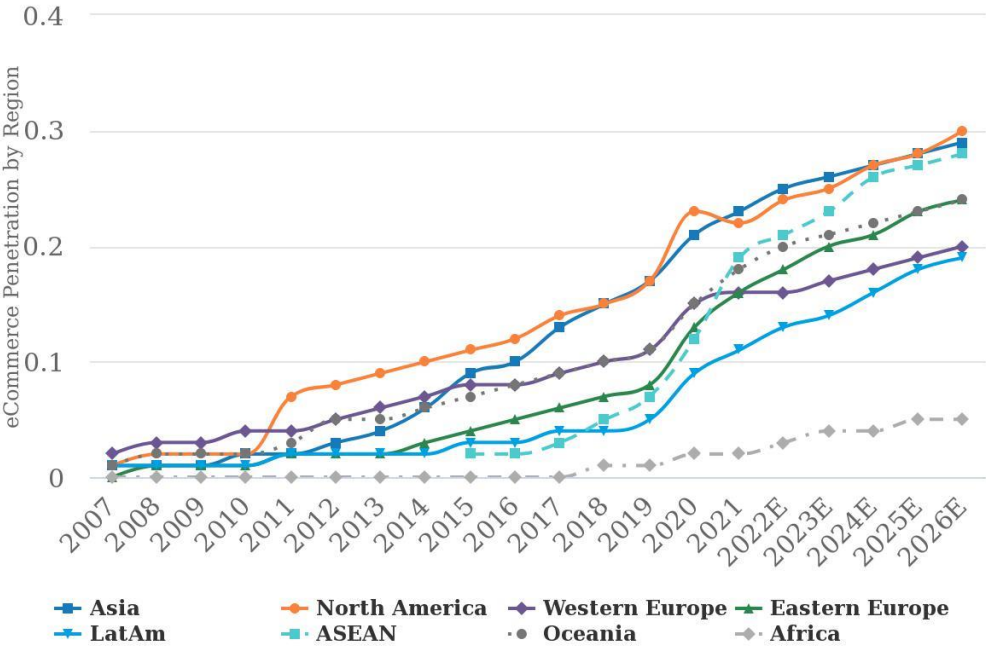


# Combining the four A's of sustainable logistics in a single operator citywide zero-emission parcel-deliveries system

Koen Mommens & Cathy Macharis



# E-commerce



E-commerce penetration rate by region (Source: Euromonitor, National Data Sources, Morgan Stanley Research estimates)



Global chain – last mile

# E-commerce deliveries account for 9% of the CO<sub>2</sub> emissions of freight transport in cities

Sector framework:

- E-commerce = fast growing sector
- Last mile delivery = free, home, same/next day
- Logistics organization = based on diesel vans

High impact on:

- viability in cities
- Social model

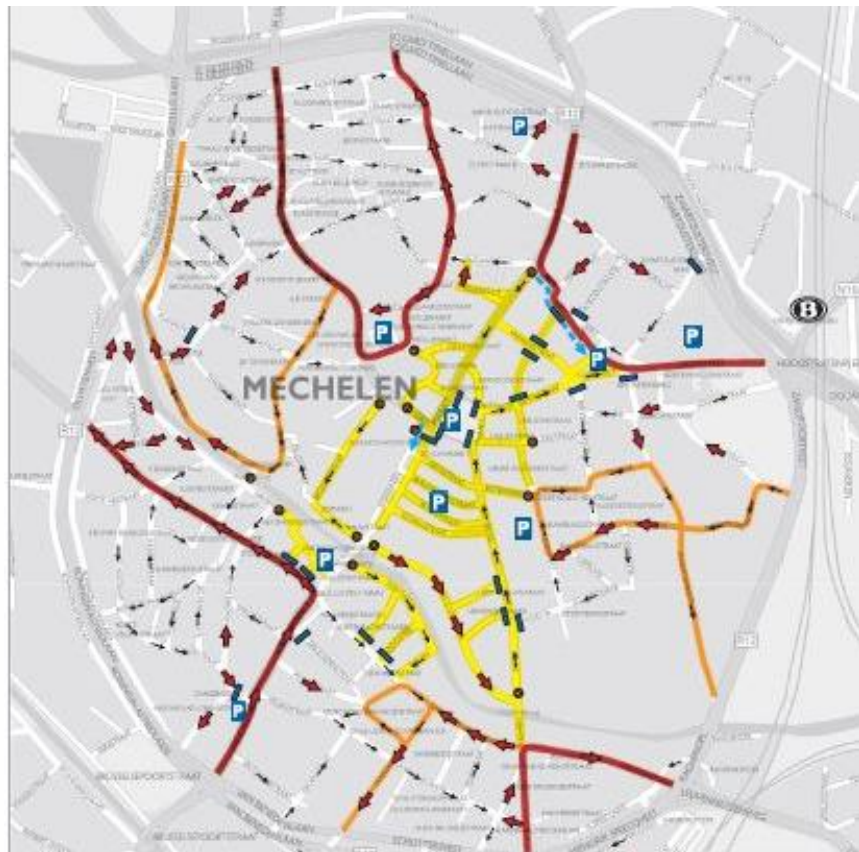
- **Emission** reduction goals
- **traffic** regulations/restrictions



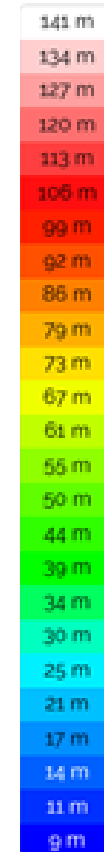
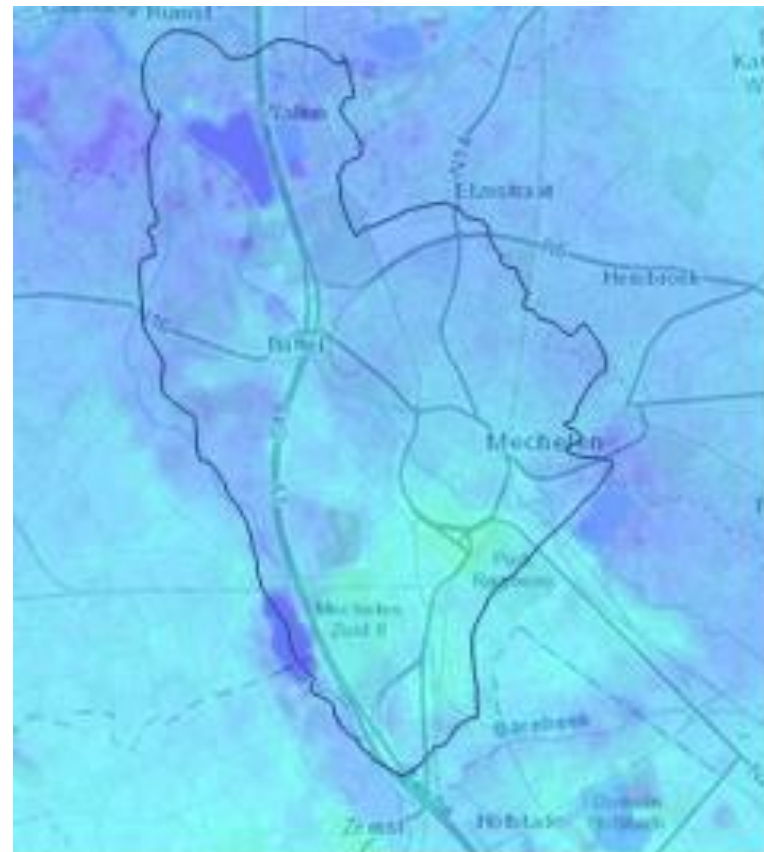
No sustainable logistic solutions implemented on city scale

**New logistics challenges**

# Ecozone



Map of city center of Mechelen with zone with vehicle restriction in yellow.

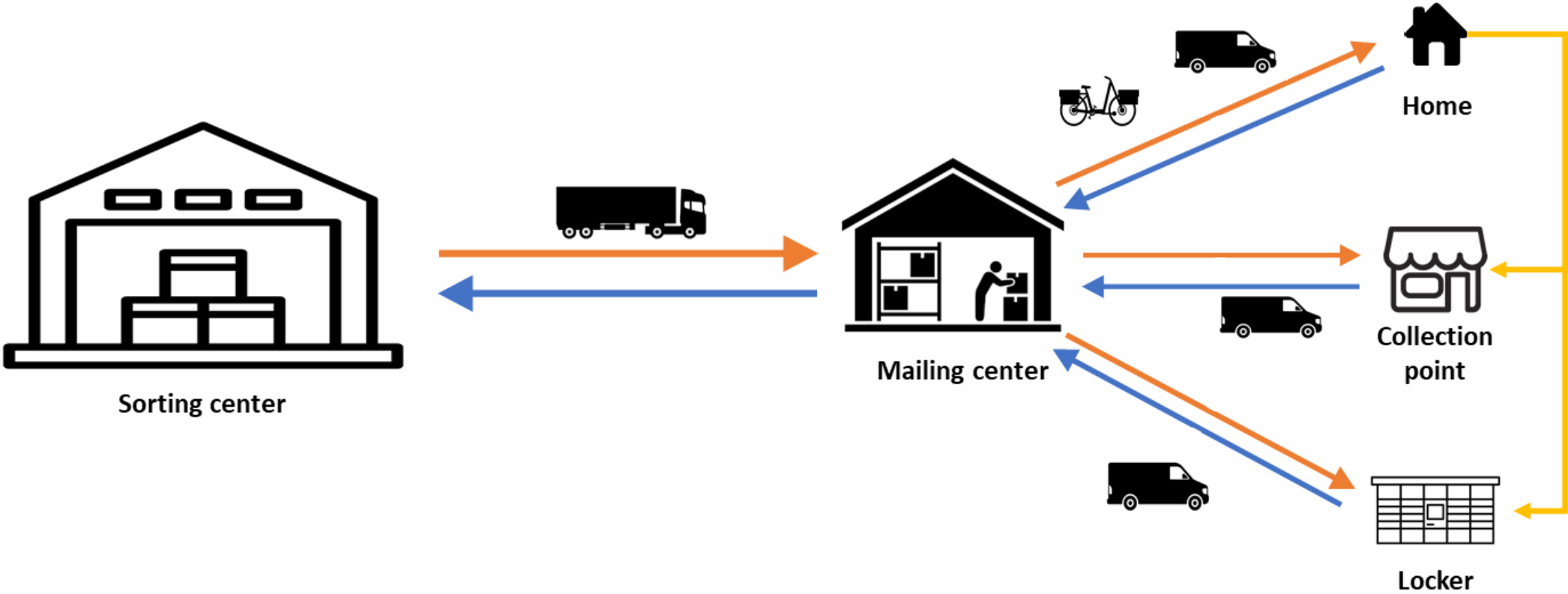


## Mechelen

- 85.000 inh.
- Between Antwerp and Brussels
- Policy support

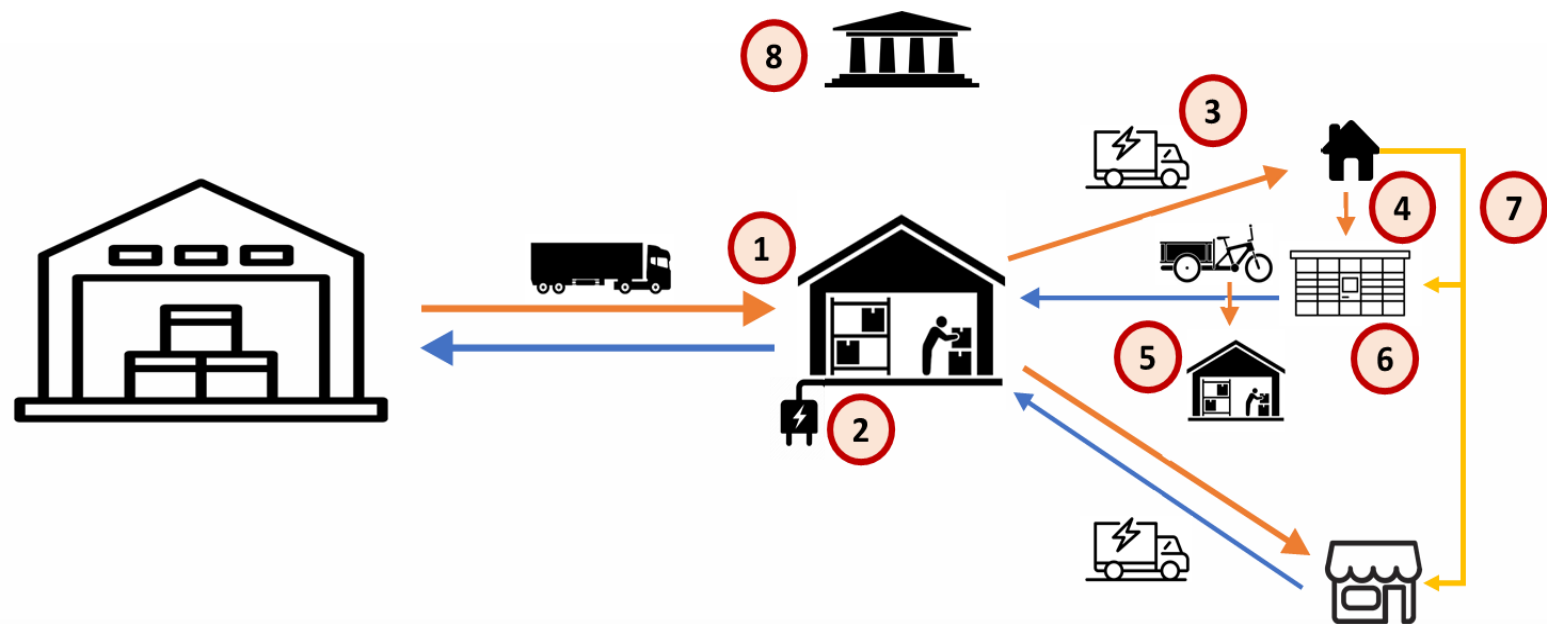


# Business as usual





# Solutions



# 4A's of sustainable transport

+ 'A' from Actor involvement + 'A' from AND

## Anticipation

100% elektrisch:



- ↳ noise,
- ↳ air pollution



## Act and Shift

Bike-trailors:   
-164 gereden km / dag

## Avoidance

Microhubs and lockers =  
efficiency gains of 64%  
compared to BAU  

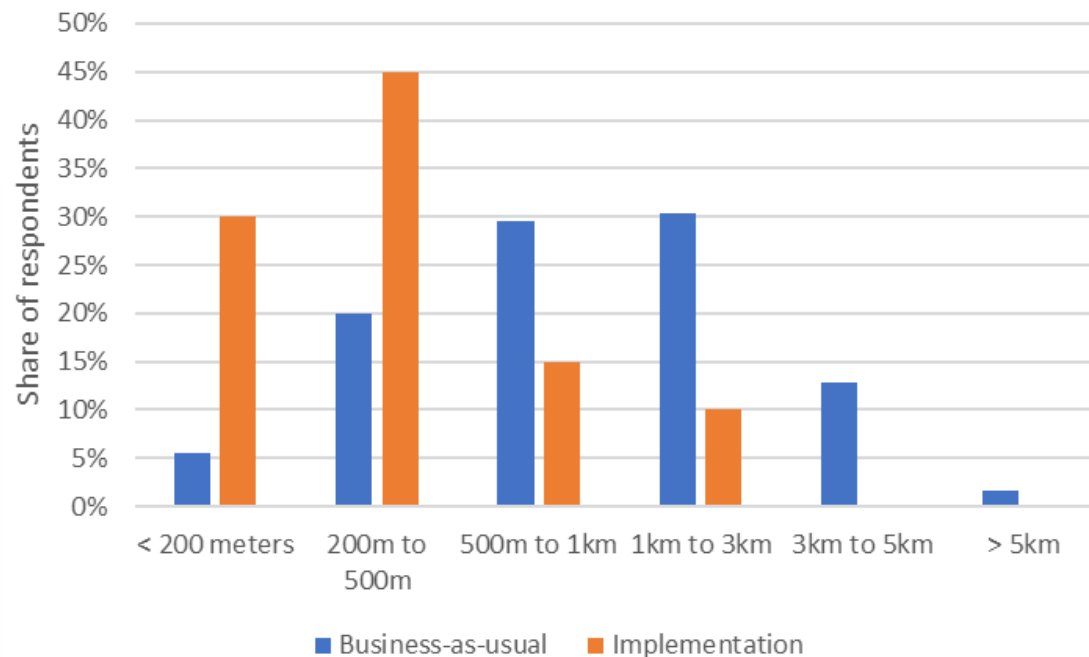
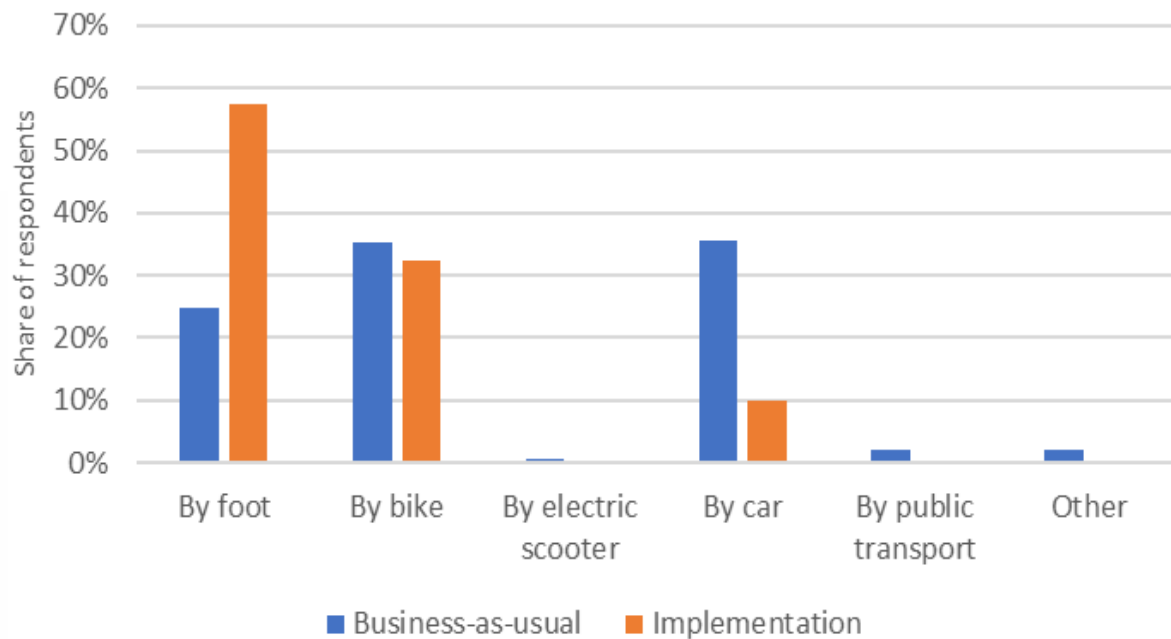
## Awareness

A lot of attention  
+ Actor involvement  
Consumer, cities, etc.



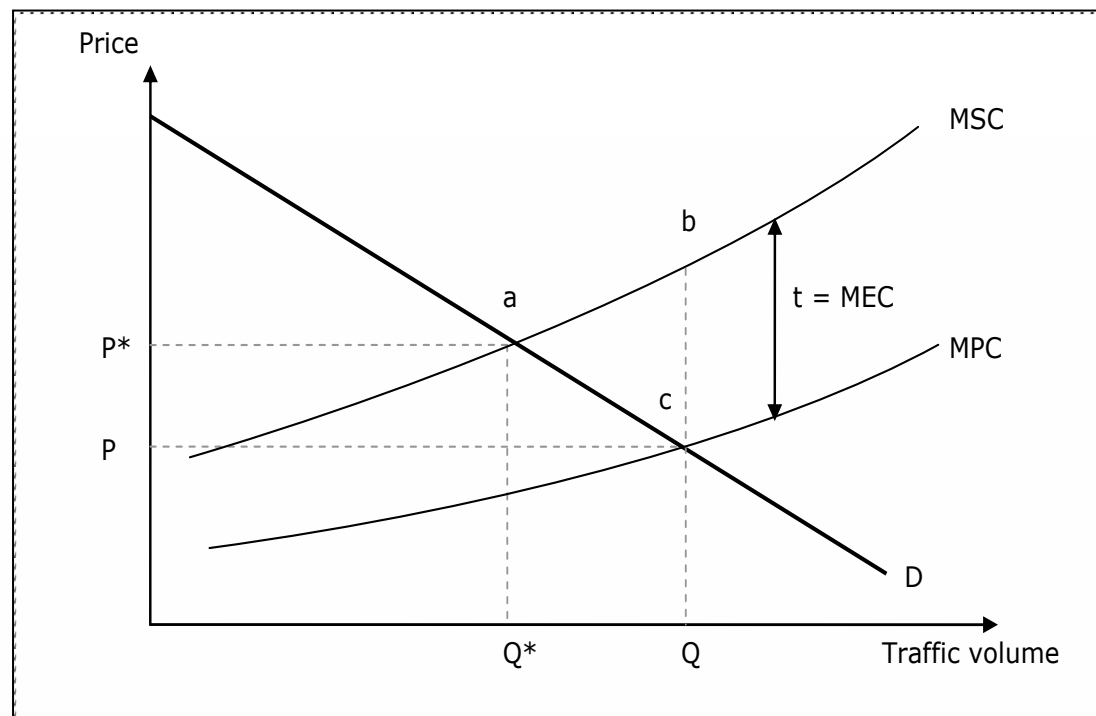


# Consumer movements



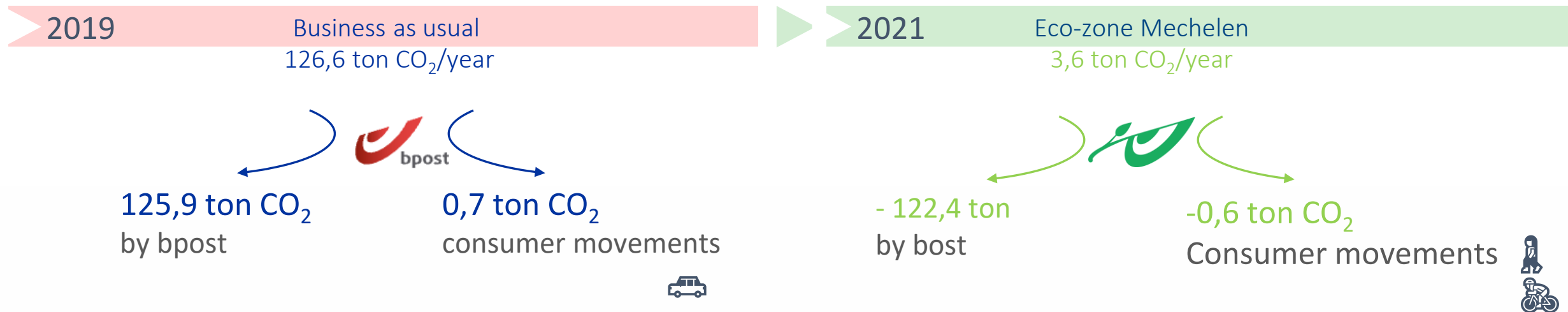
# External cost

“An external cost arises, when the social or economic activities of one group of persons have an impact and when that impact is not fully accounted, or compensated for.” Bickel and Friedrich (2005)



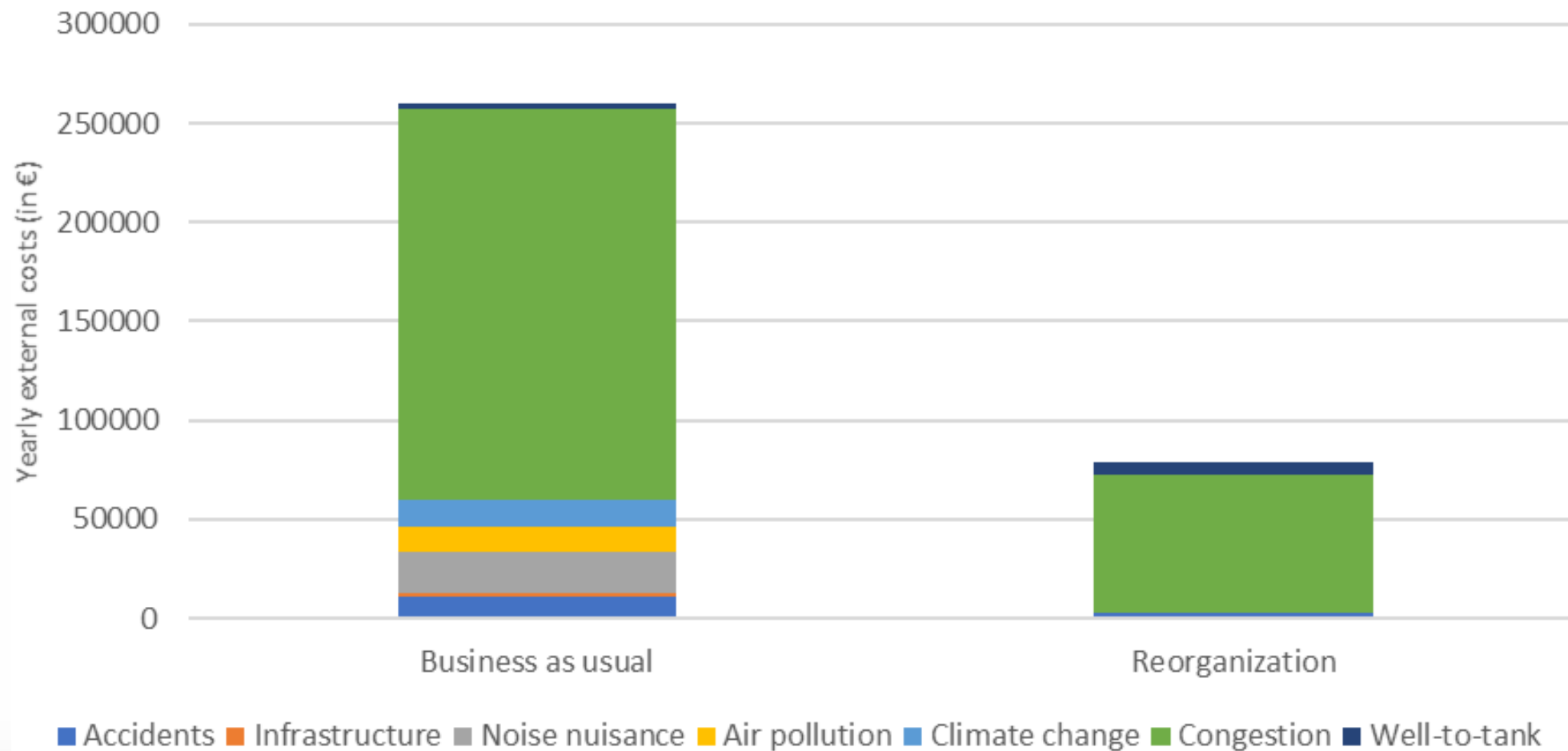
Congestion	$EC_{congestion} = \text{monetary value} \times \text{vehicle kilometer}_{a,b,c}$
Air pollution	$EC_{congestion} = \text{monetary value} \times \text{vehicle kilometer}_{a,b,d}$
Climate change	$EC_{congestion} = \text{monetary value} \times \text{vehicle kilometer}_{a,b,d}$
Infrastructure	$EC_{congestion} = \text{monetary value} \times \text{vehicle kilometer}_{a,b}$
Accidents	$EC_{congestion} = \text{monetary value} \times \text{vehicle kilometer}_{a,b}$
Noise nuisance	$EC_{congestion} = \text{monetary value} \times \text{vehicle kilometer}_{a,b,c}$
Well-to-Tank	$EC_{congestion} = \text{monetary value} \times \text{vehicle kilometer}_{a,b}$

# CO<sub>2</sub> emissions of parcel deliveries



97% CO<sub>2</sub> emission reduction

# Result



# Who are we?

to accelerate the transition to a more sustainable and socially just mobility and logistics system



**Claire**  
Urban distribution



**Lina**  
Air pollution



**Javier**  
Sychromodality



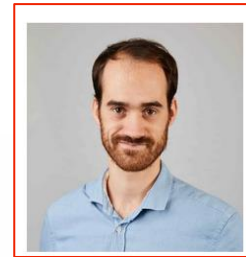
**Yves**  
Vehicle routing



**Nicolas**  
Air pollution



**Cathy**  
Sustainability



**Philippe**  
Elicitation



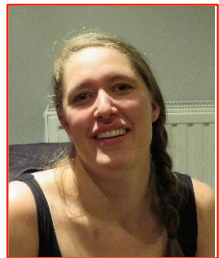
**Rocslides**  
Vehicle routing



**Shafagh**  
Sychromodality



**Valeska**  
Autonomous



**Cathérine**  
Sychromodality



**Shiqi**  
Sychromodality



**Joséphine**  
E-commerce



**Sam**  
Sustainability



**Leku**  
Cargobike



**Kathleen**  
E-commerce



**River (He)**  
MAMCA



**Koen**  
Sustainability



Thank you



**mobilise**

analysing mobility, mobilising people