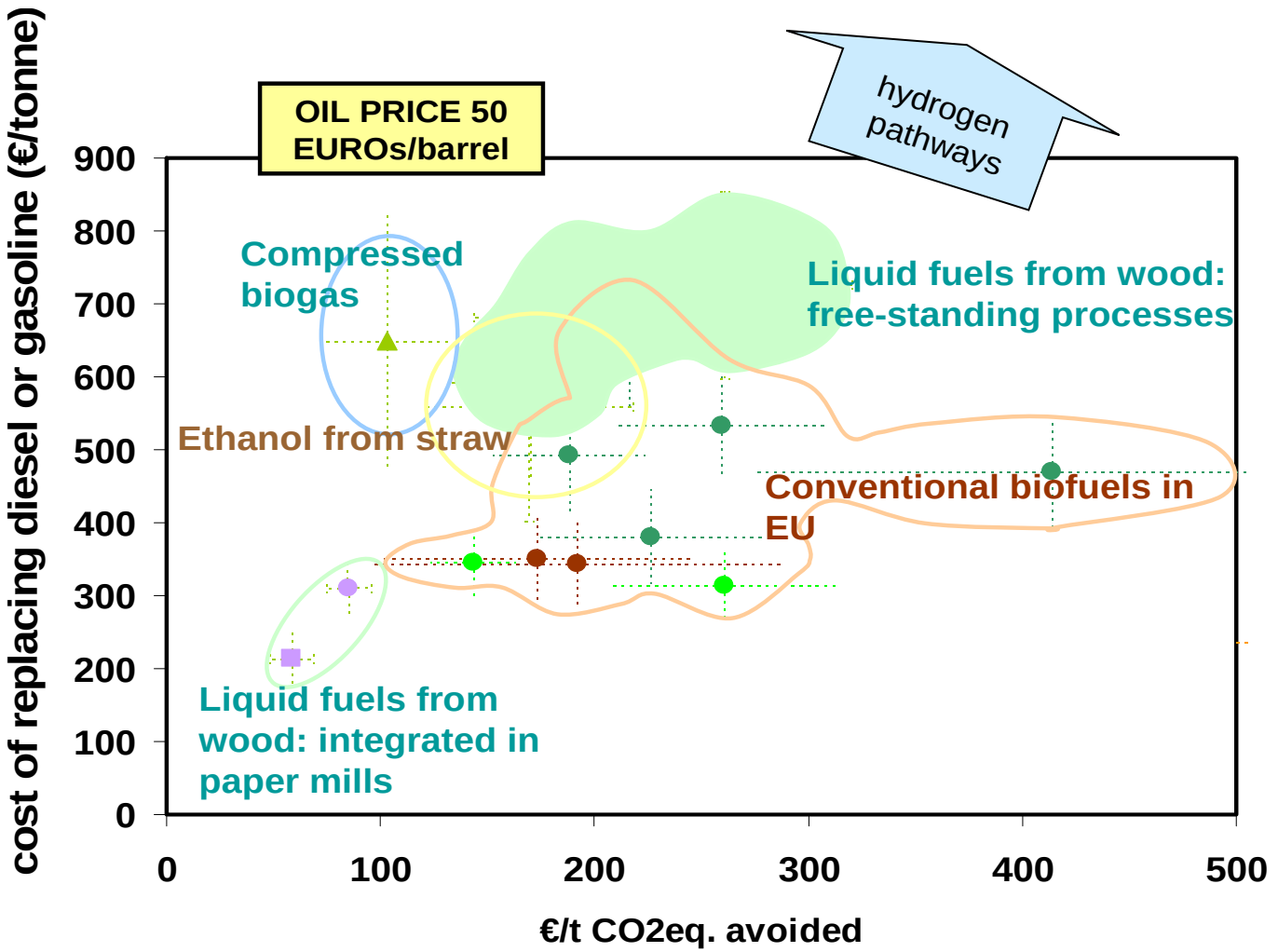
Objectives:

- Establish, in a transparent and objective manner, a consensual well-to-wheels energy use and GHG emissions assessment of a wide range of automotive fuels and powertrains relevant to Europe in 2010 and beyond.
- Consider the viability of each fuel pathway and estimate the associated macro-economic costs.
- Have the outcome accepted as a reference by all relevant stakeholders.

Well-To-Wheels Analysis of different Fuel / Vehicle concepts (2010+)



GHG Mitigation Costs - Biofuels



WTW PROJECT

- V1 published in 2003
- V3 expected Q1 2008
- V4 scheduled Q2 2010

High Policy Impact:

- DG's: TREN,ENV,AGRI
- IEA
- EEA
- OECD
- EU Parliament (STOA)

Source: JRC-IES/CONCAWE/EUCAR

Well-to-Wheels analysis of future automotive fuels and powertrains in the European context

A joint study by EUCAR / JRC / CONCAWE

The study report is available on the WEB:

http://ies.jrc.ec.europa.eu/WTW

For questions / inquiries / requests / notes to the consortium, please use the centralised mail address:

infoWTW@jrc.it

Impact of ethanol content in gasoline on vehicle emissions and fuel consumption

A joint study by EUCAR / JRC / CONCAWE

Objectives

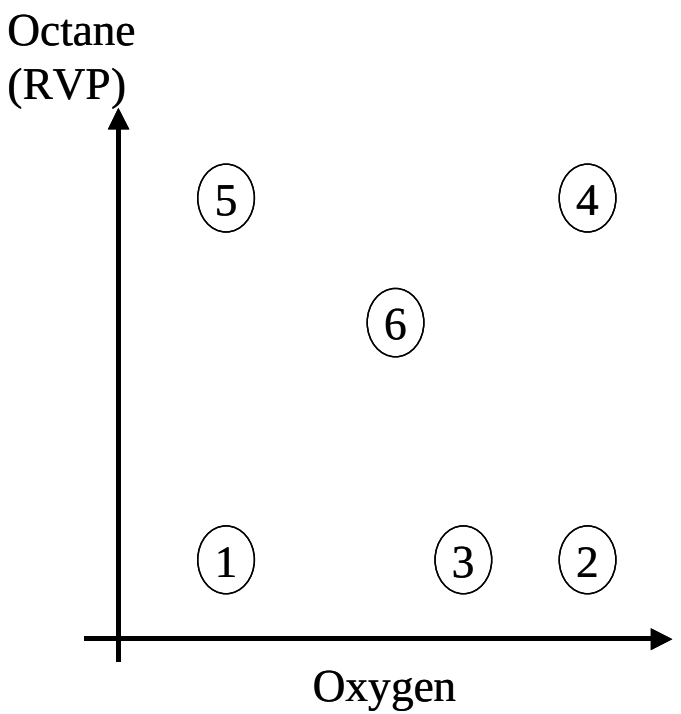
1. To define a sound and repeatable way of measuring the short-term direct effect of fuels on regulated emissions and fuel consumption.

2. To evaluate the impact of oxygenate, especially ethanol, on vehicle emissions and fuel consumption

Impact of ethanol content in gasoline on vehicle emissions and fuel consumption

Fuel Matrix

1. Base Fuel, 95 RON hydrocarbon-only fuel
2. E10 Fuel, containing 10% v/v ethanol, matched in VP and octane to Fuel 1
3. ETBE blend, 95 RON
4. E10 Fuel, containing 10% v/v ethanol but splash blended
5. Hydrocarbon-only fuel matching the octane of Fuel 4, the E10 splash-blended fuel
6. E5, containing 5% v/v ethanol but splash-blended.



Impact of ethanol content in gasoline on vehicle emissions and fuel consumption

Test vehicles

The objective of this testing is to evaluate fuel effects on vehicles of current technology, so that the results can be related to the existing vehicle parc

1. A PFI engine that is insensitive to octane
2. A VVT vehicle to check the effect of throttling
3. A vehicle optimised for 98 RON in order to take advantage of a higher octane number and the cooling effect of ethanol

Programme started in July 2008

PEMS and PAMS Activities

PEMS: Portable Emission Measurement Systems

PAMS: Portable Activity Measurement Systems

Objective: to collect data on real world emissions and fuel consumption as well as on typical driving patterns to be used for future legislation development (e.g.: legislative driving cycle review)

Portable Activity Monitoring Systems (PAMS)

Flash memory (SD format)

µcontroller

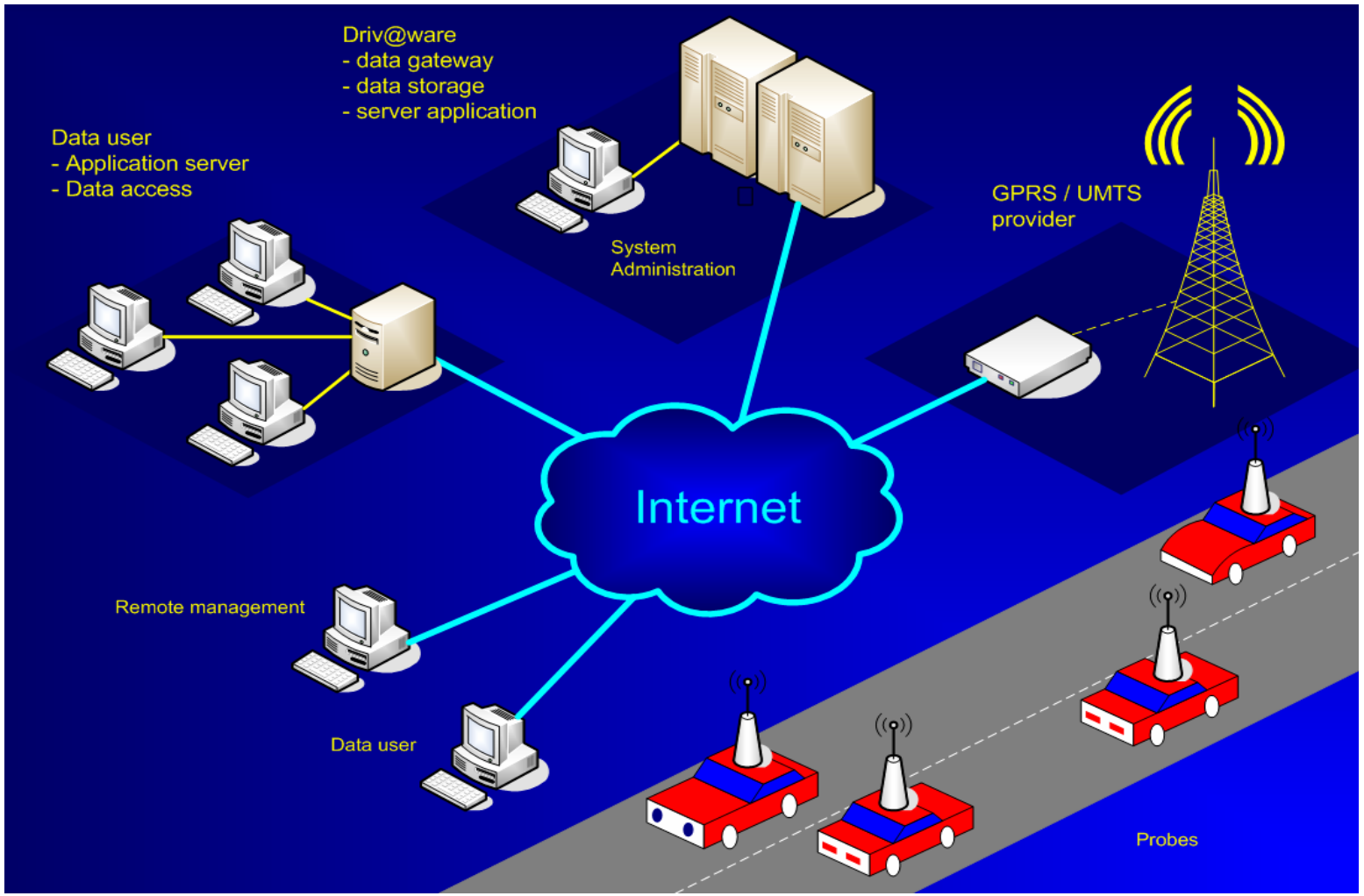
K-line and CAN interfaces

112 mm (4.40”)

50 mm (1.96”)

GPRS module
Executes a script for managing all the wireless connection workload

PAMS


Driv@ware
- data gateway
- data storage
- server application
Data user
- Application server
- Data access
System
Administration
GPRS / UMTS
provider
Internet
Remote management
Data user
Probes

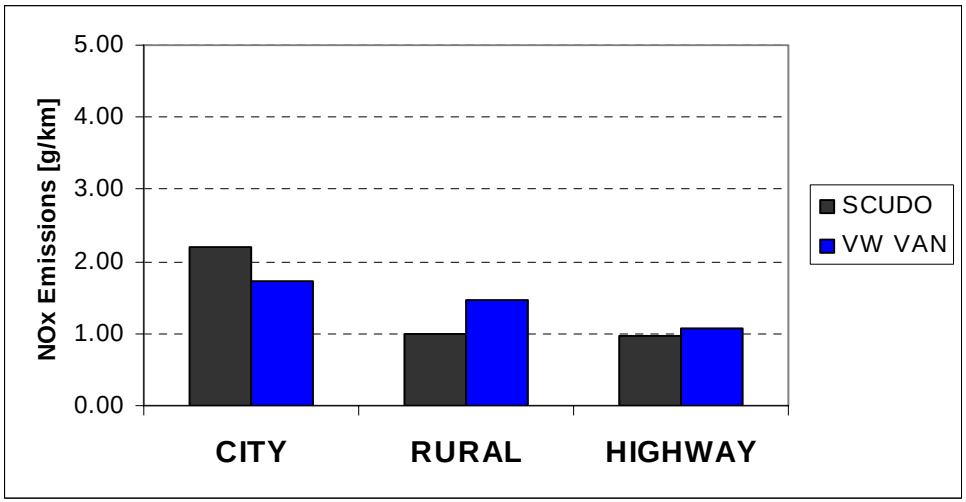
LDV PEMS activity: test routes

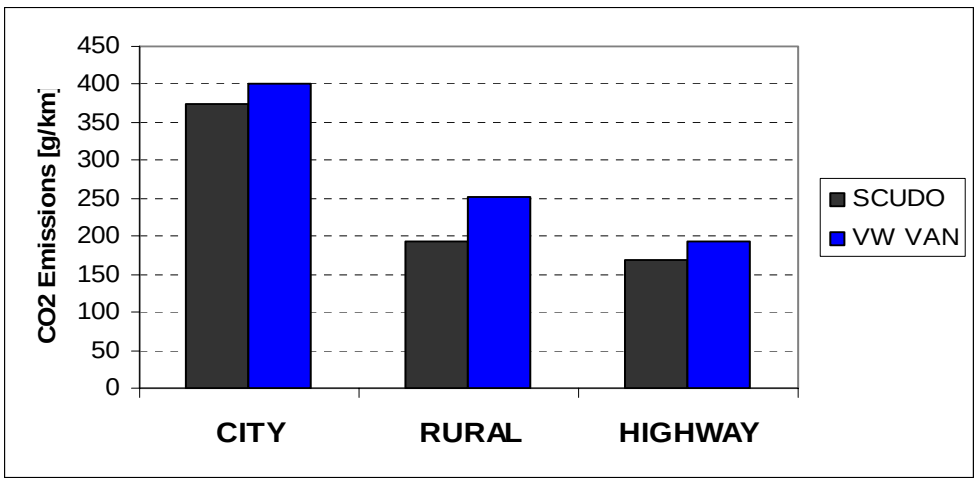
- Test protocol for the exhaust gas measurements is the one developed for HDVs

Characteristic of the test routes

Section	City	Rural	Highway
Distance [km]	17	13	35
Average speed [km/h]	11	49	94
Average altitude [m]	120	241	275
Average temperature [° C]	18	10	11

Integrated average emissions





Summary and Conclusions

- The transport sector is one of the biggest and still growing sources of GHG emissions
- Due to the increasing concerns for the consequences of the GHG emissions, the European Commission has proposed a new strategy to increase the fuel efficiency of vehicles
- The JRC is involved in many research activities in this field
- Thanks to its independency from any private and national interest, the JRC can play a unique role in providing in support of the development of the European policy to reduce GHG emissions from transport

Thank you for your attention!