

# **SCATTER**

## **Testing and evaluating potential solutions to control urban sprawl, through simulation**

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# Common policies tested in the 3 case cities

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## ■ 1. Public transport investments:

- rail networks
- radial or orbital networks

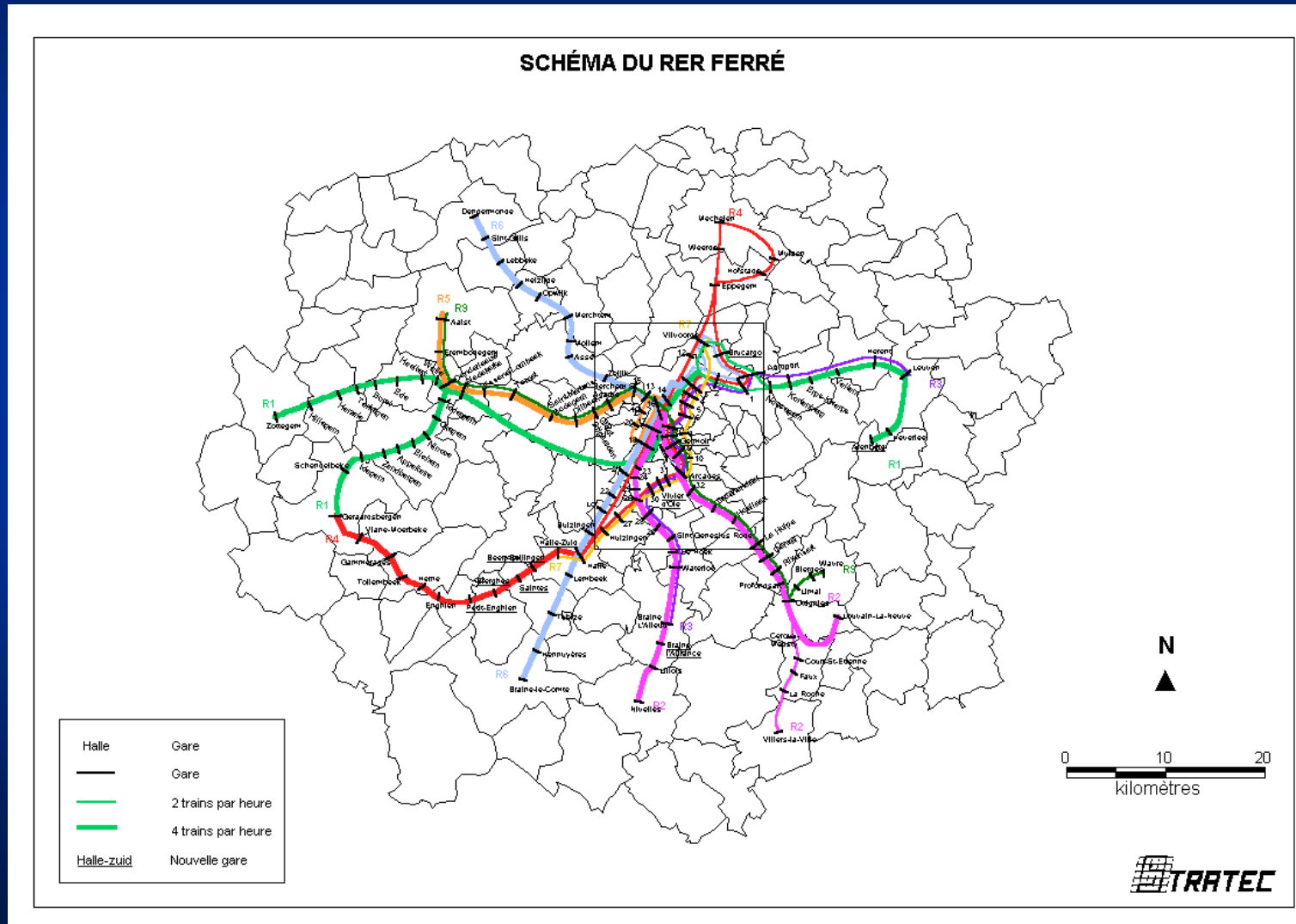
→ *The question is: do rail investments generate sprawl ?*

## ■ 2. Policies aimed to reduce urban sprawl or reduce its negative effects

→ *The question is: which measures are most effective ?*

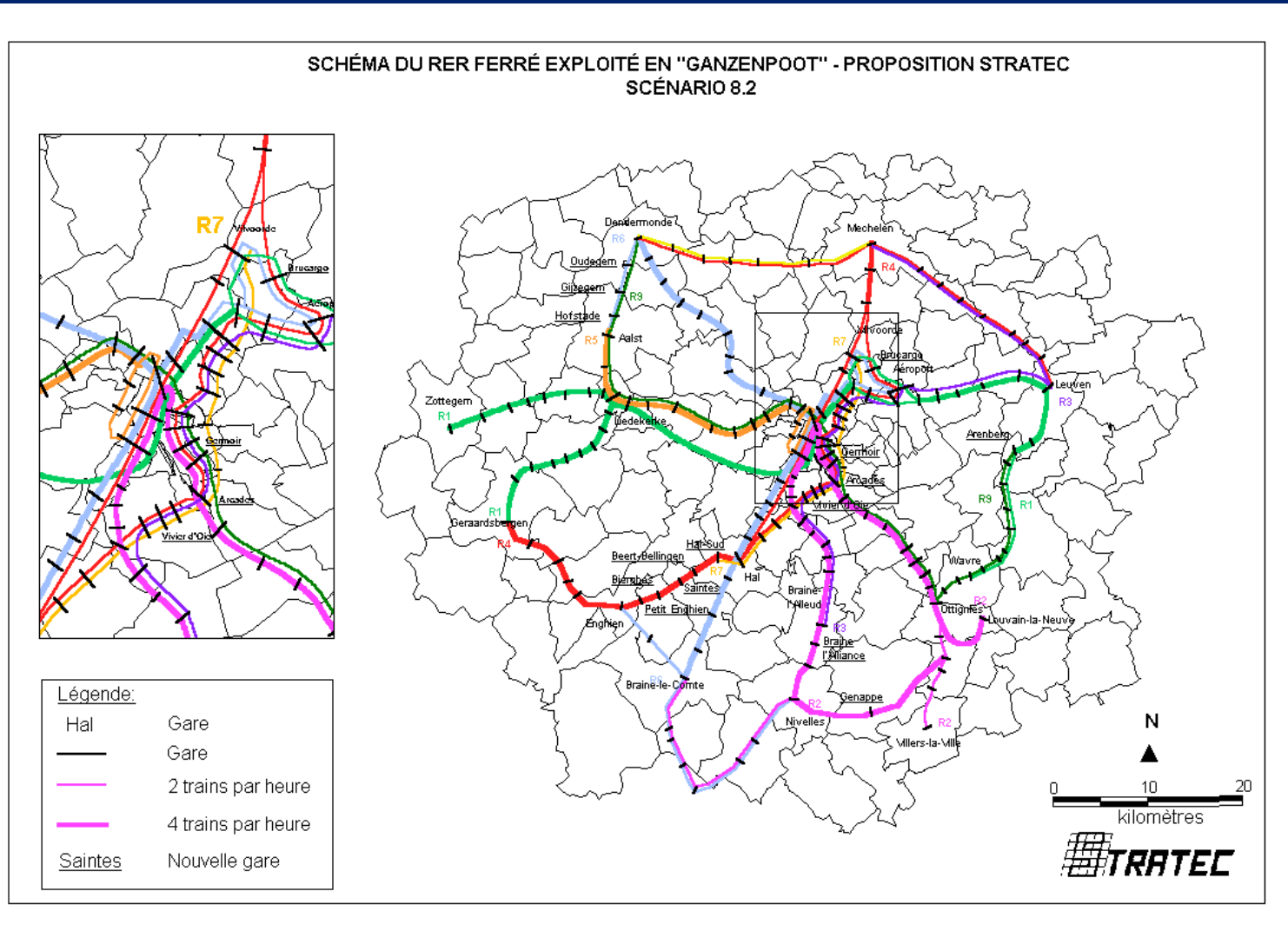
# The simulated public transport networks (1)

## Brussels – rail REN



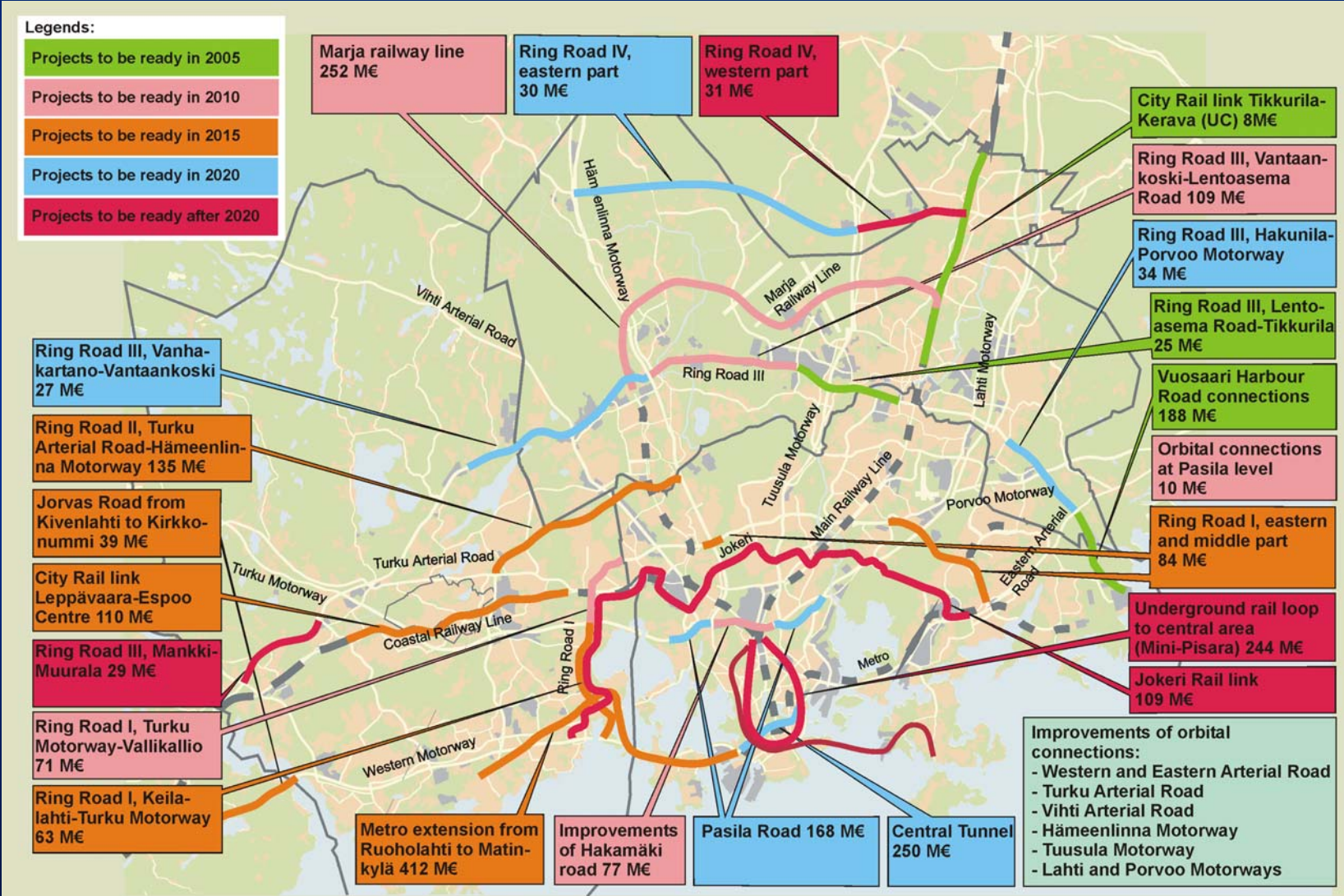
# The simulated public transport networks (2)

## Brussels – rail REN alternative



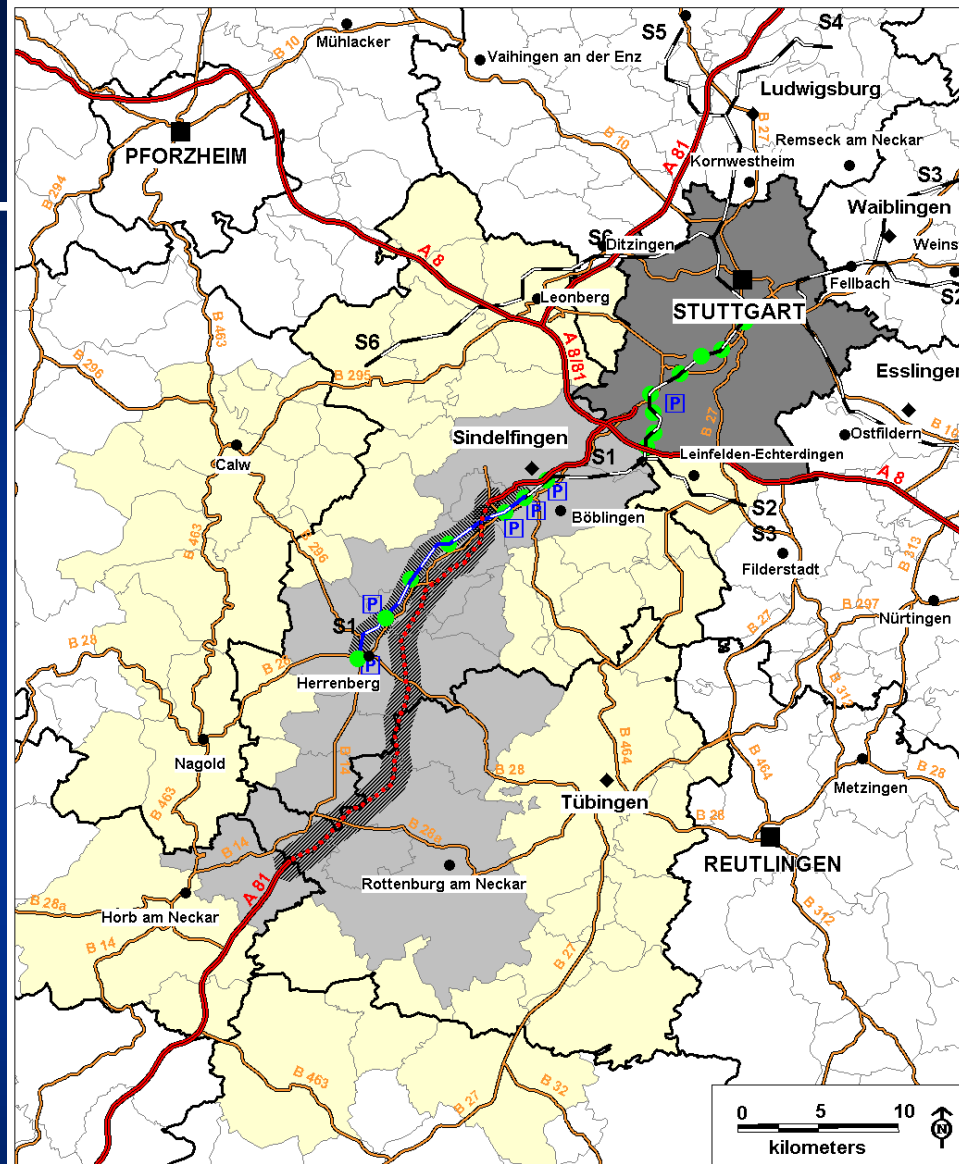
# The simulated public transport networks (3)

## Helsinki



# The simulated public transport networks (4)

## Stuttgart S1 + A81



<p><b>legend of cities</b></p> <ul style="list-style-type: none"> <li>■ more than 100000 inhabitants</li> <li>◆ 50000 to 100000 inhabitants</li> <li>● 20000 to 50000 inhabitants</li> </ul>	<p><b>legend of the light-rail system</b></p> <ul style="list-style-type: none"> <li>● stop of light-rail S1</li> <li>[P] Park &amp; Ride</li> <li>— light-rail system</li> <li>— light-rail system S1 (opened in 1990)</li> </ul>	<p><b>legend of regional areas</b></p> <ul style="list-style-type: none"> <li>▭ NUTS 3 (Kreise)</li> <li>▭ NUTS 5 (Gemeinden)</li> <li>▭ Z2b study area Stuttgart</li> <li>▭ Z2a corridor of the projects</li> <li>▭ Z1 central city Stuttgart</li> <li>▭ Z project (light-rail)</li> <li>▭ Z project (motorway)</li> </ul>
<p><b>legend of roads</b></p> <ul style="list-style-type: none"> <li>— motorway</li> <li>— motorway A81 (opened 1978)</li> <li>— main roads</li> </ul>		

# The simulation tools

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**They are able to simulate the location changes due to transport investments**



# Do rail investments generate sprawl ?

Scenarios	Variation in the number of households in the urban centre (%)	Variation in the number of households in the urban zones (%)	Variation in the number of jobs in the urban centre (%)	Variation in the number of jobs in the urban zones (%)	Variation in the average home-work trip distance (%)	Variation in the total car mileage (%)	Variation in the total CO <sub>2</sub> emission (%)
<b>Brussels</b> – future REN	-3.6 %	-1.4 %	0.7 %	0.3 %	8.1 %	-6.2 %	-8.1 %
<b>Brussels</b> – alternative REN with more orbital connections	-5.5 %	-2.8 %	0.8 %	0.3 %	12.4 %	-9.2 %	-11.5 %
<b>Helsinki</b> – HMA full plan + speeding up the rail services by 25 %	-1.6 %	-0.5 %	1.7 %	0.5 %	12.2 %	-0.8 %	-1.5 %



# Do rail investments generate sprawl ?

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- They generate sprawl, if the rail network extends to the suburban/rural areas
- They generate sprawl, if the network is radial or radial + orbital

# Policies which were simulated – policies aimed to control urban sprawl or reduce its negative effects

## ■ Land use policies:

- tax on suburban residential developments (“impact fee”)
- regulatory measure on office location
- fiscal measure applied to offices

## ■ Transport pricing:

- road pricing (car use cost increase)
- cordon pricing
- reduction of the fare of public transport

## ■ Combinations

- of land use and transport policies

## Conclusions (1/3)

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- **Most effective w.r.t. urban concentration/land consumption:**
  - road pricing
  - “impact fee” on residential developments (both in Brussels and Helsinki)
  - fiscal measure to incite services to locate in A-type zones: effective in B, not in H
  - % service jobs already located in A-zones in the reference scenario:
    - ◆ B: 37 %
    - ◆ H: 70 %

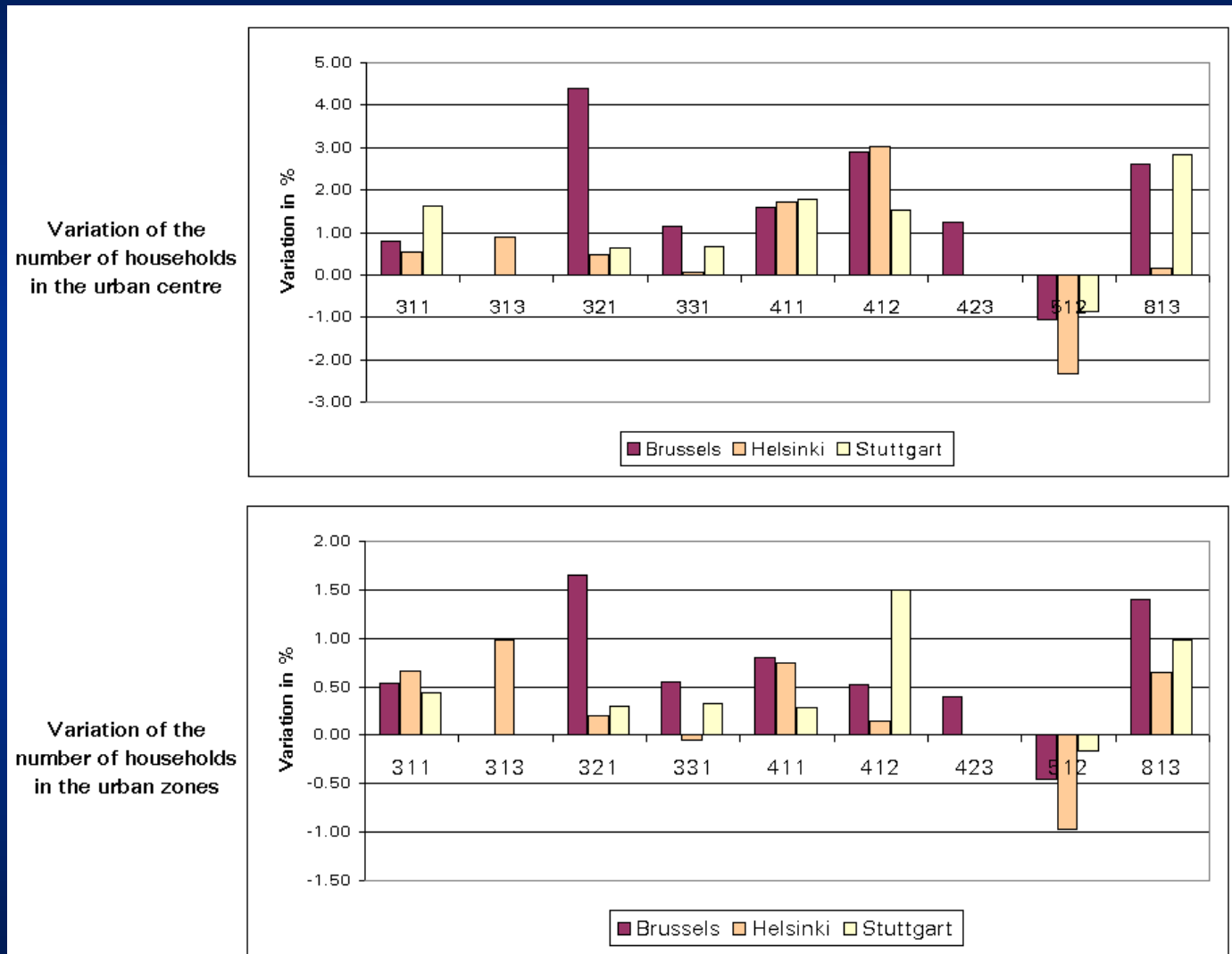
## Conclusions (2/3)

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- **Most effective w.r.t. climate change and air pollution:**
  - road pricing
  - parking policy
  - land use policies have no or low impact

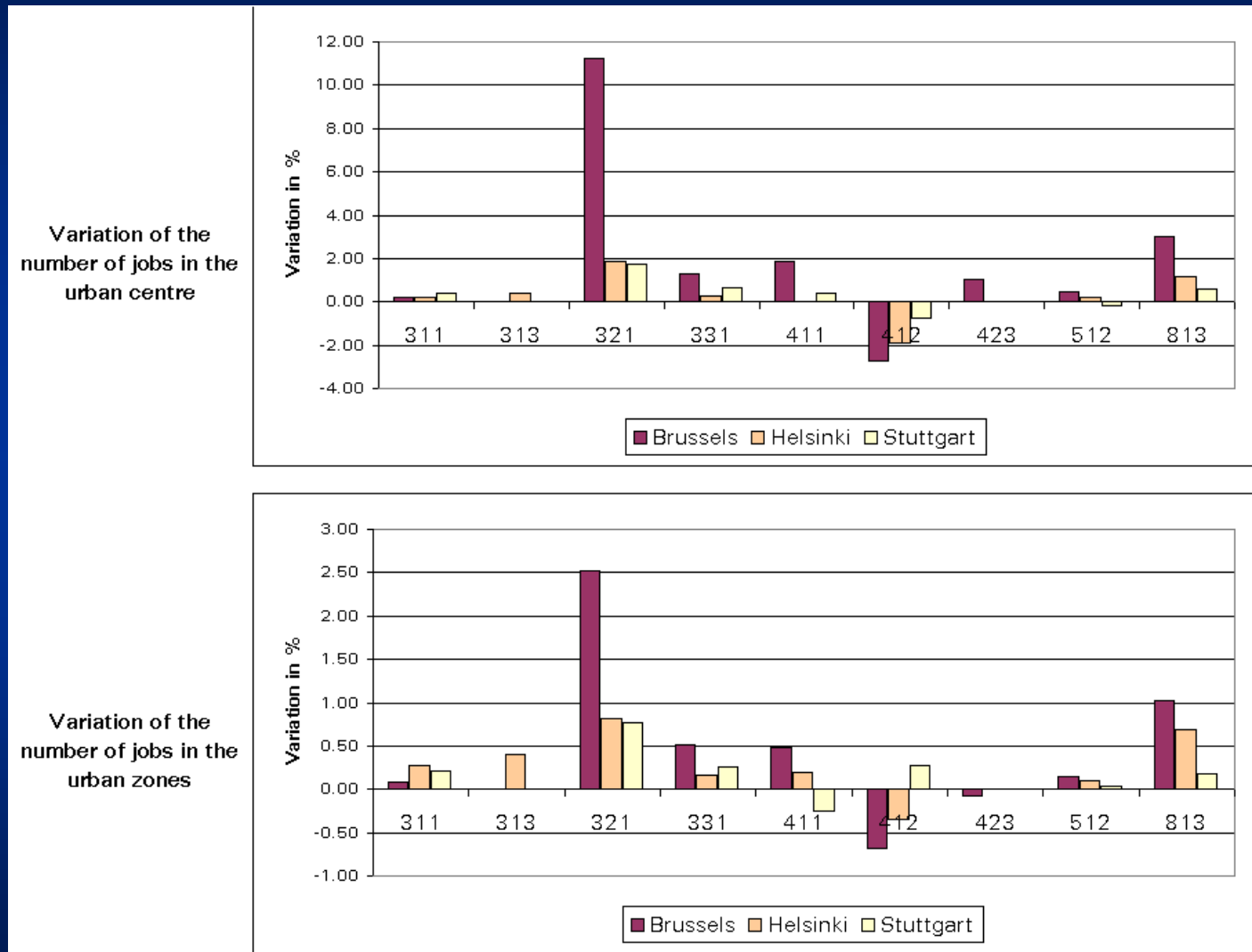
# Which measures are most effective w.r.t. urban concentration ?

Brussels, 9 November 2004



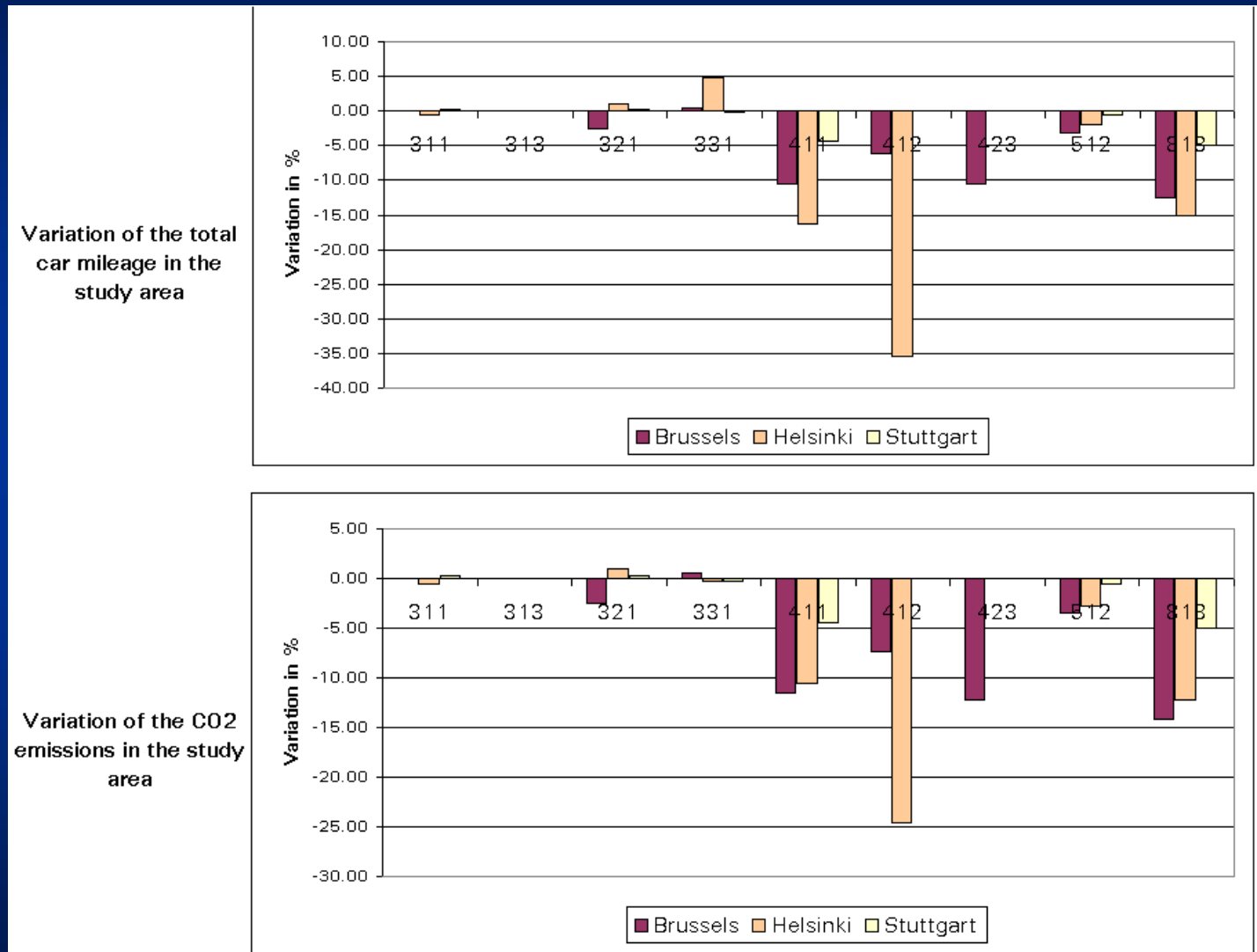
# Which measures are most effective w.r.t. urban concentration ?

Brussels, 9 November 2004



# Which measures are most effective w.r.t. fuel consumption and CO2 emissions ?

Brussels, 9 November 2004



# Package which was selected and simulated

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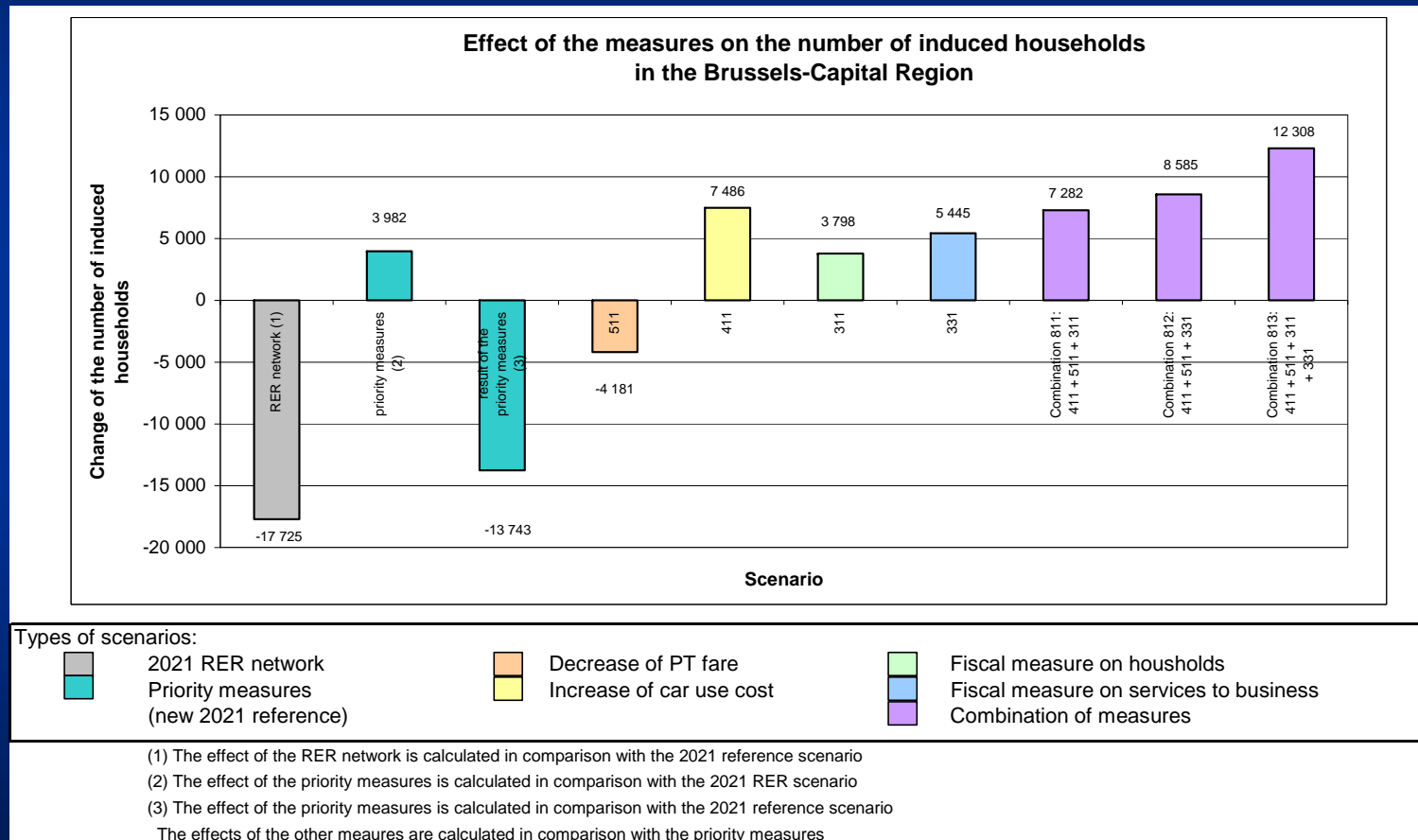
- **Increase of car cost per km (+ 50 %)**
  - ◆ *congestion pricing : increase of car use cost during the peak hours*
- **Decrease of PT fare for trips to work place (- 20 %)**
- **Fiscal measure on suburban residential developments**
  - ◆ *tax on new suburban residential developments (« impact fee »)*
  - ◆ *fiscal reduction in urban areas*
- **Fiscal measure on offices**
  - ◆ *annual impact fee per employee when located in areas poorly served by public transport*



# Policy effectiveness to counter-balance sprawl due to transport investments

Brussels, 9 November 2004

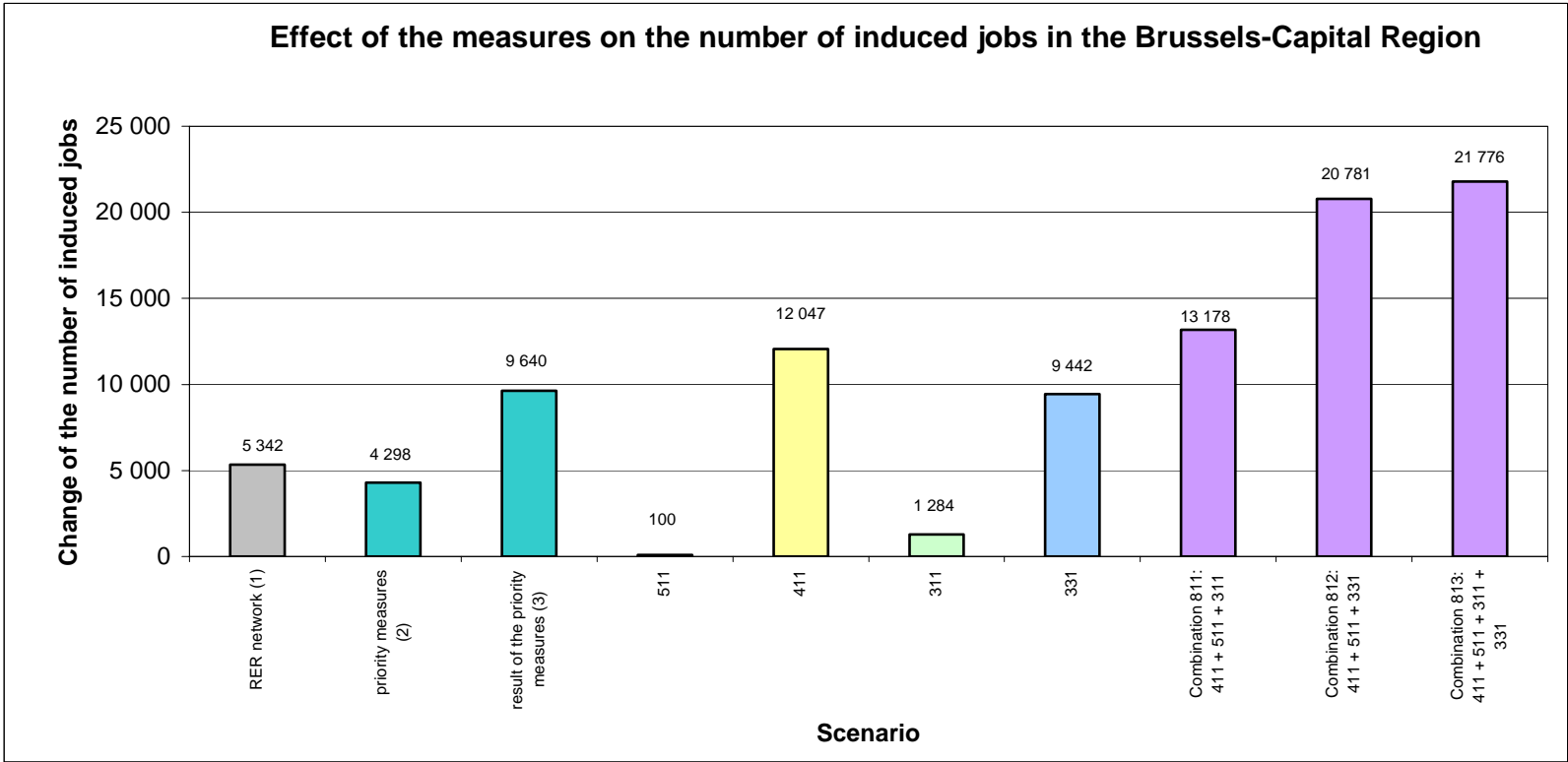
Brussels case – effect of the package of 4 policies on urban concentration (household location)



*Brussels: how the scenario 813 together with the local investment plan (“priority measures”) compensate the out-migration of households due to the REN*

# Effect on the number of jobs in the Brussels-Capital Region

Brussels case – effect of the package of 4 policies on urban concentration (job location)



Types of scenarios:

2021 RER network  
 Priority measures  
 (new 2021 reference)

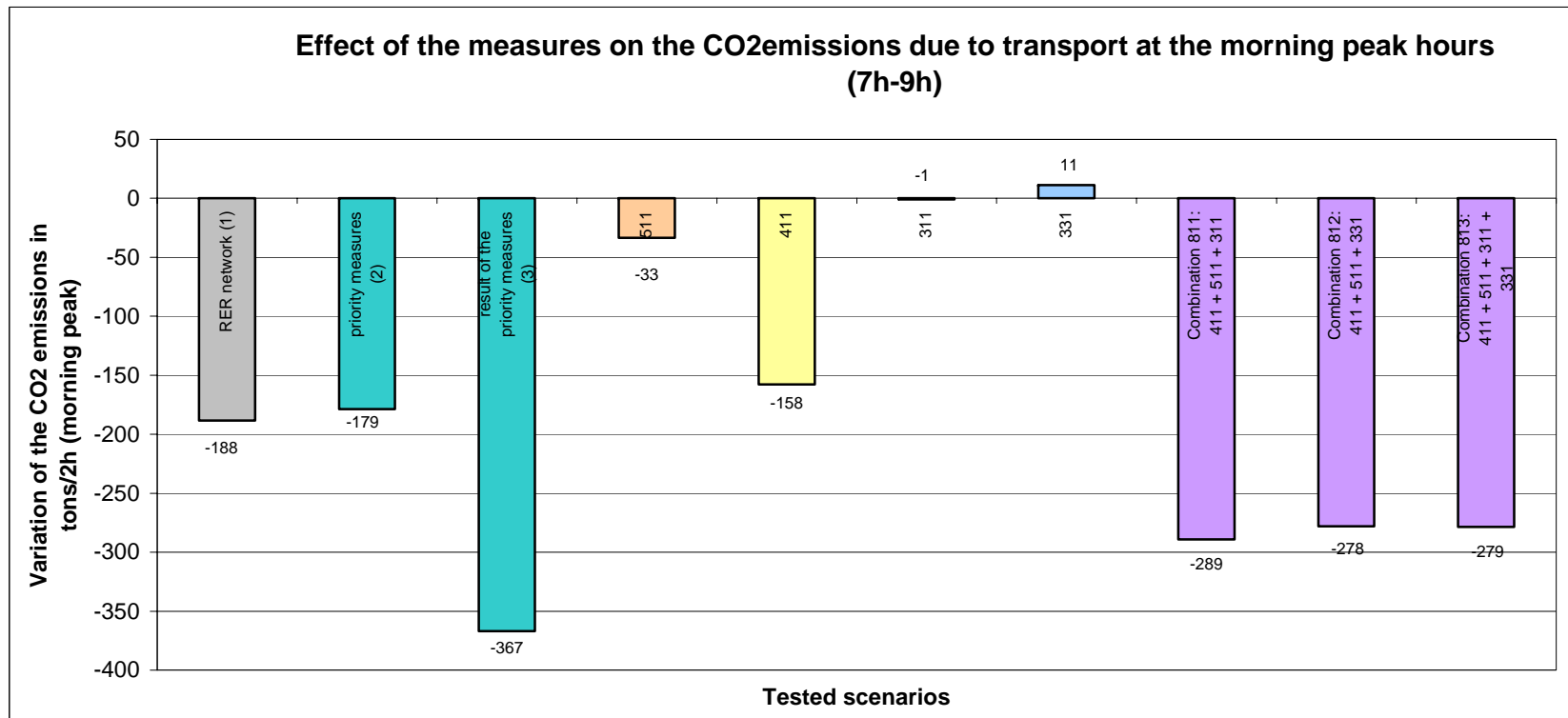
Decrease of PT fare  
 Increase of car use cost

Fiscal measure on houtholds  
 Fiscal measure on services to business  
 Combination of measures

- (1) The effect of the RER network is calculated in comparison with the 2021 reference scenario
  - (2) The effect of the priority measures is calculated in comparison with the 2021 RER scenario
  - (3) The effect of the priority measures is calculated in comparison with the 2021 reference scenario
- The effects of the other meures are calculated in comparison with the priority measures

# Effect on the CO<sub>2</sub> emissions

Brussels case – effect of the package of 4 policies on CO<sub>2</sub> emissions



- (1) The effect of the RER network is calculated in comparison with the 2021 reference scenario
  - (2) The effect of the priority measures is calculated in comparison with the 2021 RER scenario
  - (3) The effect of the priority measures is calculated in comparison with the 2021 reference scenario
- The effects of the other measures are calculated in comparison with the priority measures

## Conclusions (3/3) – Evaluation of the package

	Variation in the number of households in the urban centre (%)	Variation in the number of households in the urban zones (%)	Variation in the number of jobs in the urban centre (%)	Variation in the number of jobs in the urban zones (%)	Variation in the average home-work trip distance (%)	Variation in the total car mileage (%)	Variation in the public transport modal share (points)	Variation in the total CO <sub>2</sub> emission (%)
<b>Brussels</b> – combination 813B (scenario 813B assessed against 003B)	2.6	1.4	3.0	1.0	1.1	-12.6	5.5	-14.1
<b>Helsinki</b> – combination 813H (scenario 813H assessed against 111H)	0.2	0.6	1.2	0.7	-0.3	-15.2	12.2	-12.2
<b>Stuttgart</b> – combination 813S (scenario 813S assessed against 003S)	2.8	1.0	0.6	0.2	-1.2	-5.0	1.5	-5.0