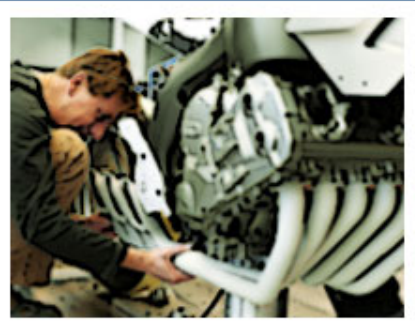


# Innovating our mobility

L-category vehicles: smaller, lighter, more specialised



# Commuting by motorcycle impact analysis



a study of Transport & Mobility Leuven for FEBIAC

## Commuting by motorcycle

### 1. Impact modal shift on traffic congestion

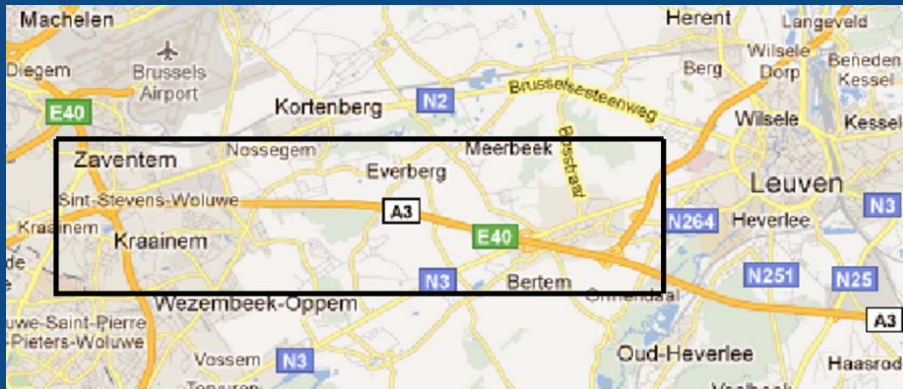
- Case study Leuven-Brussels
- Global impact on Belgian highway network

### 2. Impact modal shift on traffic emissions

- Emissions motorcycles vs. passenger cars
- Case study Leuven-Brussels

# Impact on traffic congestion

## Case study Leuven-Brussels



- 1) Reference scenario: current morning peak (2011)
- 2) Scenario 10% modal shift from car to motorcycle

### Reference scenario (morning peak 2011)

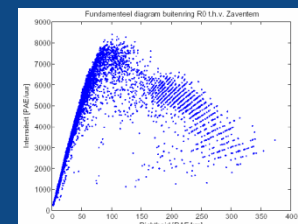
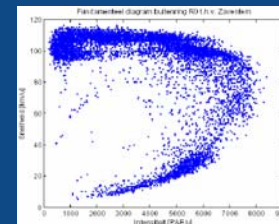
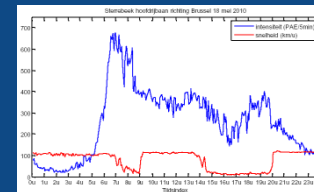
- Dynamic simulation of traffic flows by LTM

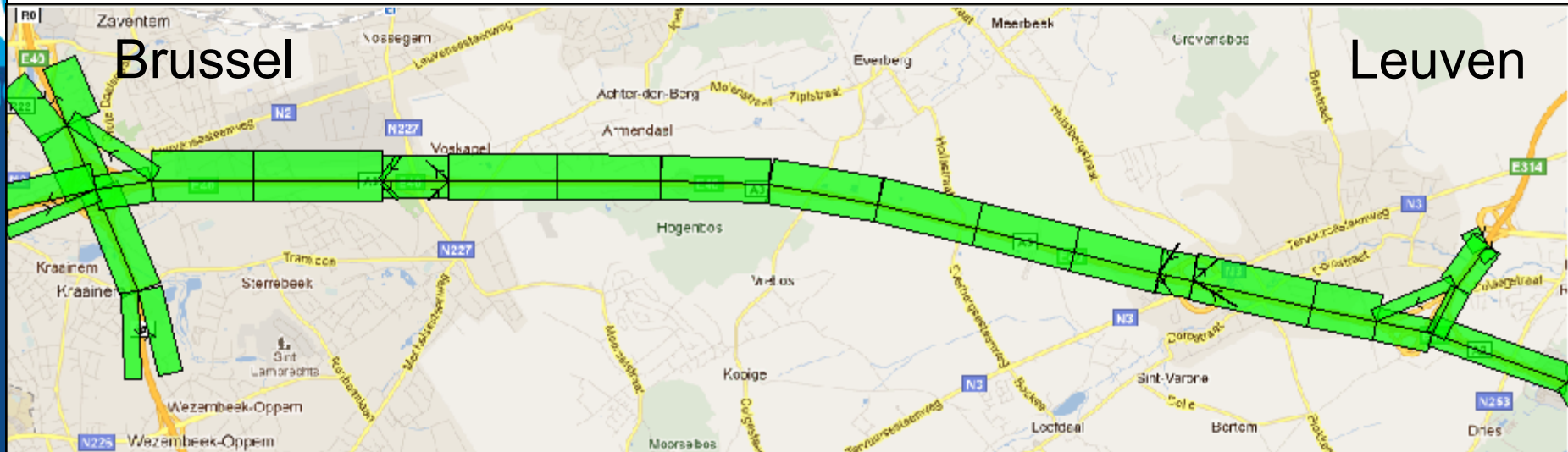
- Realistic representation in line with traffic counts

- 42 detectors on 7 locations

- May 2011, every 5 minutes: volumes, speeds, composition

- Capacity network sections



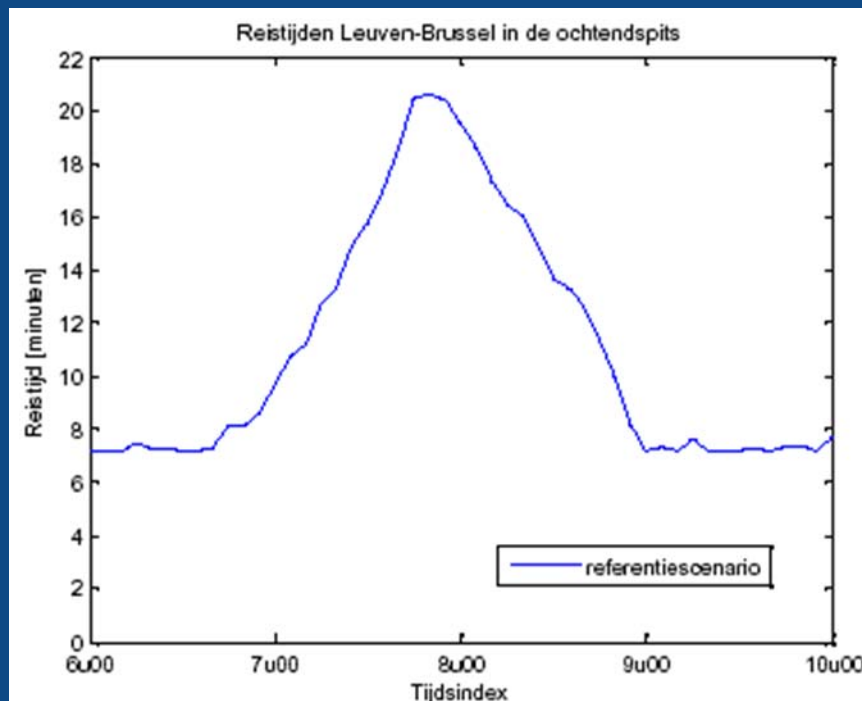


## Reference scenario - simulation results (6.30 – 9.30)

- Free-Flow
- Capacity
- Congestion

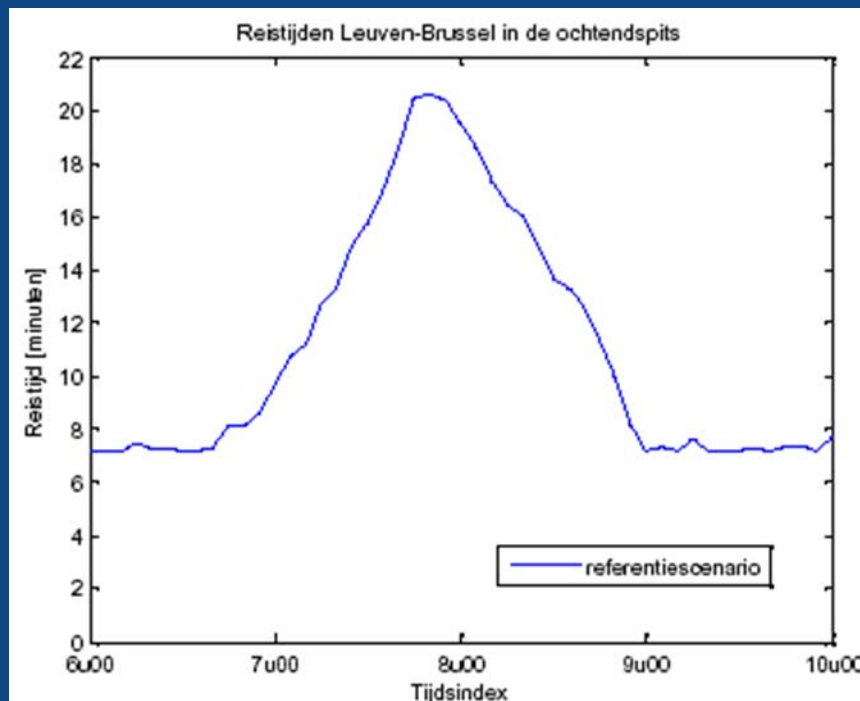
### Reference scenario (morning peak 2011)

#### Travel Times



### Reference scenario (morning peak 2011)

#### Travel Times



Total time loss

(all vehicles Leuven-Brussels 6.30 – 9.30)

**= 1925 hours**





### Modal shift scenario (morning peak 2011)

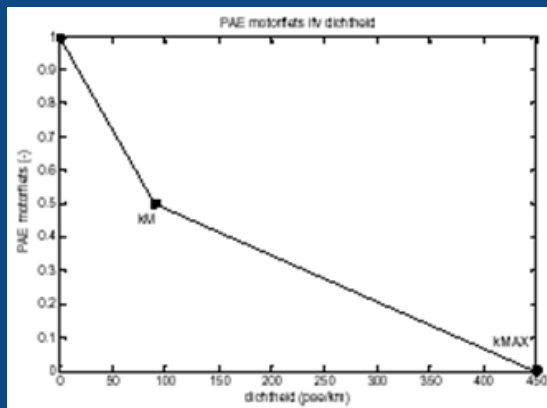
#### Assumptions:

- 10% passenger cars replaced by motorcycles
- Occupancy passenger car (commute) = 1.1
- Occupancy motorcycle (commute) = 1.0

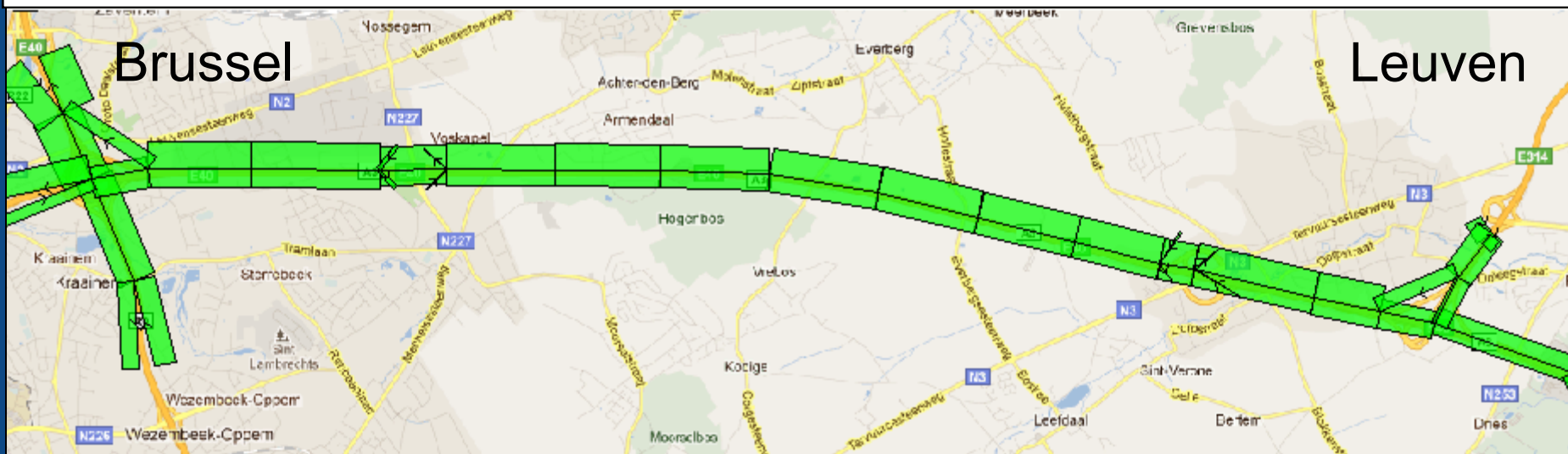
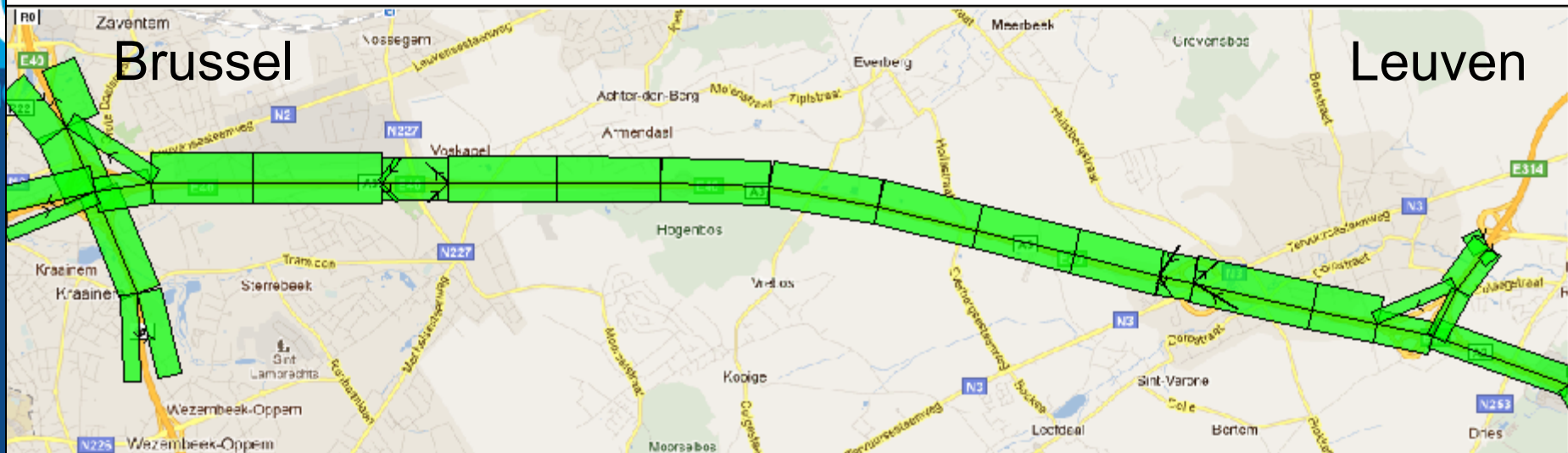
### Modal shift scenario (morning peak 2011)

#### Assumptions:

- Passenger-Car-Equivalent (PCE) motorcycle  
(How many cars would have same effect on traffic flows?)

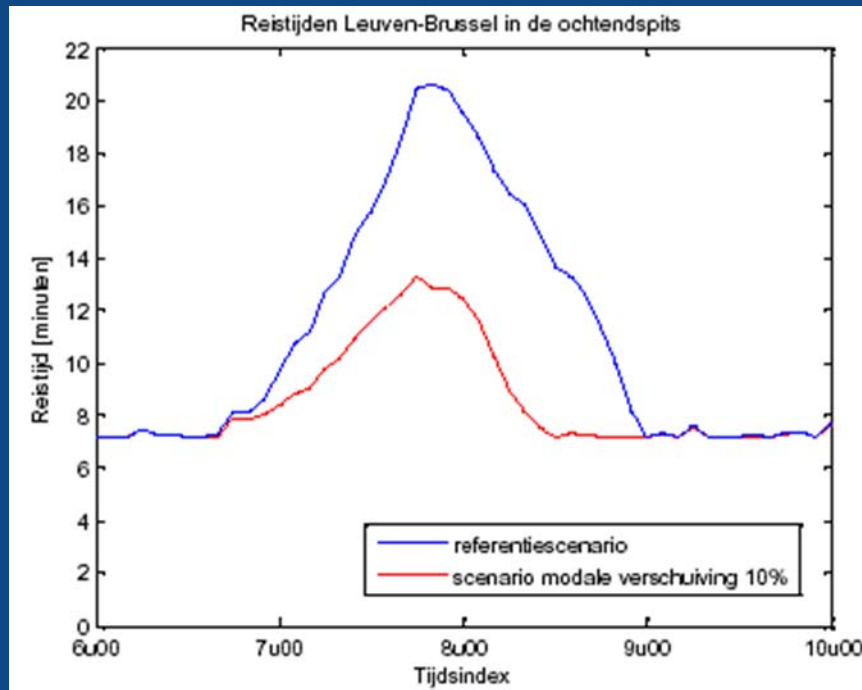


- $PCE = 1$  for min. density
- $PCE = 0.5$  at capacity
- $PCE = 0$  for max. density



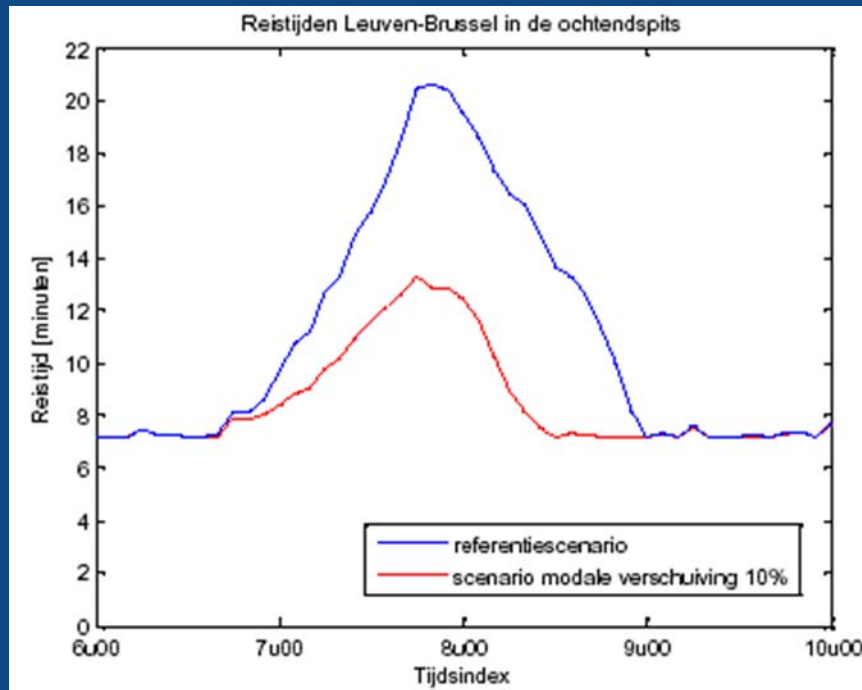
### Modal shift scenario (morning peak 2011)

#### Travel Times



### Modal shift scenario (morning peak 2011)

#### Travel Times



Total time loss

(all vehicles Leuven-Brussels 6.30 – 9.30)

**= 706 hours**

(- 60% to reference)



## Modal shift scenario (morning peak 2011)

Total time loss

(all vehicles Leuven-Brussels 6.30 – 9.30)

taking into account newly attracted traffic

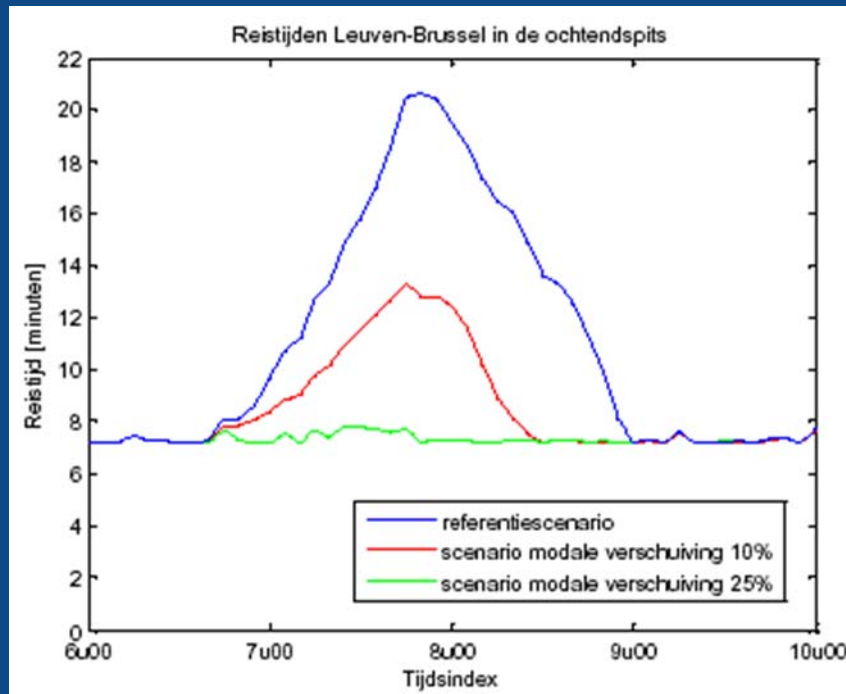
on highway due to improved traffic conditions

**= 1158 hours**

(- 40% to reference)

### Modal shift scenario (morning peak 2011)

#### Travel Times



25% modal shift  
needed to  
avoid congestion



## Global impact on traffic congestion

Extrapolate impact to Belgian highway network

Reference: **37.000 hours** lost per day

- 40% time lost in modal shift scenario

Time savings: **15.000 hours** per day

Value of time commuter 13.96 €/h

Time benefits: **210.000 €** per day

**50 Million €** per year (indicative figure)



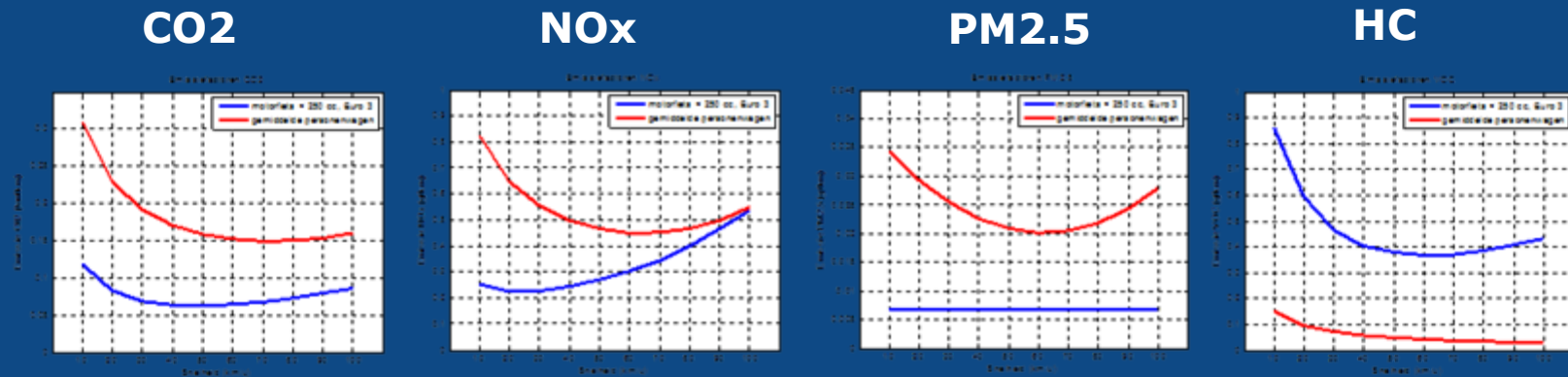
## Global impact on traffic congestion

Impact on underlying road network:

- less (rat-run) traffic, shift to highway network
- if also modal shift on underlying road network:  
similar time benefits

### Impact on emissions

- Emission factor 'mean' car (mean Belgian vehicle fleet)
- Emission factor 'recent' motorcycle (250cc, Euro 3)  
(source: COPERT IV emission functions 2010)



Emissions CO<sub>2</sub>, NO<sub>x</sub>, PM<sub>2.5</sub> lower for recent motorcycles

### Impact on emissions

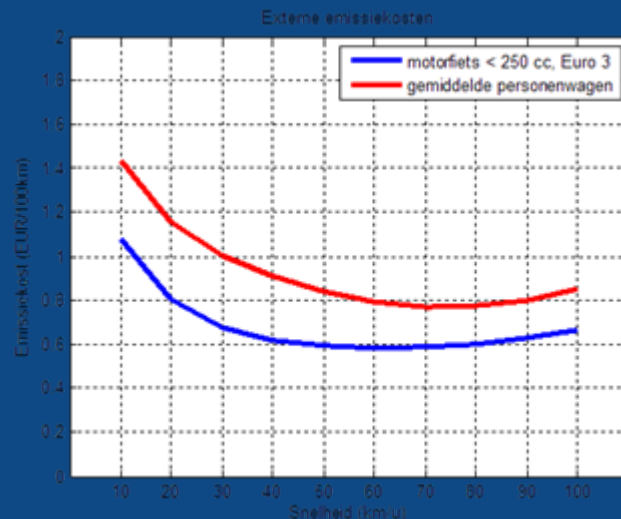
Total Emission costs (€/100 km)

(monetization based on environmental damage: NO<sub>x</sub>: 0.58 €/kg

PM<sub>2.5</sub>: 135.5 €/kg

HC: 7.5 €/kg

CO<sub>2</sub>: 20 €/ton



— 'mean' car

— 'recent' motorcycle

Emission costs **20% lower** for recent motorcycles



### Impact on emissions

Total Emission costs in case study Leuven-Brussels:  
(all vehicles Leuven-Brussels 6.30 – 9.30)

**6% lower** in modal shift scenario c.t. reference

- 1% due to shift in traffic composition
- 5% due to avoided traffic congestion

### Conclusions

#### Impact modal shift (10%) on traffic congestion:

- Queues are shorter and disappear more quickly
- Travel times are shorter
- Total time losses reduced by 40%
- Time benefits on Belgian highway network: 50 M€/year

#### Impact modal shift (10%) on traffic emissions:

- Recent motorcycles emit less CO<sub>2</sub>, NO<sub>x</sub>, PM<sub>2.5</sub>, but more HC
- Total emission costs 20% lower for recent motorcycles
- Total case study emission costs 6% lower, 5% due to avoided congestion





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## Additional information

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