



**Can particulate matter be used to evaluate  
traffic related abatement measures?  
Conclusions of some recent case studies  
in the “hot spot” Flanders, Belgium.**

Stijn Janssen, Wouter Lefebvre, Frans Fierens

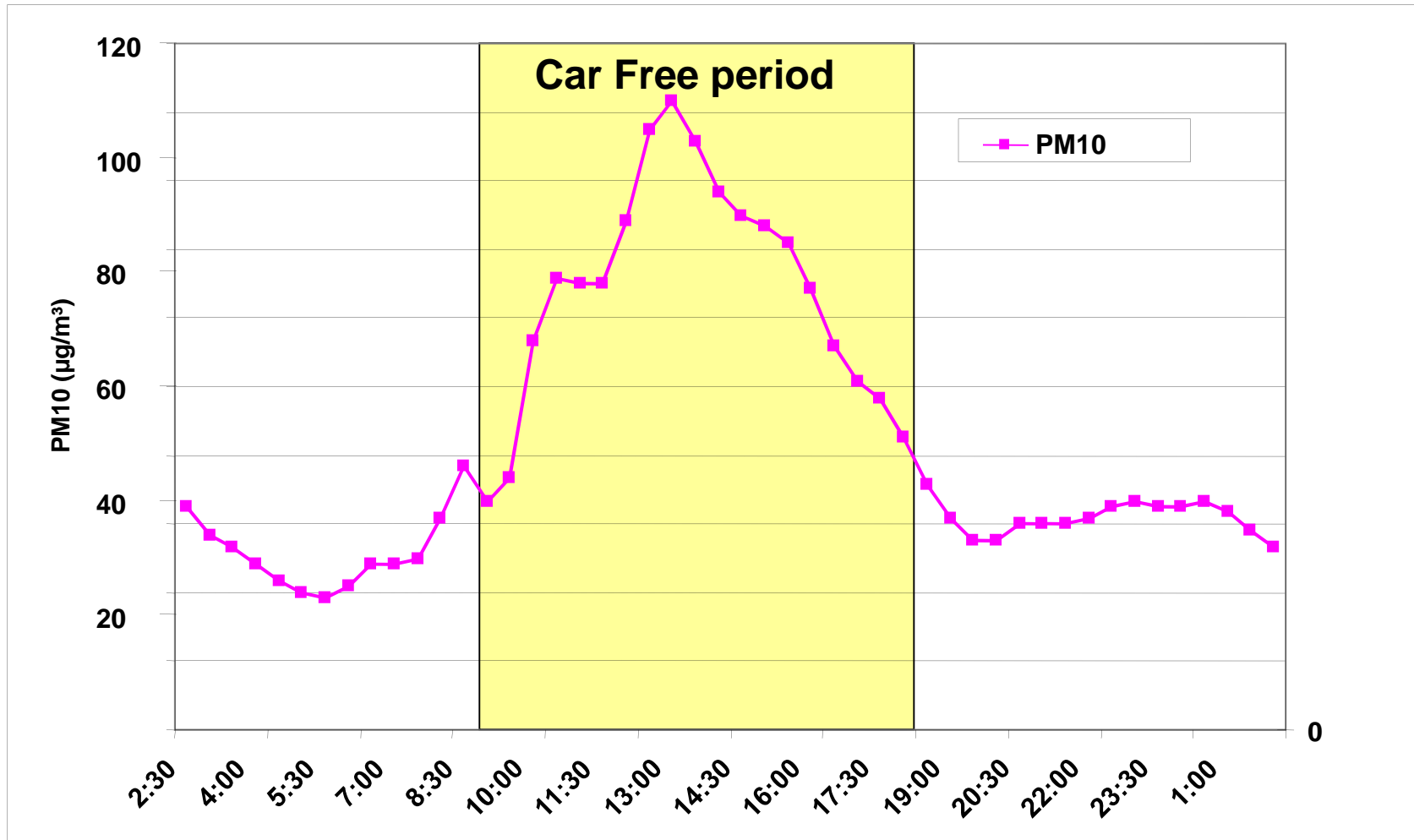
HARMO13, 1-4 June 2010, Paris - France

# Content

- » Results from some recent case studies in Flanders, Belgium:
  - » Car free Sunday
  - » Closure of a ring road
  - » Low emission zone
  - » Impact of a speed limit reduction
  - » Assessment of the air quality along major roads
- » Can particulate matter be used to evaluate traffic related abatement measures?

# Case 1: Car Free Sunday, Brussels - 20 Sept 2009

Source : Peter Vanderstraeten (Leefmilieu Brussel, 2009)

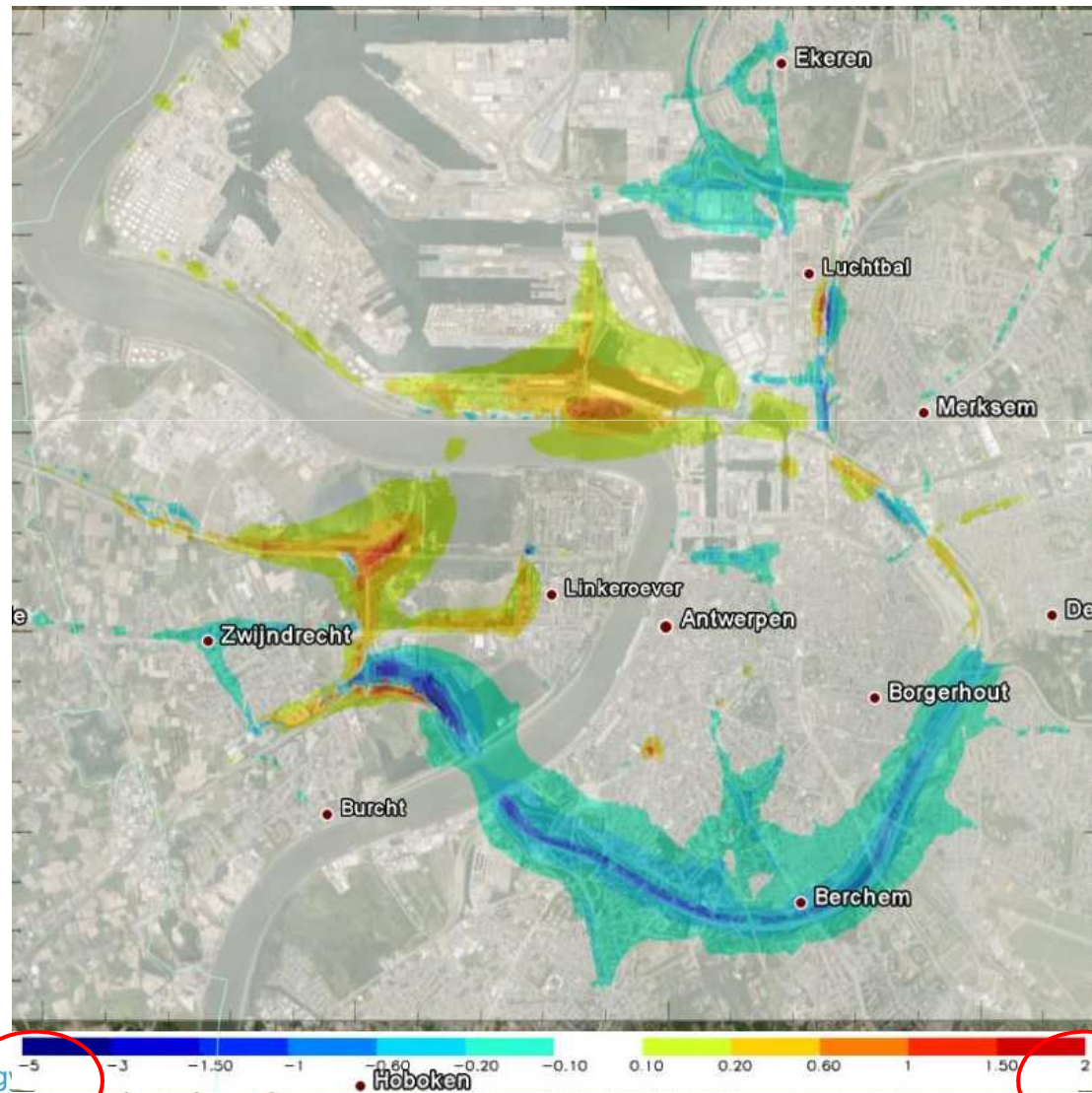


# Case 2: Closure of the Ring road of Antwerp via “Oosterweelverbinding”

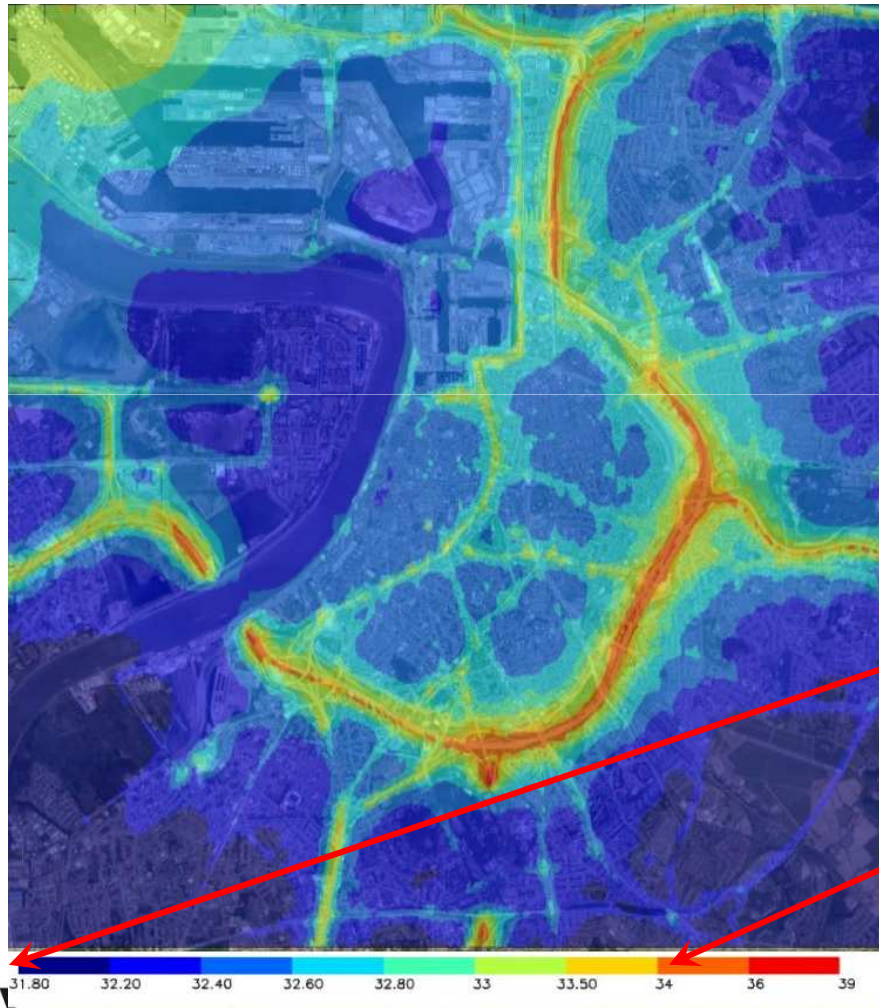


# Case 2: Impact of “Oosterweelverbinding” on PM<sub>2.5</sub>

Increase  
of 2%  
Decrease  
of 5%



# Case 3: Low Emission Zone for city center of Antwerp



Annual mean PM<sub>10</sub>  
concentrations  
(2006)

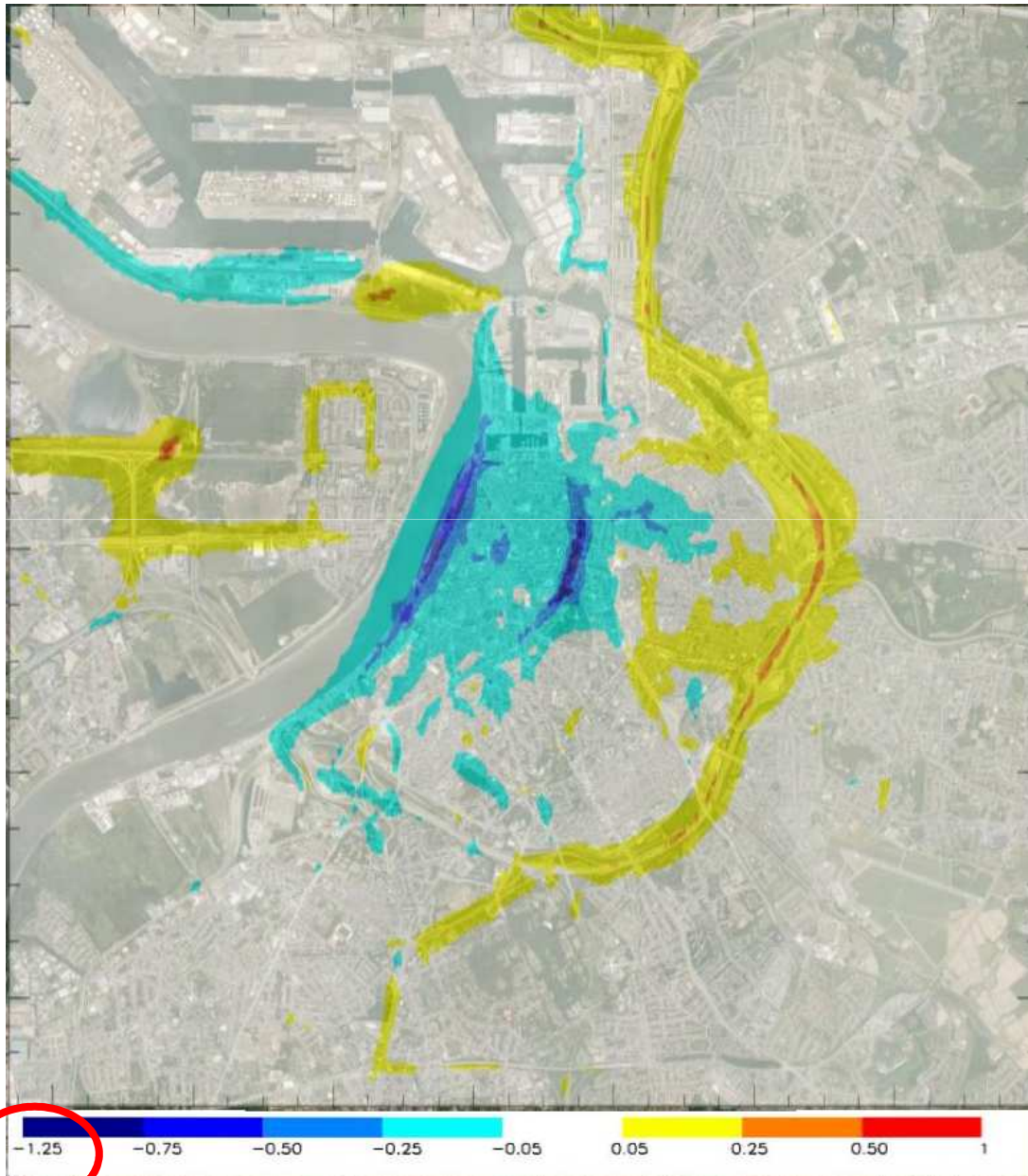
31.8 µg/m<sup>3</sup>

34.0 µg/m<sup>3</sup>

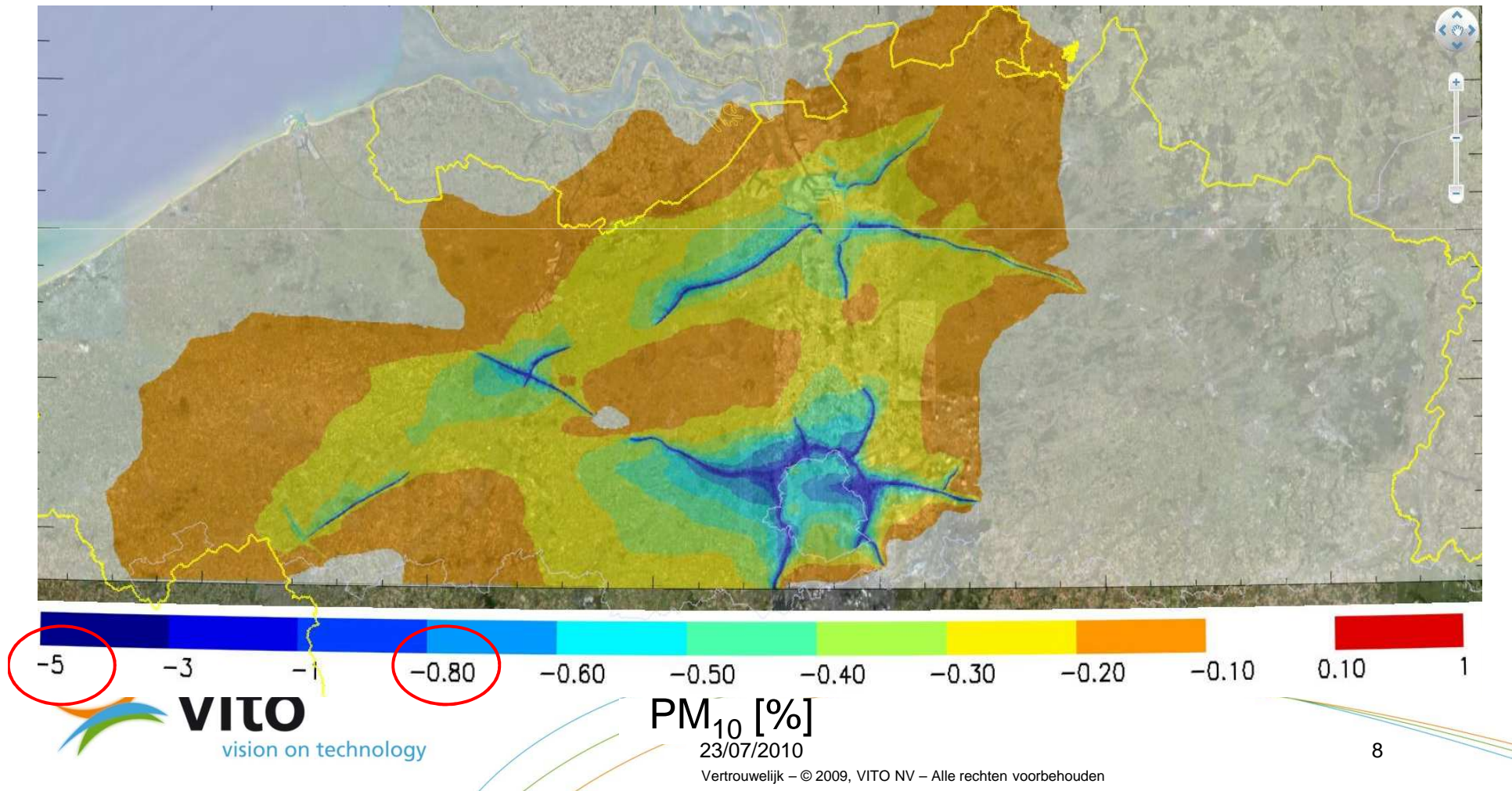


# Case 3: Impact “Low Emission Zone” in Antwerp - 2015

- » PM<sub>10</sub> difference [%]  
LEZ – BAU
- » Maximum range for  
local policy: **-1.25%**

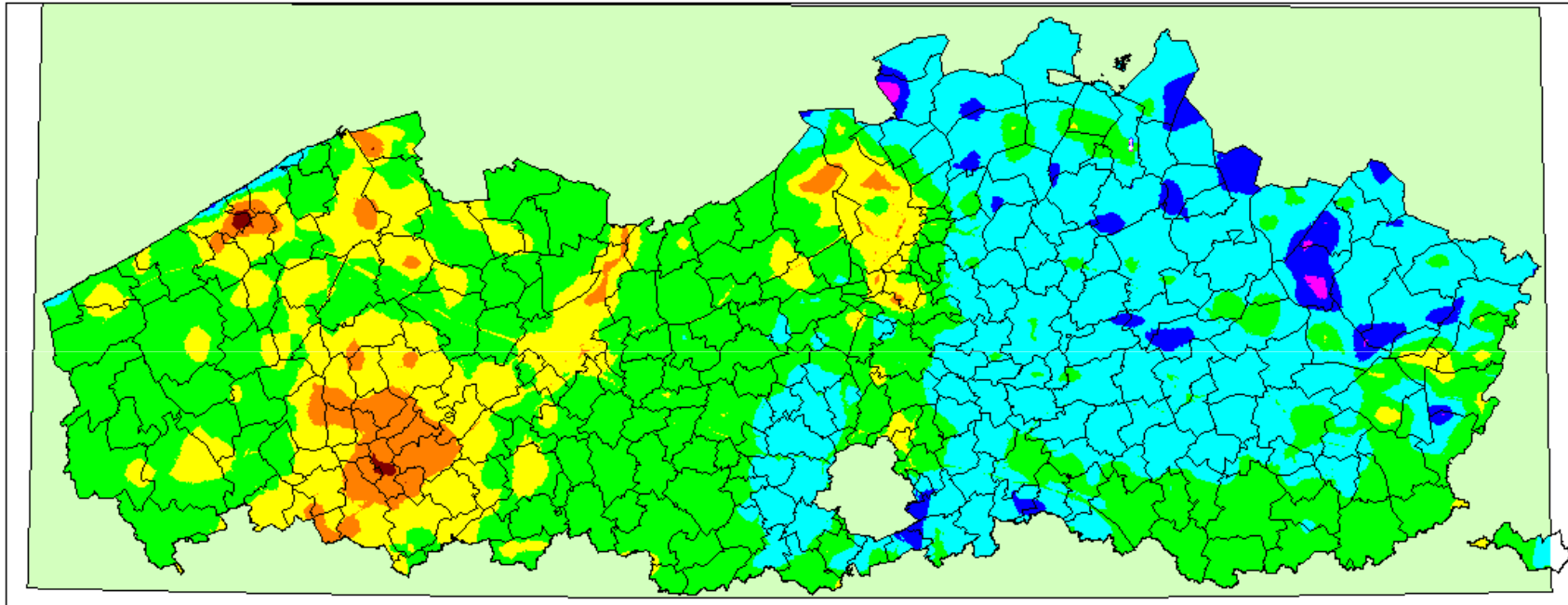


# Case 4: Impact of a speed limit reduction (120→90km/h) during PM episodes

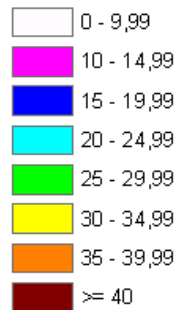




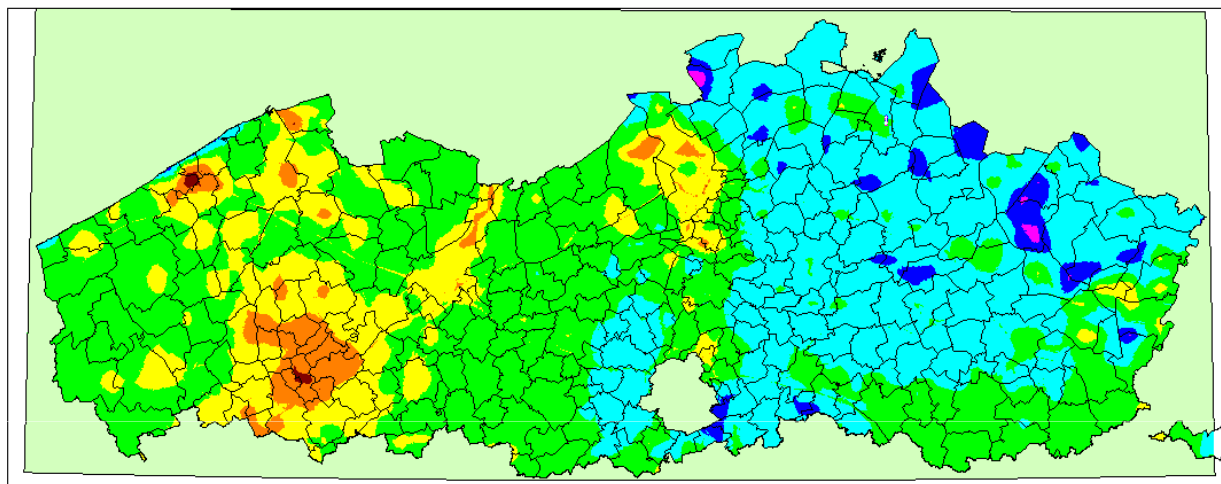
# Case 5: Air quality assessment along major roads



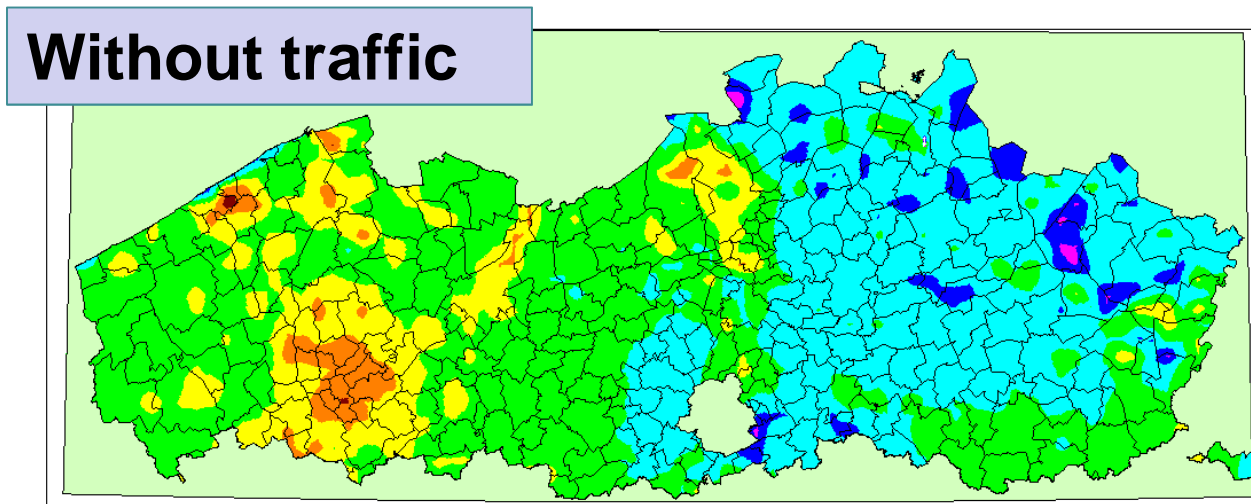
2007  
Jaargem PM10 ( $\mu\text{g}/\text{m}^3$ )



# Case 5: PM<sub>10</sub> map Flanders: with and without primary PM traffic emission



2007  
Jaargem PM10 (µg/m<sup>3</sup>)



Without traffic

2007  
Jaargem PM10 zw (µg/m<sup>3</sup>)

**Are PM<sub>10</sub> and PM<sub>2.5</sub> the appropriate indicators for traffic related pollution?**

**Can they be used to evaluate traffic related abatement measures?**

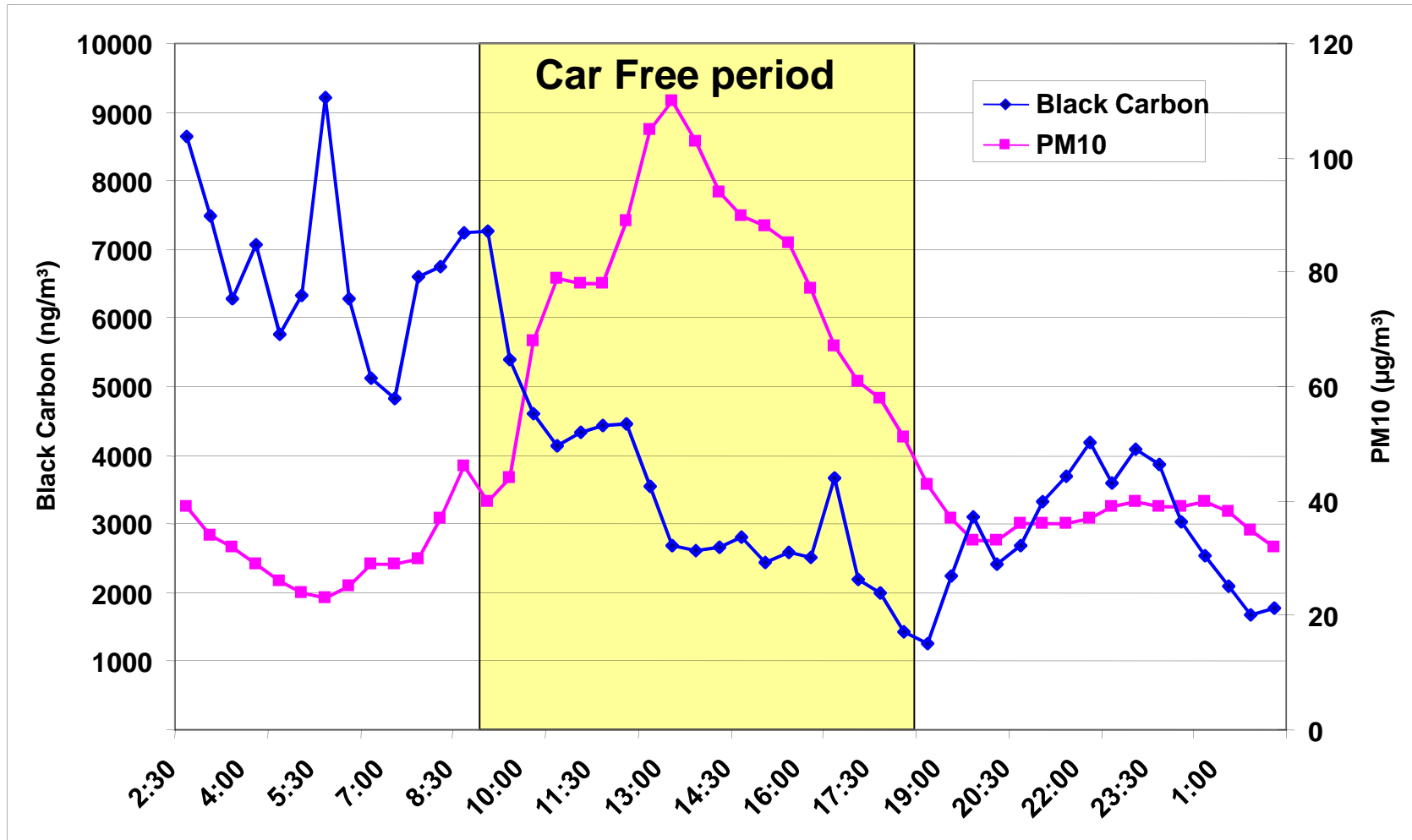
# Elemental Carbon (EC) as “tracer” for traffic pollution

- » Elemental Carbon ~ Black Carbon ~ Soot
- » Low background concentrations ( $\sim 0.5 \mu\text{g}/\text{m}^3$ )
- » Significant traffic contribution
  - » EC = 70% direct  $\text{PM}_{2.5}$  exhaust emissions
- » Link to health effects (?)



# Case 1: Car Free Sunday, Brussels - 20 Sept 2009

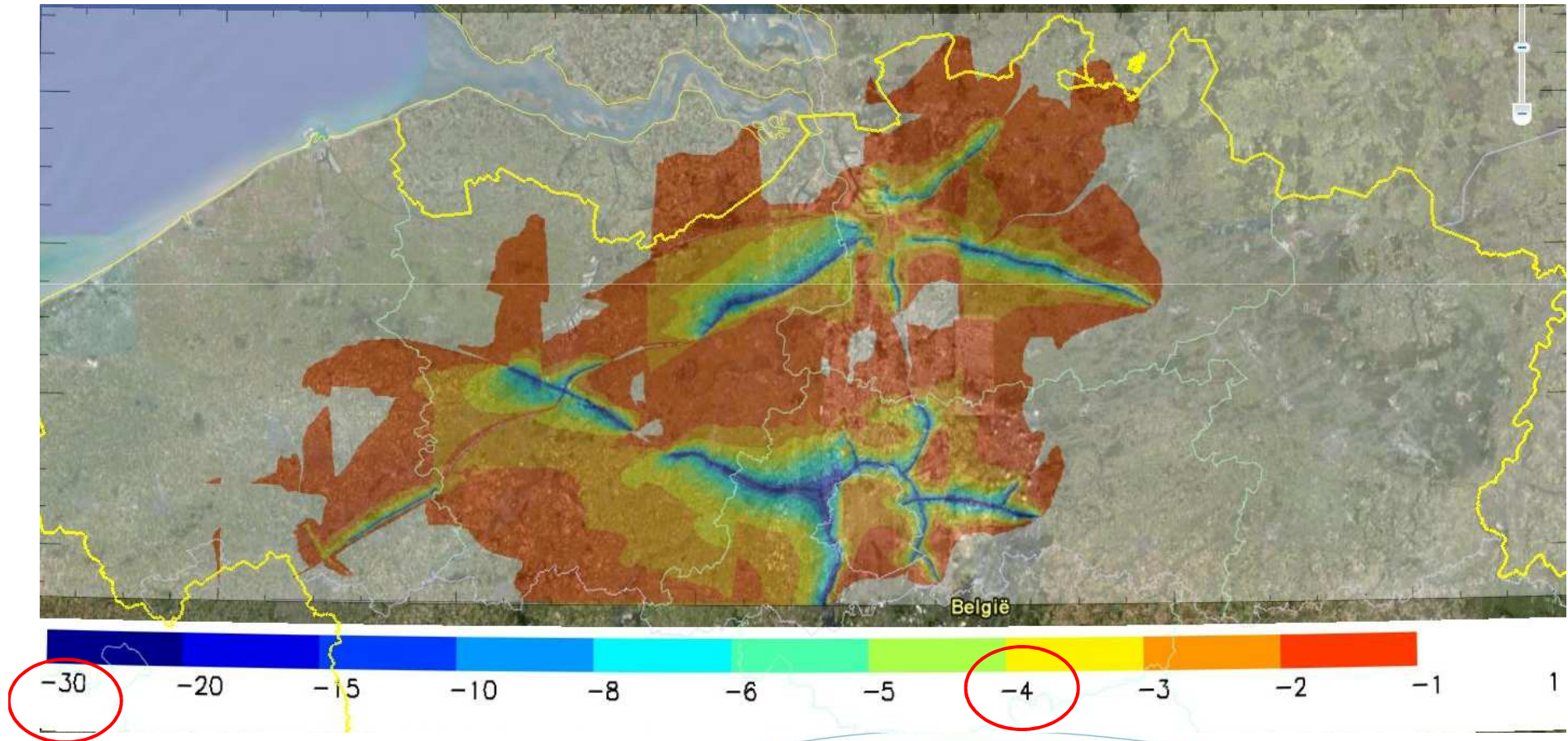
Source : Peter Vanderstraeten (Leefmilieu Brussel, 2009)



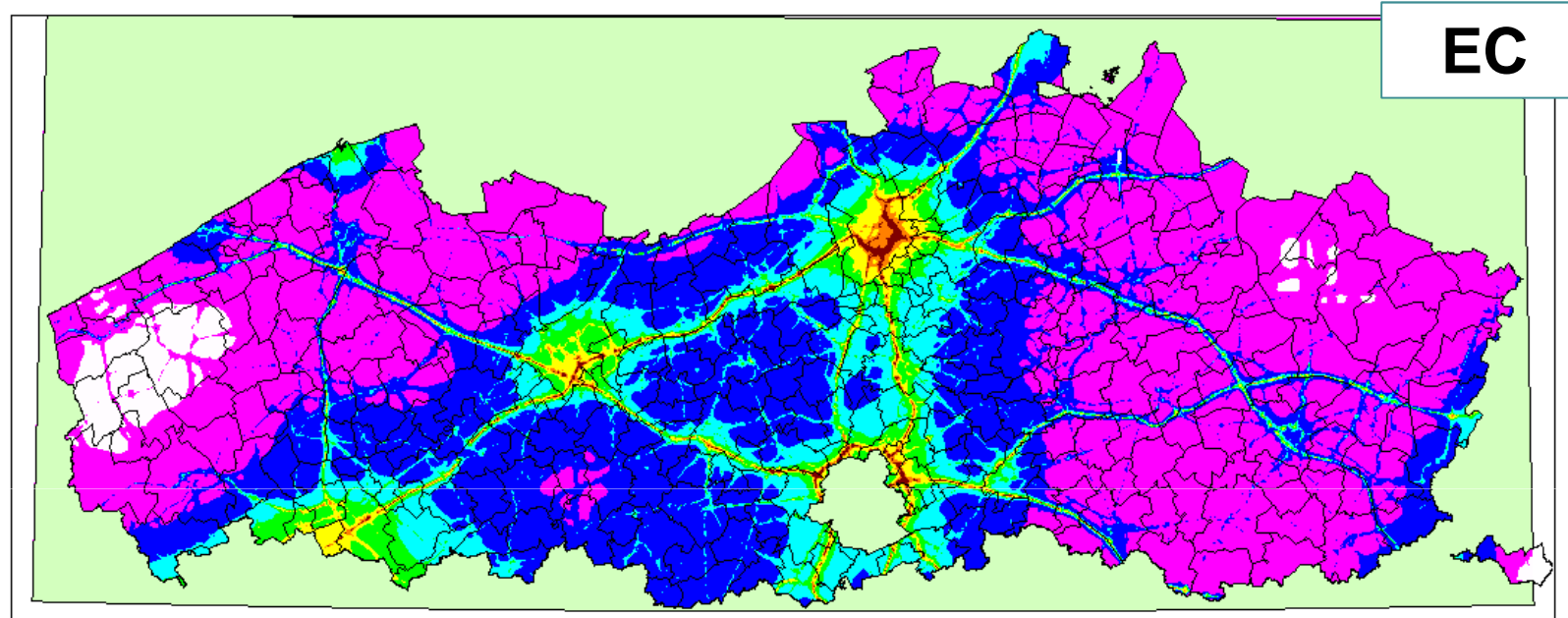
**PM10 : high secondary fraction → precursors yesterday ...**

**EC : local (traffic) emissions much more important : immediate effect !**

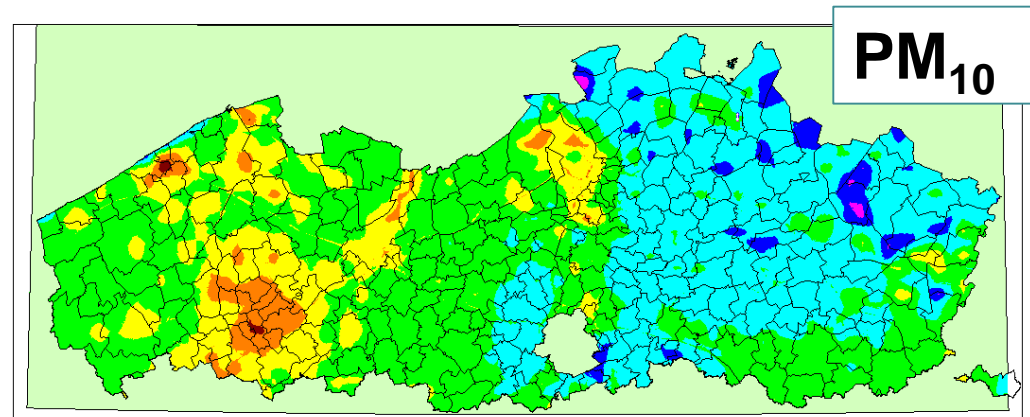
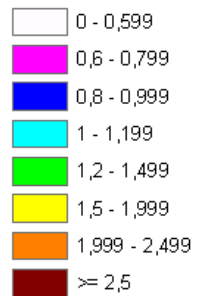
# Case 4: Impact of 90km/h speed limit on Elemental Carbon



# Case 5: Air quality along highways: EC



2007  
Jaargem EC ( $\mu\text{g}/\text{m}^3$ )



2007  
Jaargem PM10 ( $\mu\text{g}/\text{m}^3$ )

# Conclusions

- » Primary traffic emission have low impact on the total mass concentrations of  $PM_{10}$  and  $PM_{2.5}$
- » PM hot spots will only be marginally influenced by traffic related measures
- » EC is a better traffic related air quality indicator
- » Therefore, an EC analysis is also setup for case 1, 4 and 5
- » Traffic measures are not helping much in meeting European PM legislation but can have relevant effect in reducing health impacts of air pollution