

# **Energy Efficiency Indicators for European Cars**

## **A researcher's viewpoint**

**Theodoros Zachariadis**

*Economics Research Centre, University of Cyprus*

*t.zachariadis@ucy.ac.cy*

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# Several indicator datasets available for car fuel efficiency / CO2 emissions

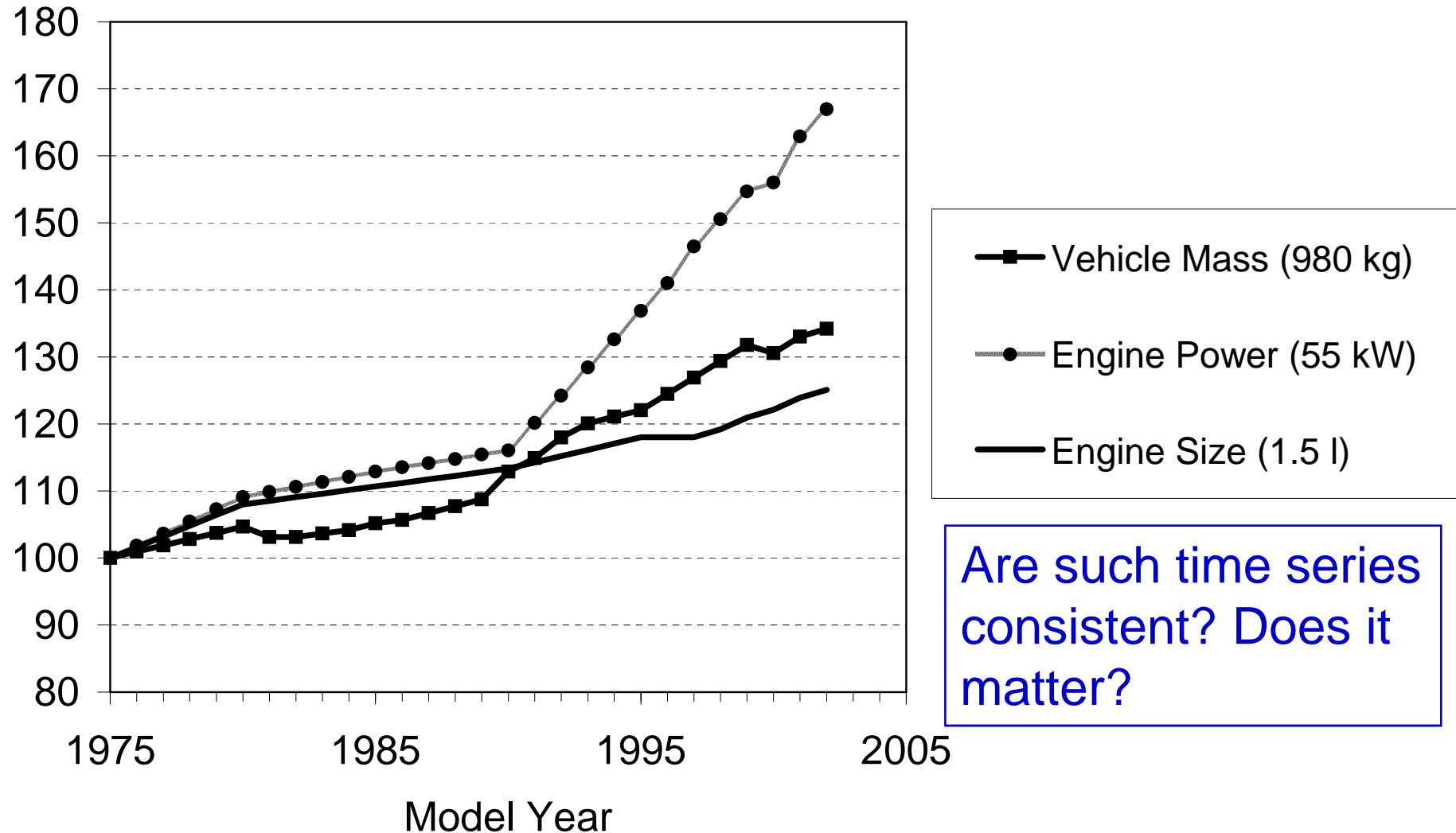
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- Transport and Environment Reporting Mechanism in Europe:  
[http://themes.eea.europa.eu/Sectors\\_and\\_activities/transport/indicators](http://themes.eea.europa.eu/Sectors_and_activities/transport/indicators)
- CO<sub>2</sub> Monitoring Mechanism (European Commission)
- Indicators from numerous international organisations
- National activities

➤ **What does a researcher/analyst need?**

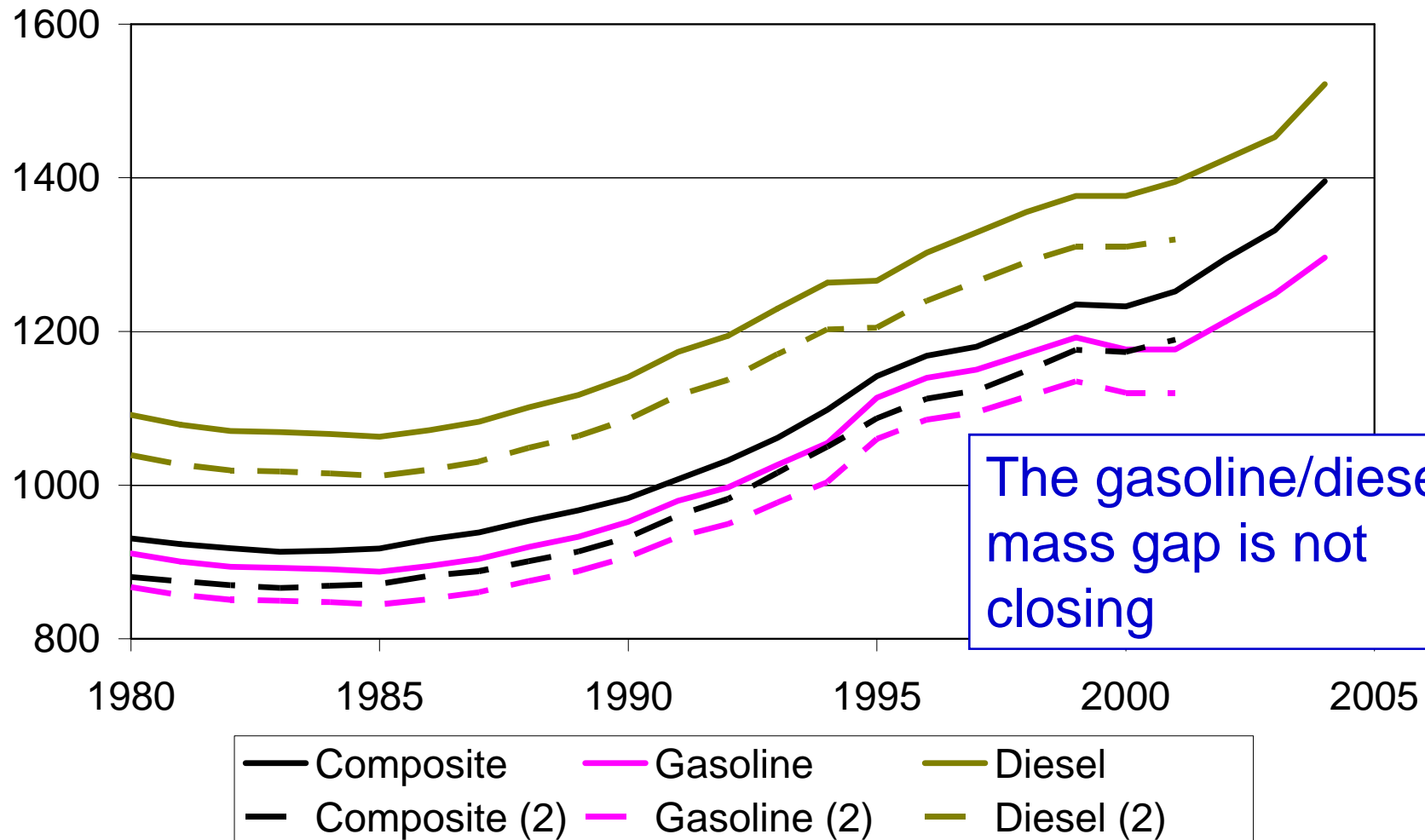
# Attributes of new European cars

(Zachariadis, Energy Policy 34 (2006) 1773–1785; adjusted data from:  
IEA 1980-1994, European Commission 1995-2003, consultant study for 1975-1980)



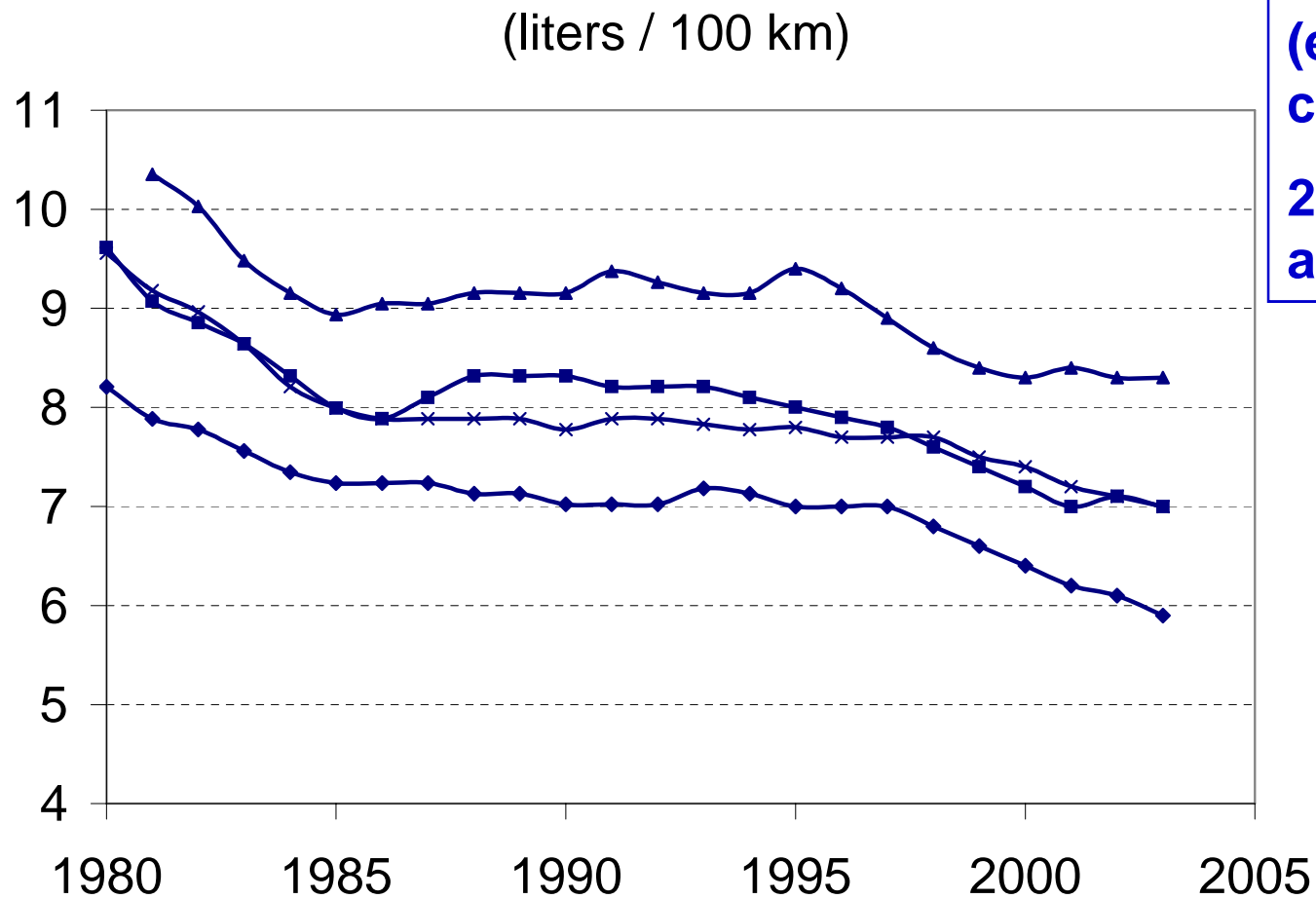
# Vehicle mass in EU-15, two estimates

(compilation of data from IEA)



# New-car fuel consumption in Europe, 1980-2003

(Source: European Commission & various IEA publications)



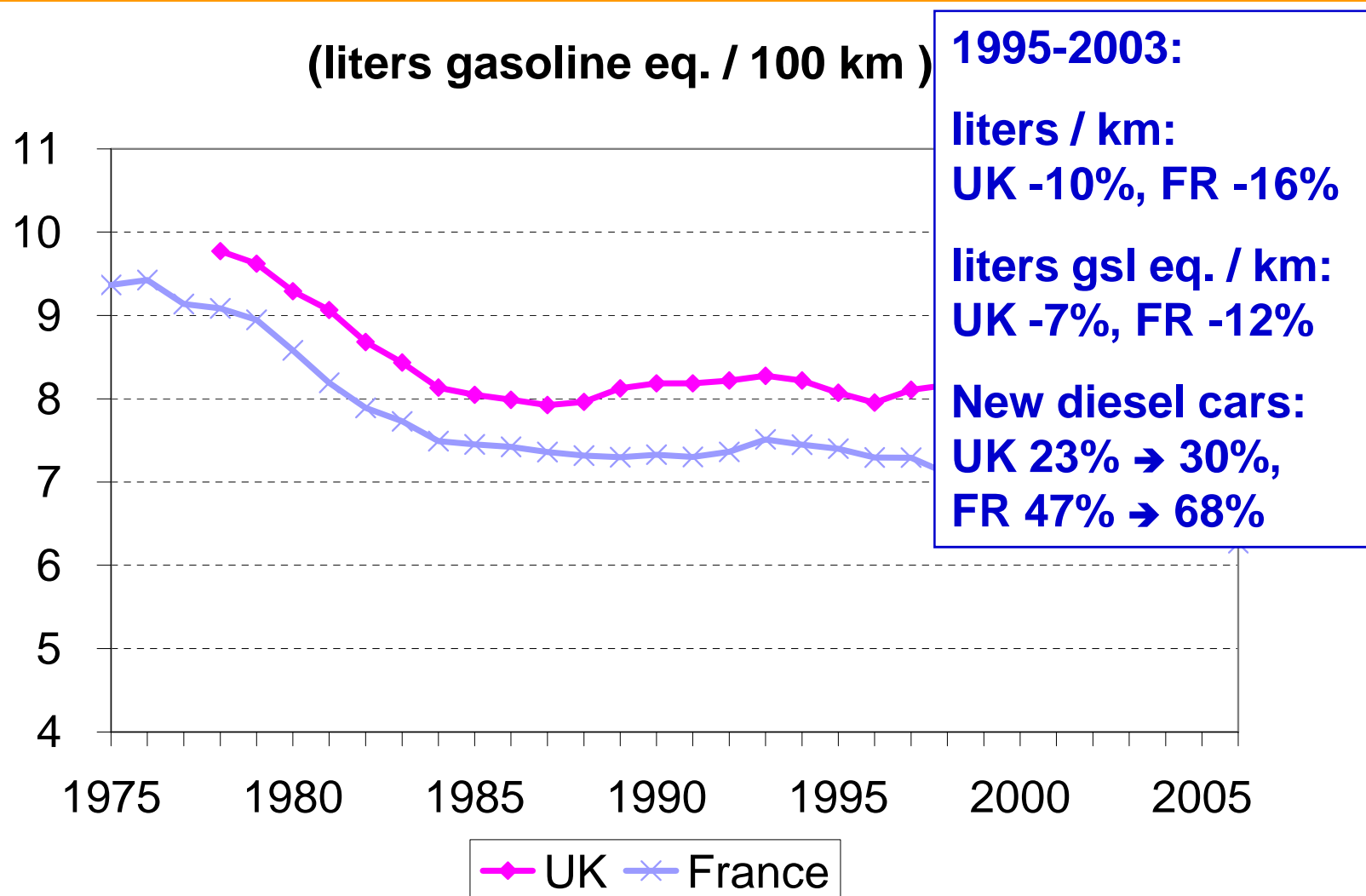
1. Consistency?  
(e.g. driving  
cycle changes)

2. Data  
availability?

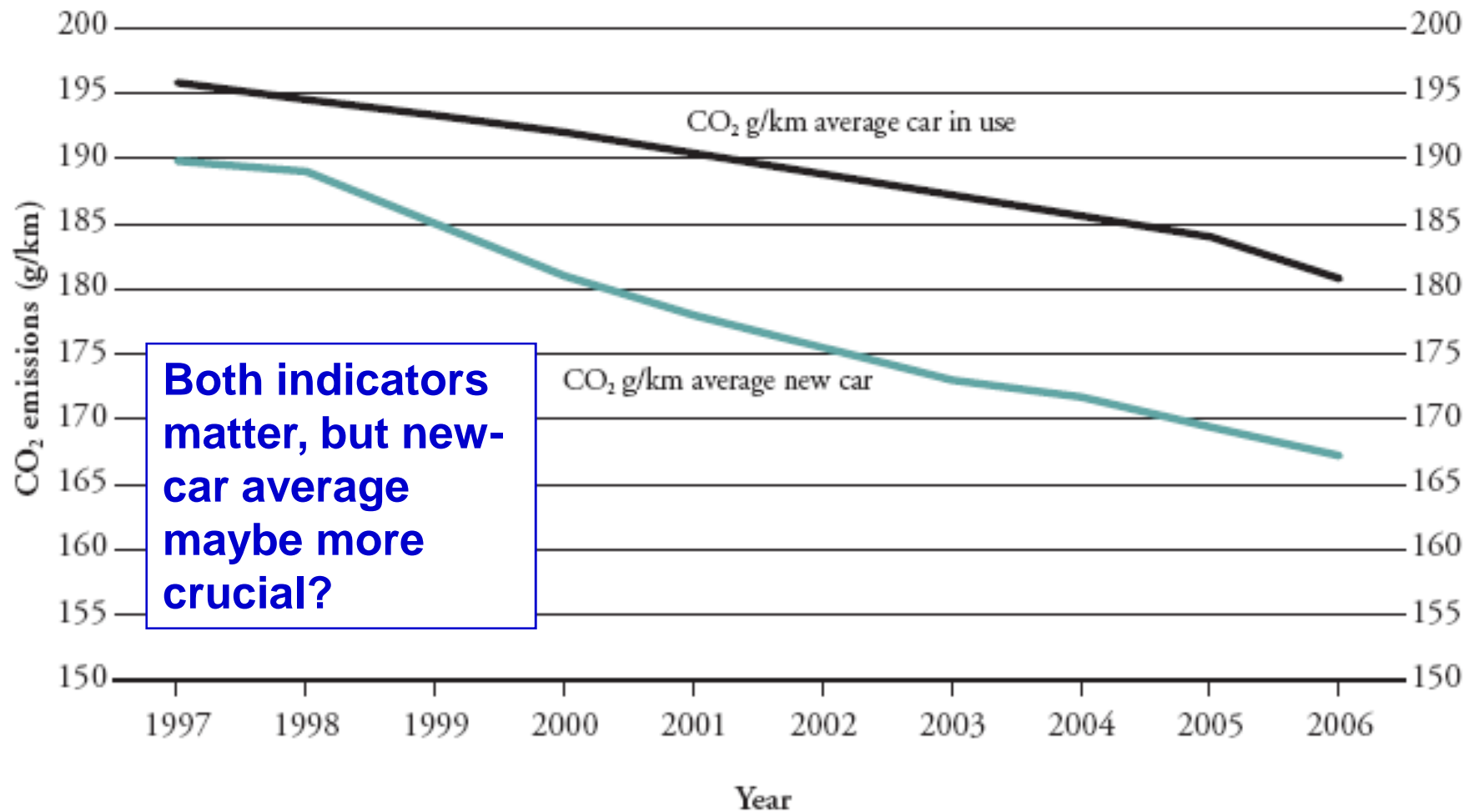
◆ France  
■ Germany  
▲ Sweden  
× UK

# New-car fuel consumption in UK and France, 1980-2003, gasoline equivalent!

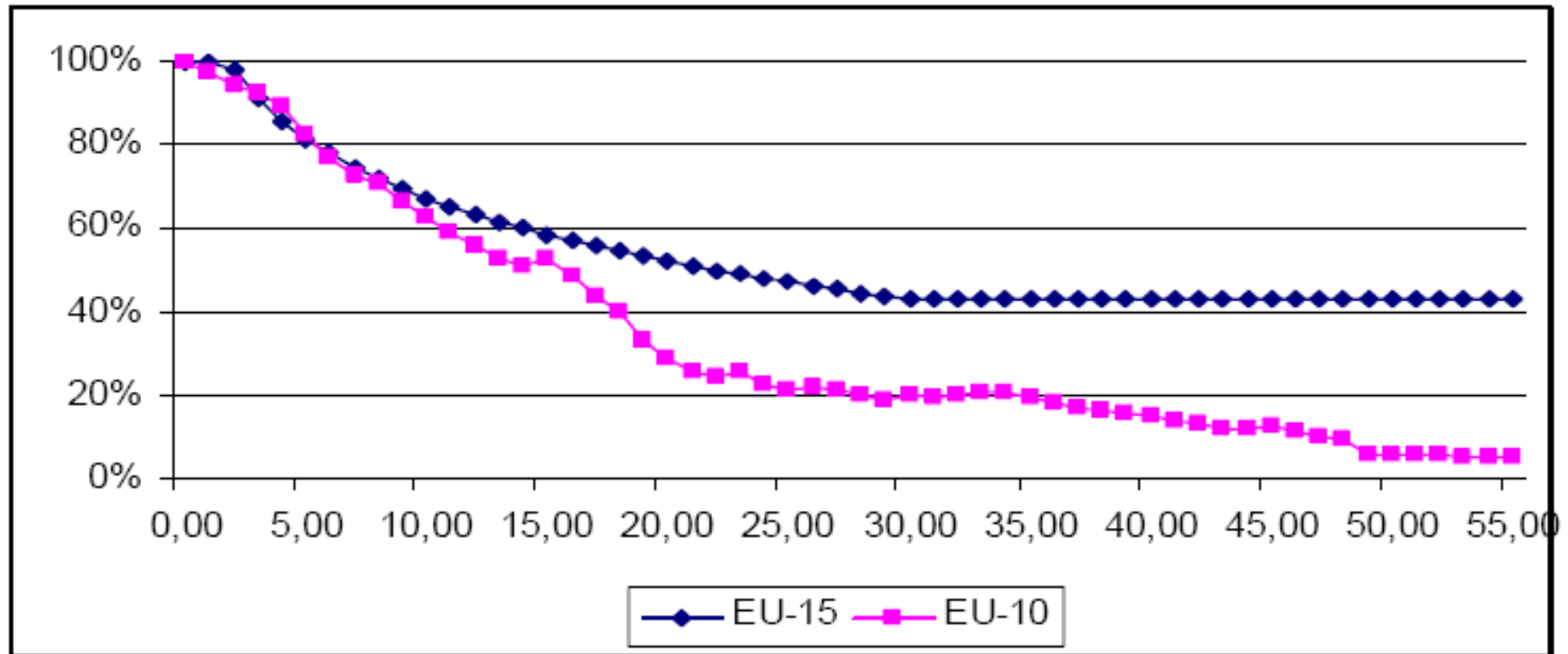
(Schipper, 2007)



# CO<sub>2</sub> emissions from average new cars and cars in use in the UK (King Review, 2007)



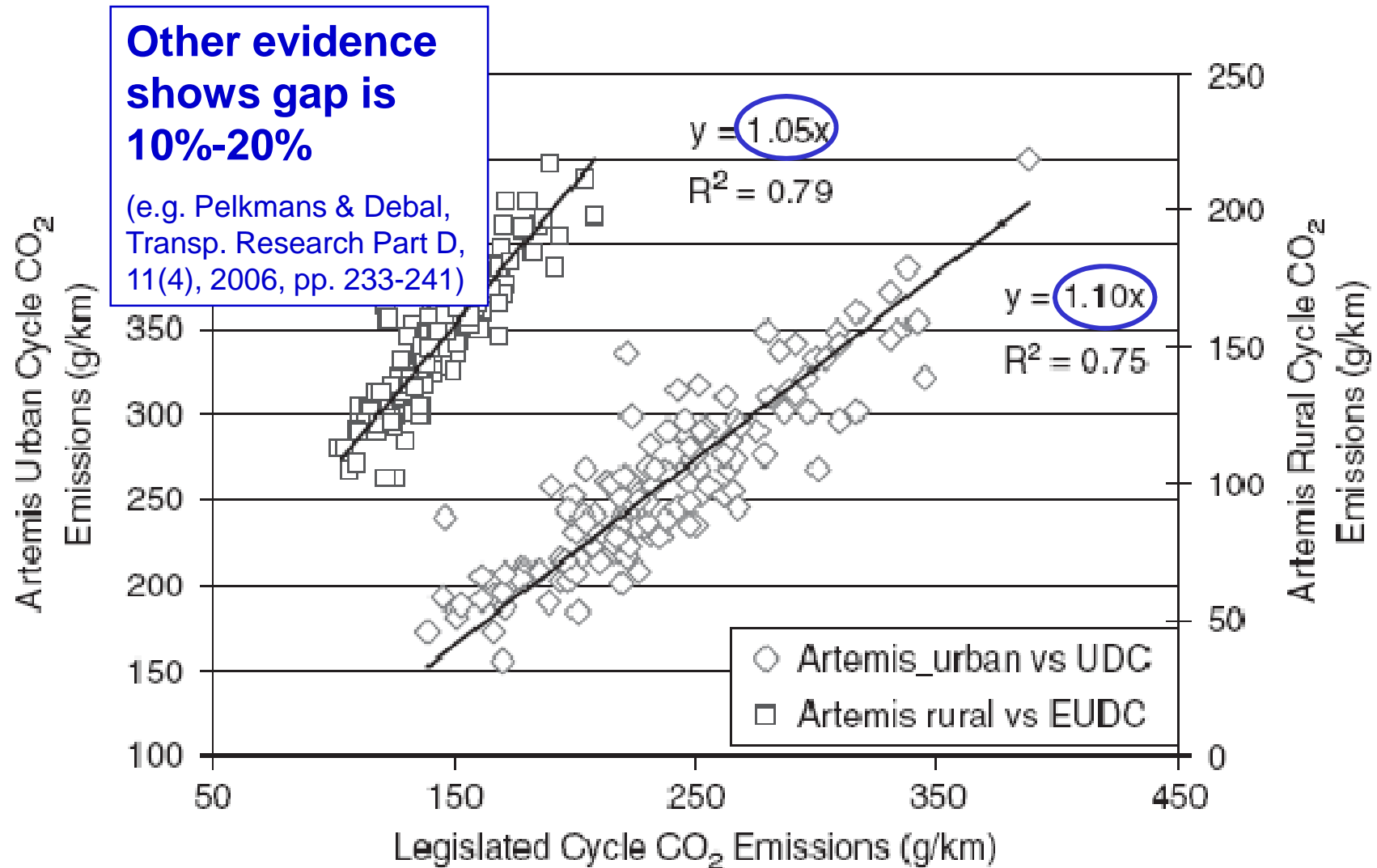
# Relative annual car mileage as a function of vehicle age (in %) (ZEW, 2006)



Source: TREMOVE

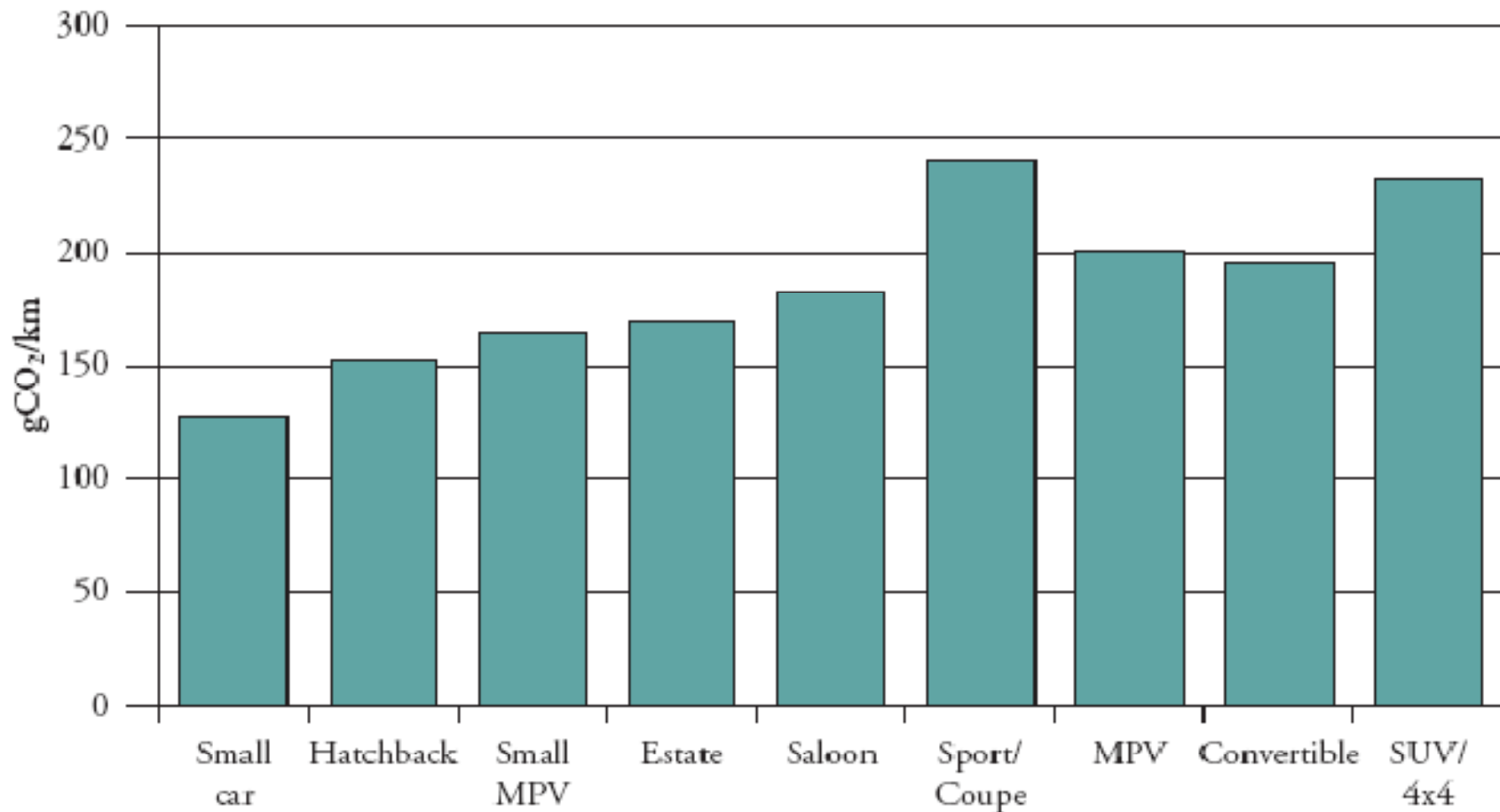
# CO<sub>2</sub> emissions, on-road vs. regulated

(Fontaras & Samaras, Energy Policy 35 (2007) 2239–2248)



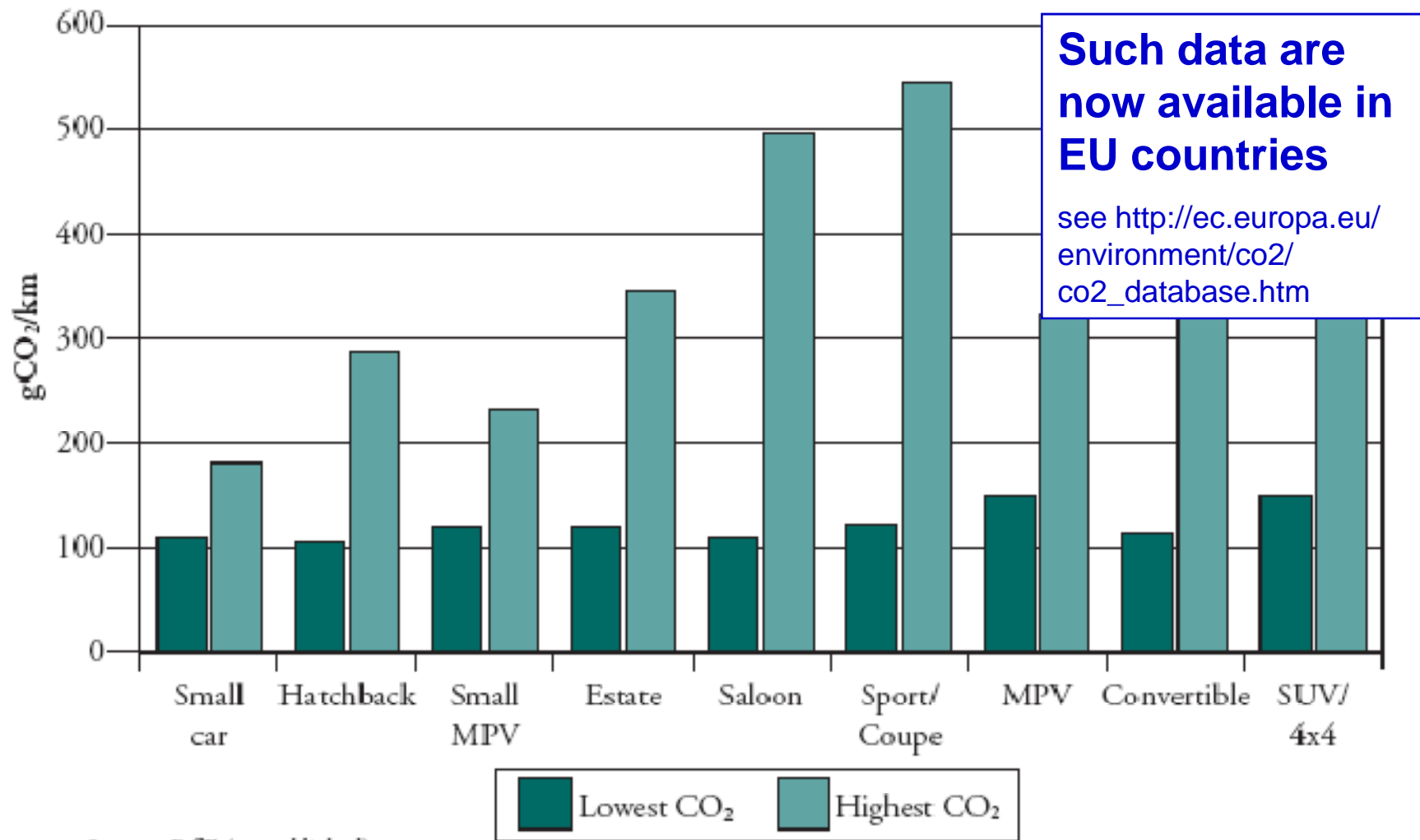
# Average emissions by new vehicle type in the UK in 2006 (King Review, 2007)

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Source: DfT (unpublished)

# Range of Emissions by Vehicle Class in the UK in 2006 (King Review, 2007)

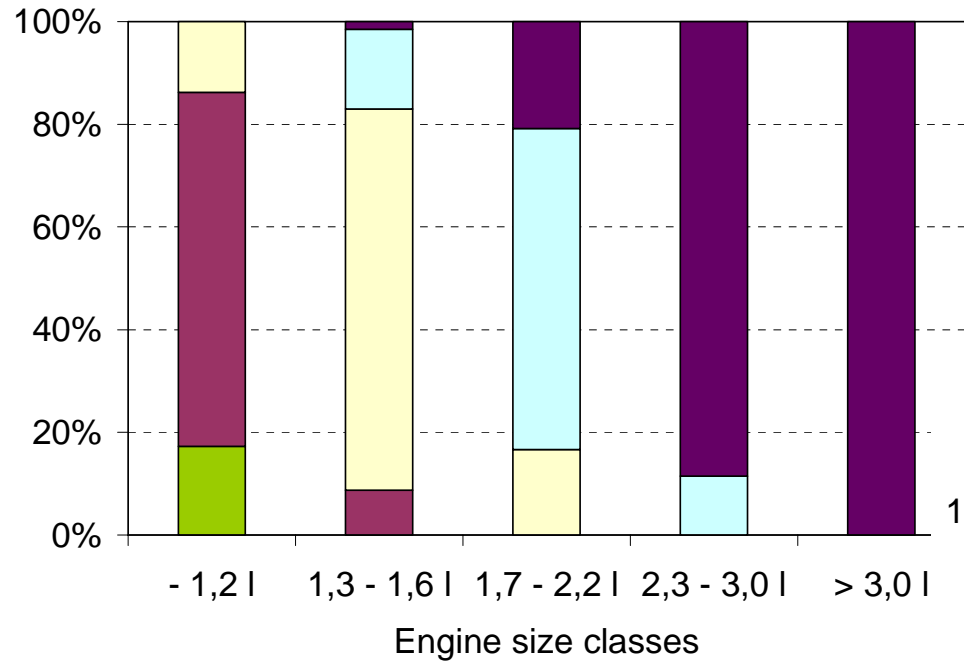


Source: DfT (unpublished)

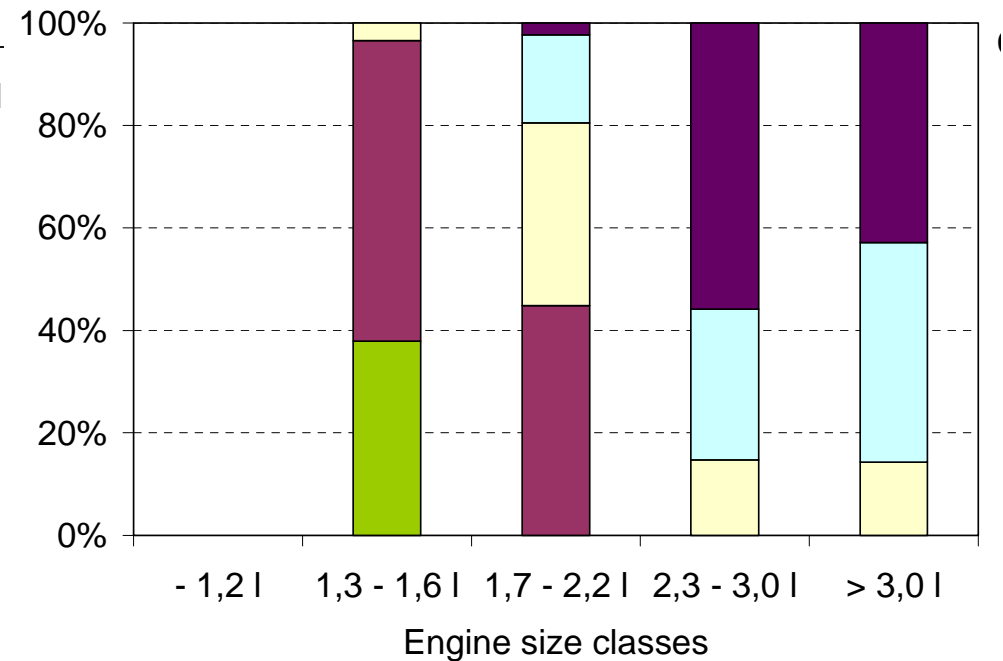
[hm-treasury.gov.uk/king](http://hm-treasury.gov.uk/king)

# CO<sub>2</sub> emissions by engine size class in Cyprus – New cars, 2005

Gasoline Cars



Diesel Cars



# Passenger car taxation (Euros/year)

(Kunert U. & Kuhfeld H., DIW Berlin Discussion Paper 589, 2006)

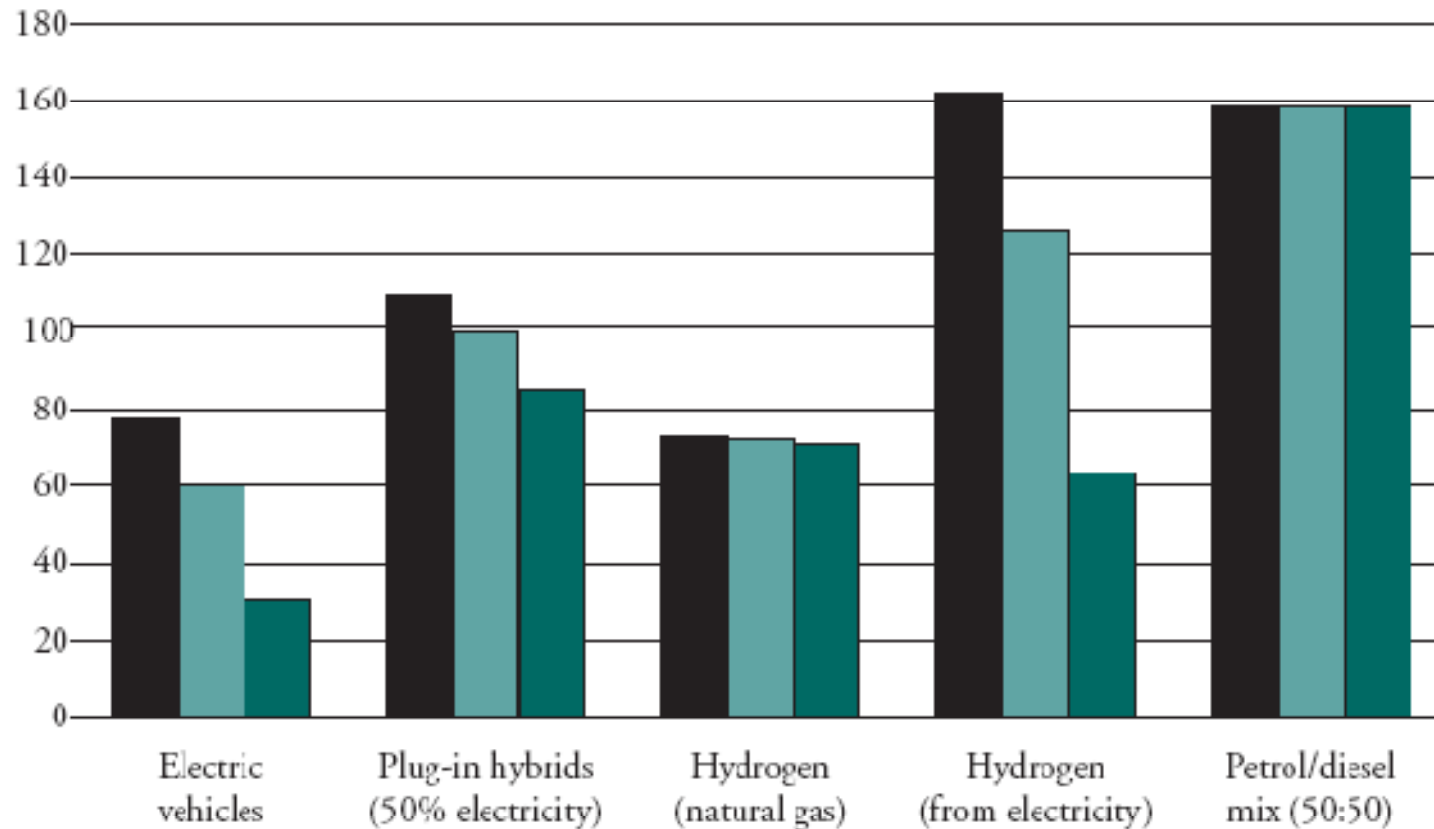
Golf 1.4, gasoline	Total	Registration charges	VAT on purchase price	Circulation tax	Insurance charge	Fuel tax	VAT on fuel tax	Total without fuel taxes
Austria								773
Belgium								642
Switzerland								404
Cyprus								506
Czech Republic								340
Germany								424
Denmark								2970
Spain	1051	134	209	57	22	404	145	482
Estonia	740	26	287	0	0	294	134	313
France	1259	33	344	0	78	601	204	455
Finland	1765	425	331	128	52	593	237	936
Great Britain	1461	23	313	182	41	701	201	559
Greece	1165	189	299	168	48	306	155	704
Hungary	1417	36	452	264	2	431	231	754
Italy	1425	76	358	142	60	575	214	636
Ireland	2365	1061	365	292	6	452	189	1724
Luxemburg	932	7	269	51	9	451	145	336
Lithuania	761	3	293	0	35	293	137	331
Latvia	904	106	306	78	0	282	132	490
Malta	1863	1012	280	93	23	316	138	1408
Norway	3138	1245	758	314	0	538	284	2317
The Netherlands	2311	609	340	432	16	681	231	1397
Portugal	1790	499	454	48	30	544	216	1031
Poland	1066	104	374	0	0	395	193	478
Sweden	1350	0	407	144	0	542	257	551
Slovakia	927	13	340	0	0	409	164	353
Slovenia	1361	382	347	68	15	385	163	812

**Such indicators are difficult to obtain,  
but important for 'feebate' policy  
analyses**

**Solution?**

Assumption: annual mileage of 15000 km, consumption of 6.8 l/100 km

# CO<sub>2</sub> (g/km) from alternative fuelled vehicles depending on electricity grid mix (King Review, 2007)



Source: E4tech (2007) *A Review of the UK Innovation System for Low Carbon Road Transport Technologies*

[hm-treasury.gov.uk/king](http://hm-treasury.gov.uk/king)

- Grid mix scenario A – 450 gCO<sub>2</sub>/kWh – equivalent to current grid mix.
- Grid mix scenario B – 351 gCO<sub>2</sub>/kWh – equivalent to a new combined cycle gas turbine plant (CCGT).
- Grid mix scenario C – 176 gCO<sub>2</sub>/kWh – increased renewables/nuclear and use of CCS with coal.

# Concluding remarks

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- Recording new-car fuel economy worldwide is crucial → compare energy equivalents & CO<sub>2</sub> !
- Continuously monitor on-road vs. test fuel economy gap through
  - i) experiments; ii) VMT statistics
- New indicators necessary to analyse impact of fiscal measures on efficiency & CO<sub>2</sub>:
  - Car taxes across countries & over the years
  - Distribution of fuel economy / CO<sub>2</sub> emissions by car segment