

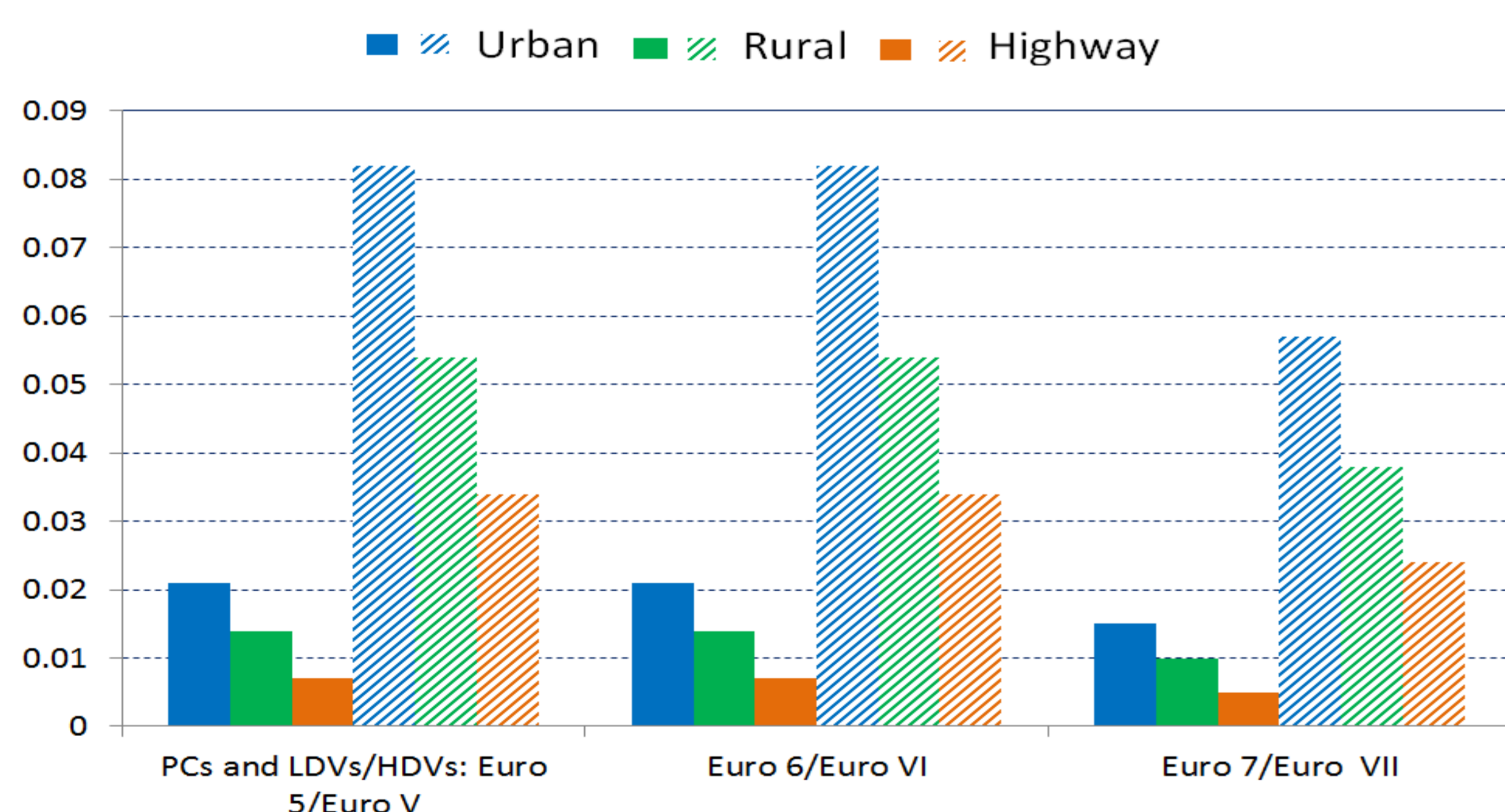
Introduction

- Non-exhaust emissions are not regulated. Today emissions of PM10 from wear processes are about equal to exhaust emissions and will dominate traffic related PM emissions in the near future.
- Improvement, determination and harmonization of road transport non-exhaust PM emission factors (EFs) (40 compounds in total).

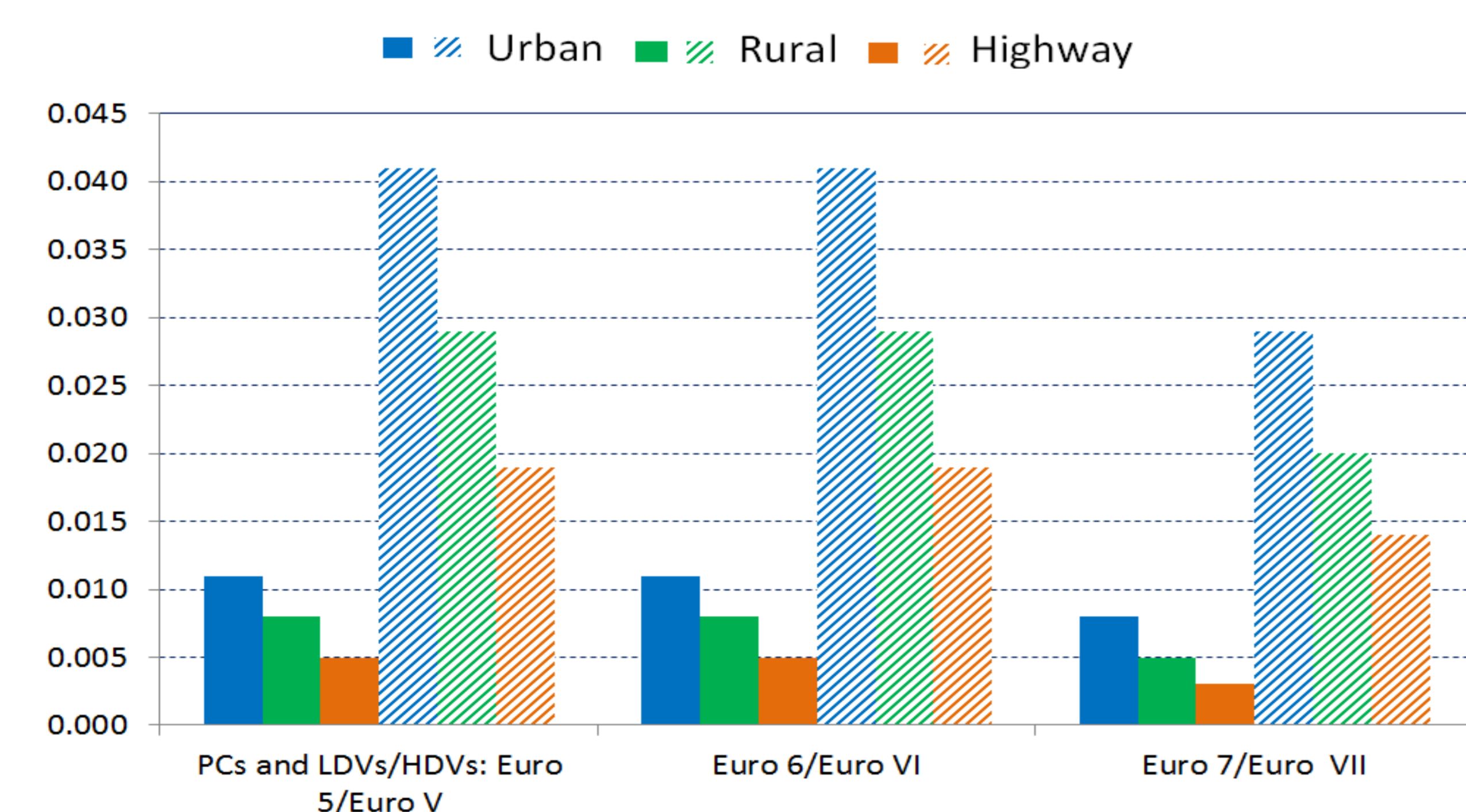
Method

- ❖ $EF_{non-exhaust} = \text{tyre wear} + \text{brake wear} + \text{road wear and resuspension}$
- ❖ COPERT 4 and a combined methodology (literature review plus COPERT 4)
- ❖ EFs correspond to urban, rural and highway conditions.
- ❖ Only one EF for each pollutant for all EU-27 countries.
- ❖ For technologies up to Euro 6, Euro VI, and Euro 4, EFs are taken equal to those of Euro 4, Euro IV, and Euro 2 (no improvement).
- ❖ For future technologies Euro 7, Euro VII and Euro 5, EFs are taken to be 30% lower (assuming the maximum technically feasible future reductions due to):
 - better brake pads and discs
 - reformulated rubber mixtures for tyres
 - appropriate adjustment of pavement properties
 - use of dust suppressants to keep road surfaces wet

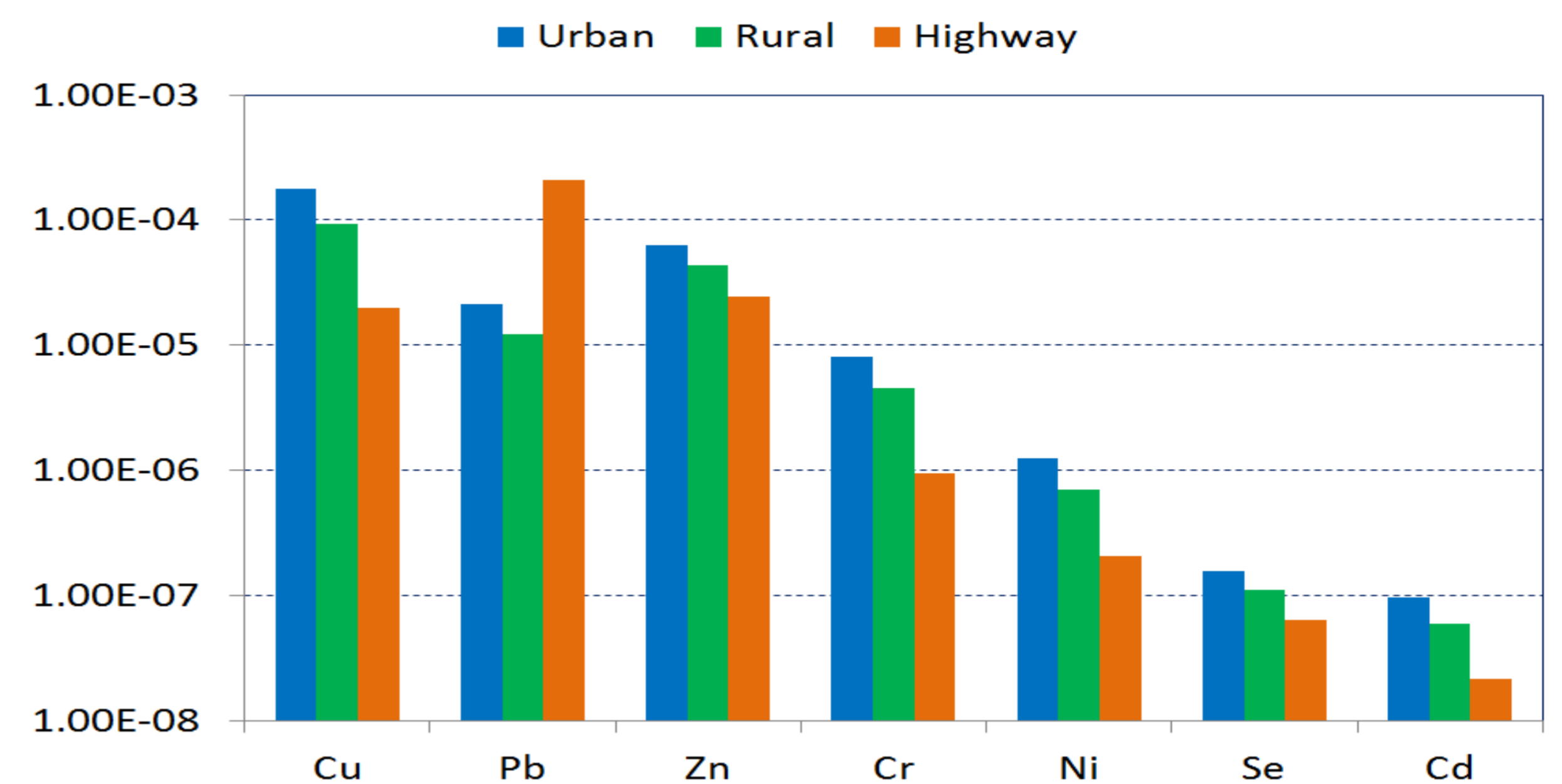
Results



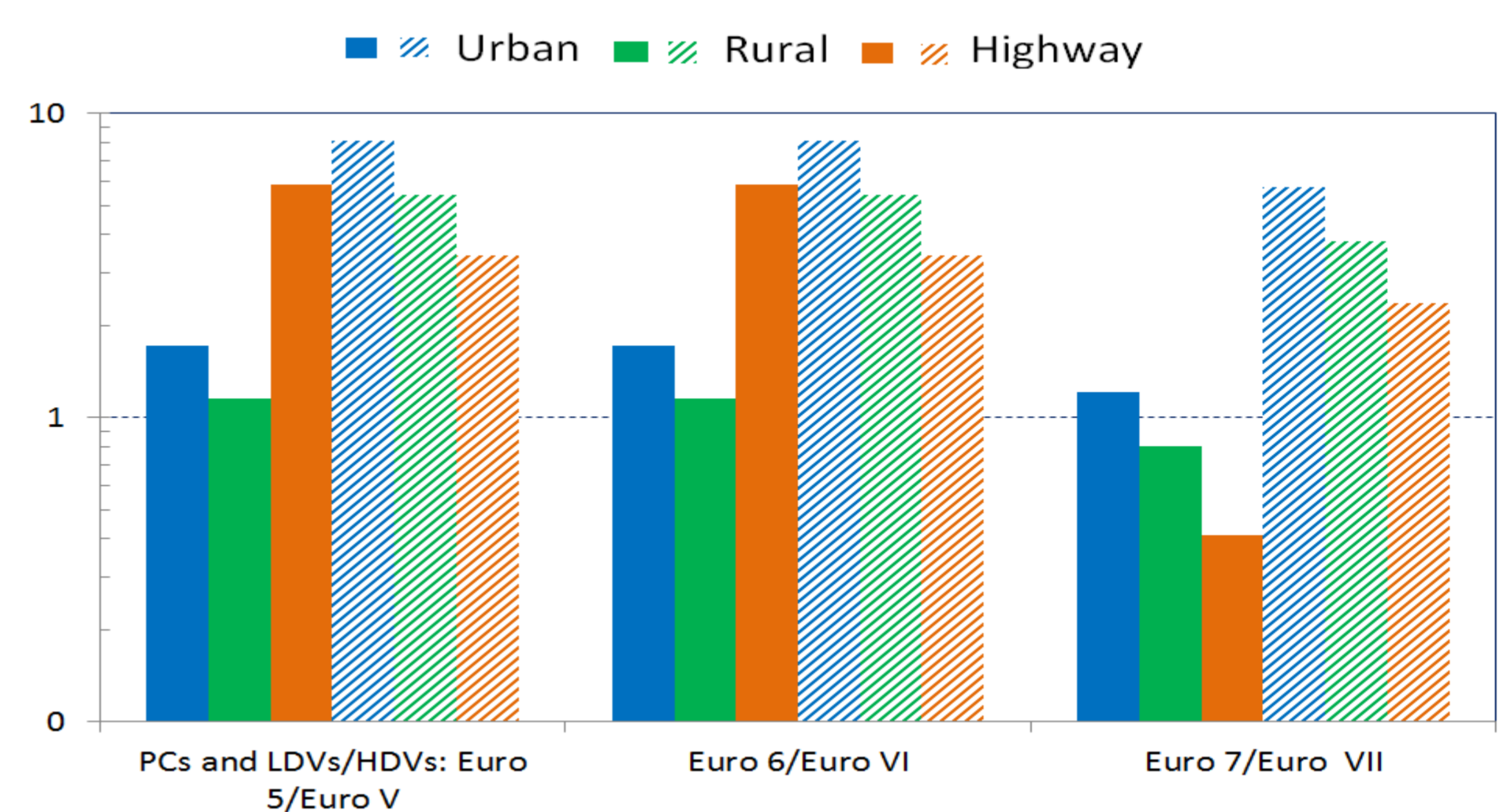
PM10 EFs (g/km) (exhaust plus non – exhaust) in different driving) current and future PCs and HDVs



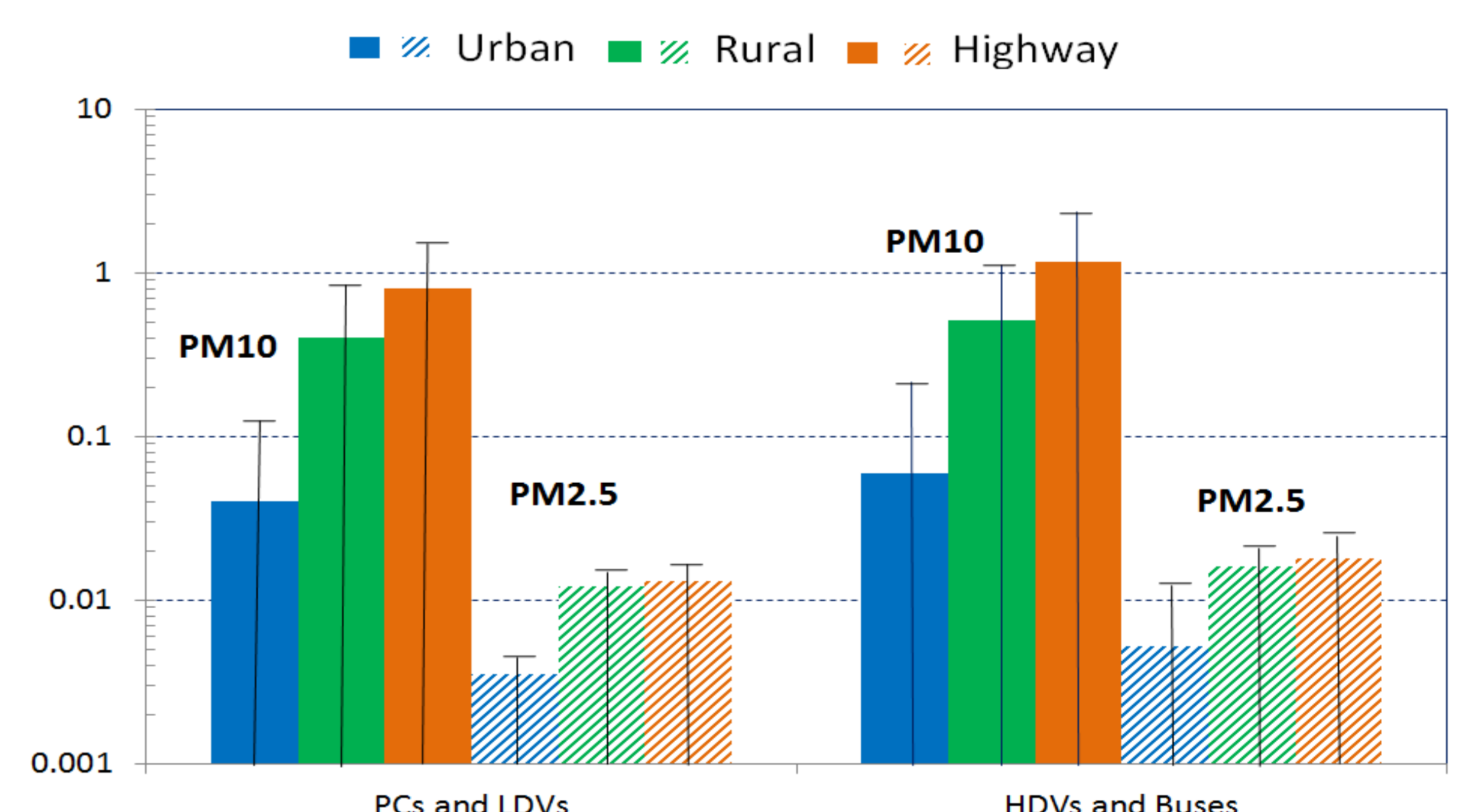
PM2.5 EFs (g/km) (exhaust plus non – exhaust) in different driving) current and future PCs and HDVs



Metallic EFs for Euro 7 Passenger Cars - all sizes



Benzo[a]pyrene EFs ($\times 10^{-7}$ g/km) in different driving conditions current and future PCs (all fuels) and HDVs (all fuels). EFs were obtained for 28 PAHs



PM10 and PM2.5 resuspension EFs (g/km) for various vehicles

Vehicle	Urban	Rural	Highway
PCs and LDVs	3 (2.9)	160 (180)	500 (650)
HDVs and Buses	15 (15)	800 (920)	2500 (3200)

Studded tyres PN EFs ($\times 10^{10}$ particles/km) for various vehicles

Conclusions

- ❖ A database of road transport non-exhaust EFs was developed based on COPERT 4 and on a detailed survey of the available literature.
- ❖ Resuspension, road surface wear and studded tyres effects were included.