Case study traffic-related non-exhaust PM emissions

(Menno Keuken, Steinar Larssen, Ranjeet Sokhi, Ulrike Kummer and Thomas Pregger)

(City of Rome – Fabio Nussio; City of Rotterdam – Sef van den Elshout)

6th Framework Programme- Policy oriented Research
Priority 8.1 Topic 1.5 Task 2

- Background
- Objective
- Method
- Results
- Conclusions and Recommendations

Non-exhaust PM

- AQ PM10 exceedences in urban areas. Traffic emissions important local source for PM. Traffic-related PM health concern;
- Limitation to spatial coverage of PM10 in urban areas by monitoring (i.e. expensive automated equipment). Thus, PM monitoring combined with street-canyon modelling. EF traffic-PM?
- Traffic emissions: exhaust and non-exhaust PM. *Non-exhaust PM: mixture of road-dust; friction; tire-wear.*

(general) case studies test recommendations from WP3-5 resulting in basic requirements, best practices and recommendations for further research.

(specific) this case study tests Oslo/SEC-method to estimate non-exhaust contribution of PM in urban streets in cooperation with the cities of Rotterdam, Rome and London.

Non-exhaust PM

- Hourly monitoring data (NOx, PM10/2.5) at urban background station and street station;
- Hourly increment PM10/2.5 and NOx at street station;
- Hourly increment ratio PM10/NOx and PM2.5/NOx;
- (Hourly) emissions from traffic data in the street;
- (Hourly) ratio emitted PM10/NOx and PM2.5/NOx;
- Difference between monitored and emitted PM10/NOx and PM2.5/NOx: indication for contribution non-exhaust PM.

Non-exhaust PM

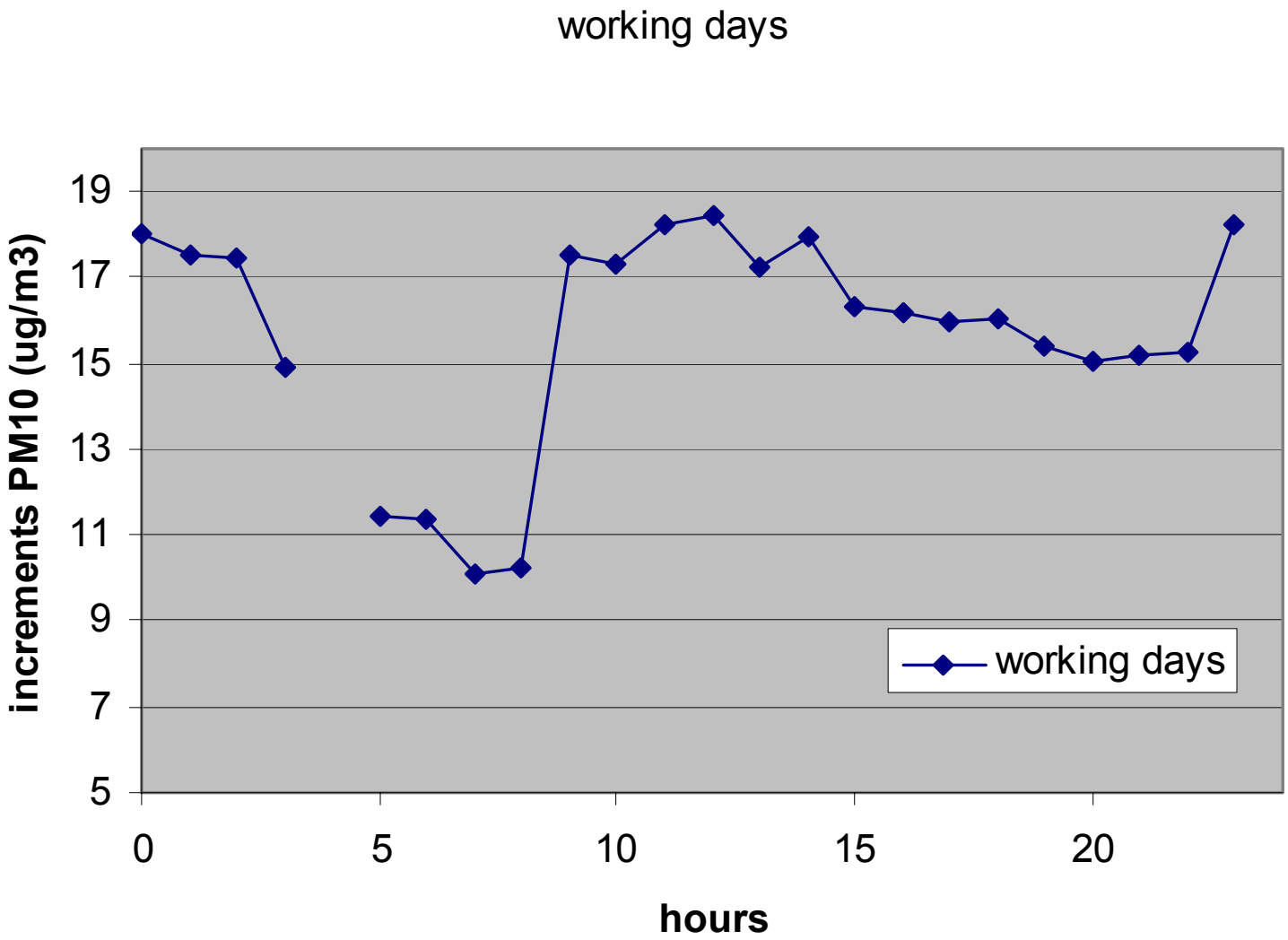
Rome: Magna Grecia

- 45 m wide/15-20 m height;
- 38-35.000 vehicles/24-h;
- 75-87% pc; 18-10% ld; 7-3% hd;
- 5.000/24-h 2-wheelers
- UB: Villa Ada park (centre of Rome);

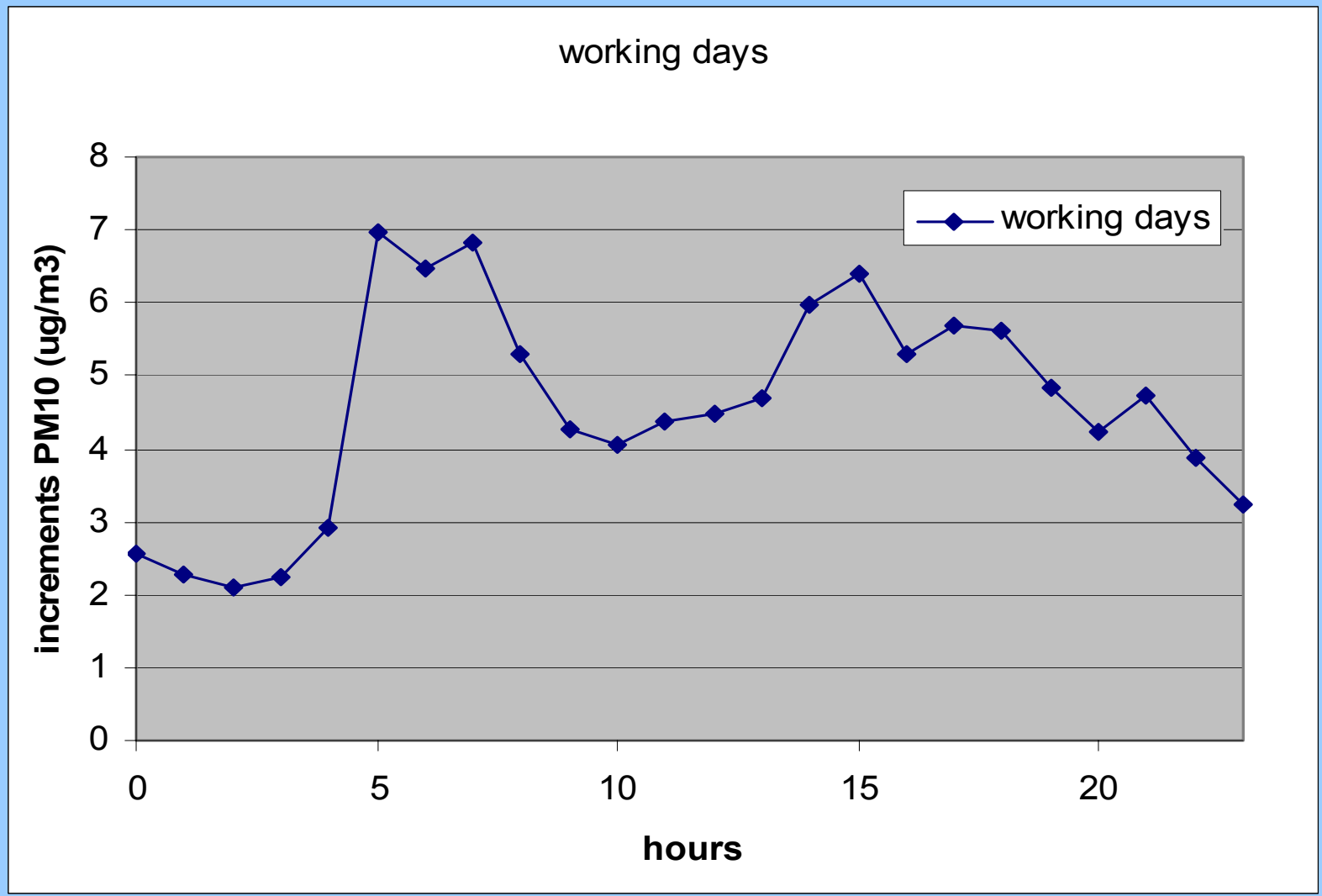
Rotterdam: Bentinckplein

- 35 m wide/10-15 m height;
- 28.000 vehicles/24-h;
- 95% pc; 2% ld; 1% hd; 2% buses
- no 2-wheelers
- UB: Schiedam (2 km from B.plein);

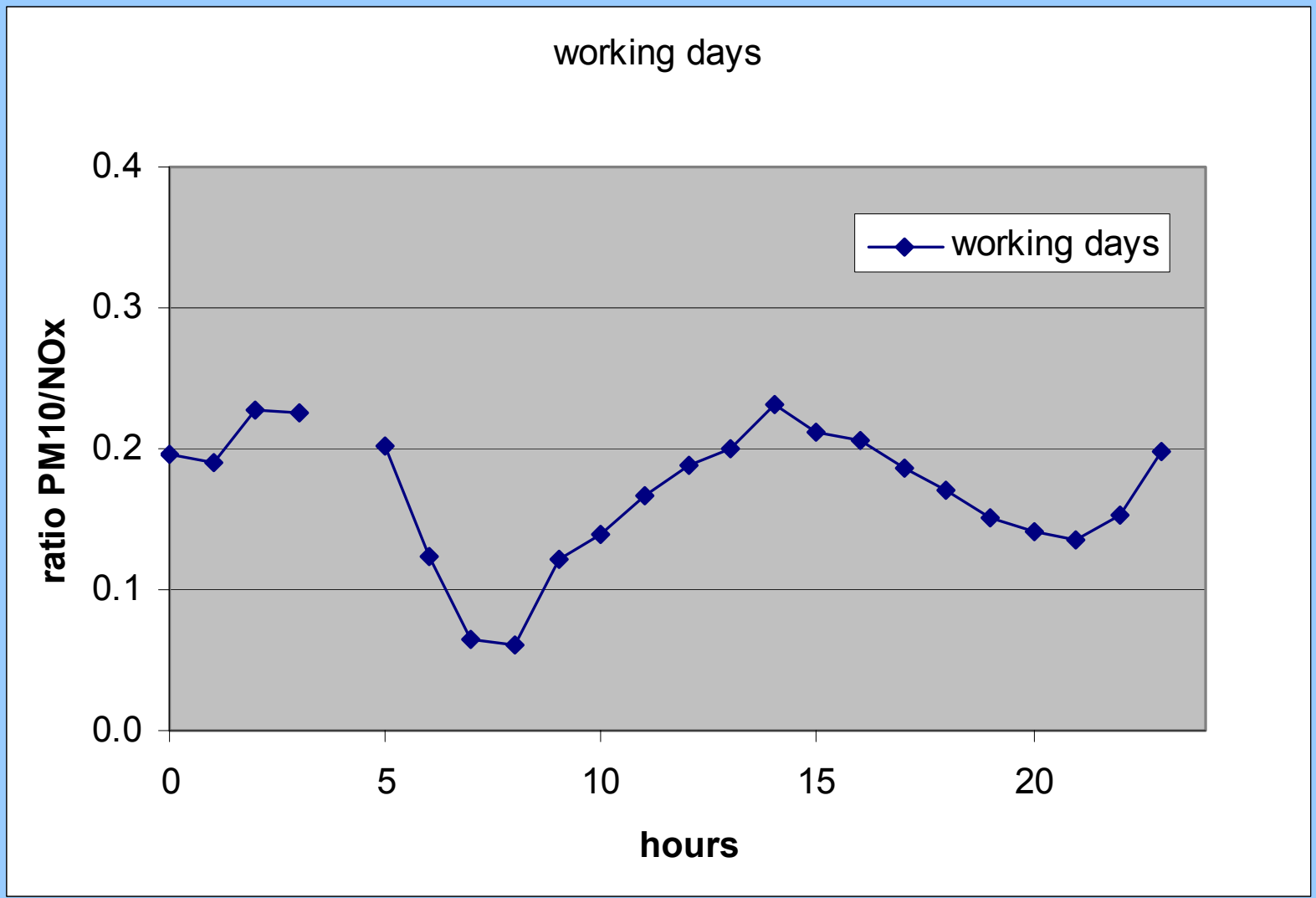
Rome: Increments PM10 (2003)



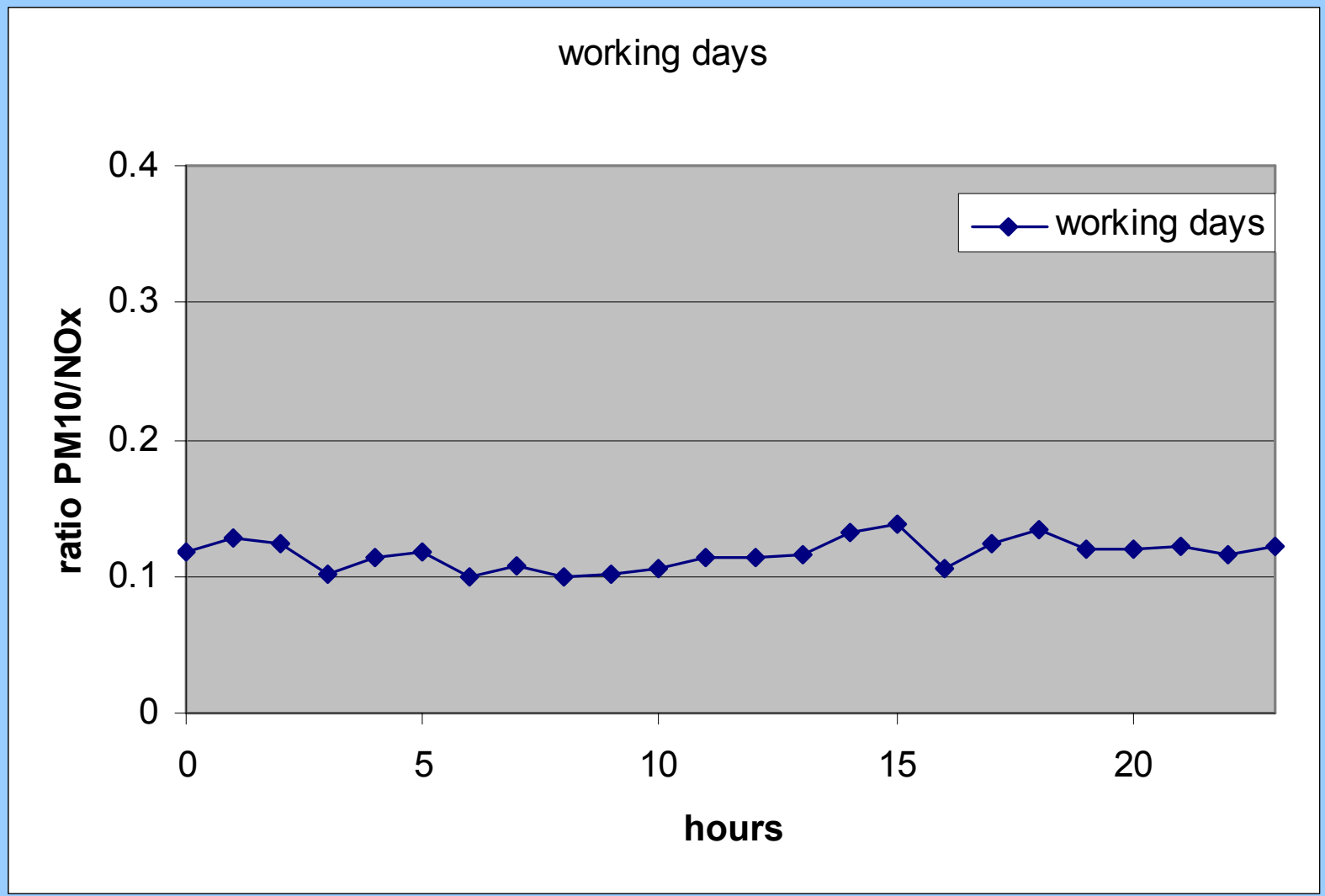
Rotterdam: Increments PM10 (2005)



Rome: Increments PM10/NOx (2003)



Rotterdam: Increments PM10/NOx (2005)



Non-exhaust PM

	measured increments ratio PM10/NOx	emitted ratio PM10/NOx (HBEFA/NL)
	Working days	Working days
Rome	0.17	0.05
Rotterdam	0.12	0.05

Non-exhaust PM

Fitting monitoring data with EF non-exhaust PM results in Rome:

- 100 mg/km Private Vehicles/Light Duty and
- 550 mg/km Heavy Duty;
- Agreement with HBEFA (UBA-Ger.).

In Rotterdam, non-exhaust PM is underestimated by factor 2 when fitting monitoring data with Dutch non-exhaust EF;

Non-exhaust PM

- (*best practices recommendations*) A simple method has been demonstrated based upon monitoring and traffic data as an *indication* for the contribution of non-exhaust PM10 traffic emissions.

- The method will be disseminated as part of Air4EU with the recommendations:
  1. to include PM2.5 monitoring and PM2.5/NOx ratio;
  2. to ensure QC (reproducibility) of PM monitoring network; and
  3. to ensure that the “area of representativeness” of urban background station represents the urban background.