

Assessment of accompanying measures to the Regional Express railway Network in the Brussels metropolitan area

Sylvie Gayda and Hugues Duchâteau
STRATEC, Brussels

*4th seminar of **PlanNetEurope**
on Strategic Environmental Assessment*

Brussels, October 24th-25th 2005

- **This study was co-funded by**

- EC DG Research, as case study of the research project SCATTER dedicated to urban sprawl and transport (2000-2004) under the “Energy, Environment and Sustainable Development Programme” of FP5
- the Belgian federal Administration of Transport
- the Brussels-Capital Region



- **SCATTER project web site: www.casa.ucl.ac.uk/scatter**

The Brussels metropolitan area

The Brussels metropolitan area

-2.9 millions inhabitants

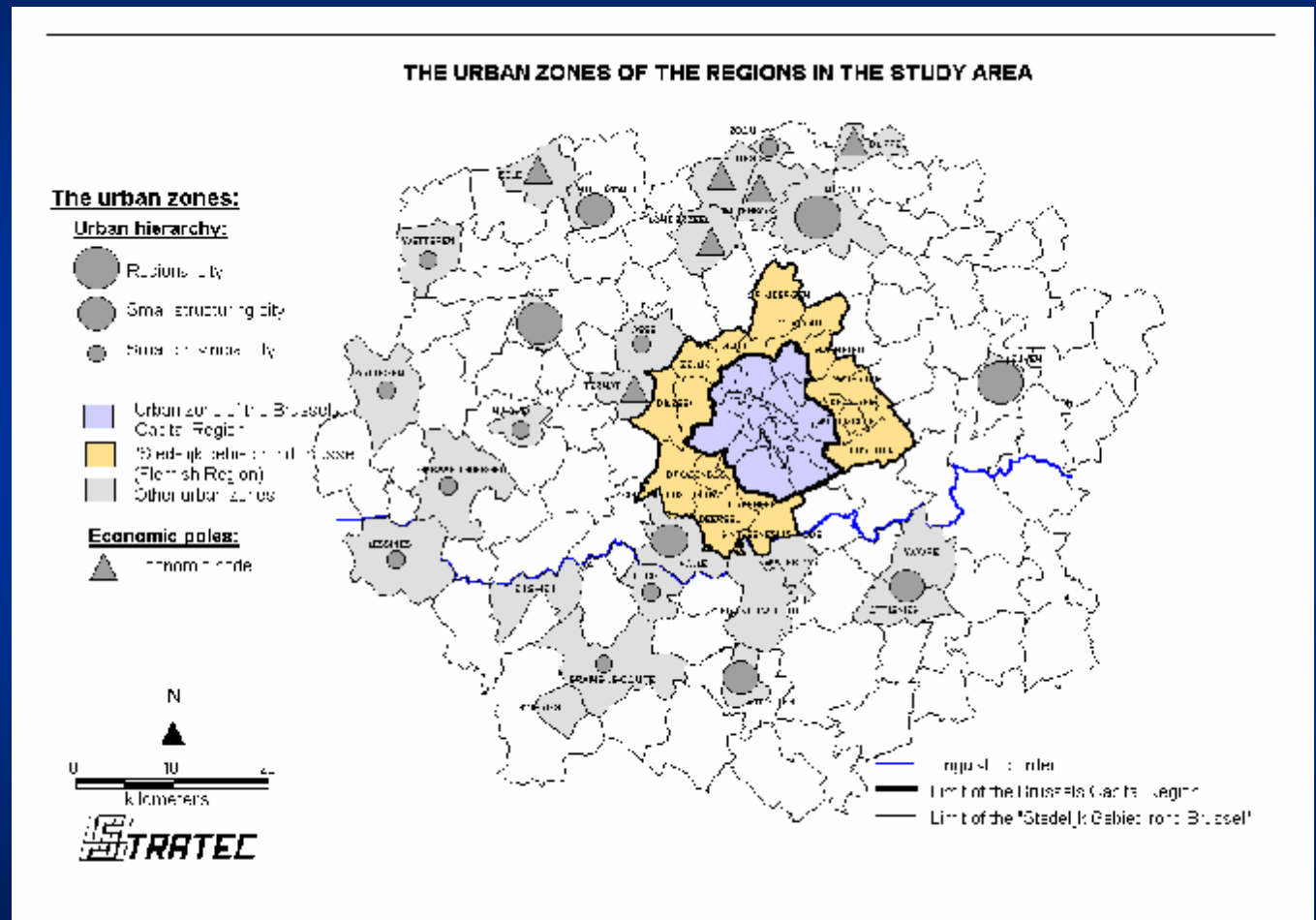
-1.2 million jobs

The Brussels-Capital Region

-1 million inhabitants

-650 000 jobs

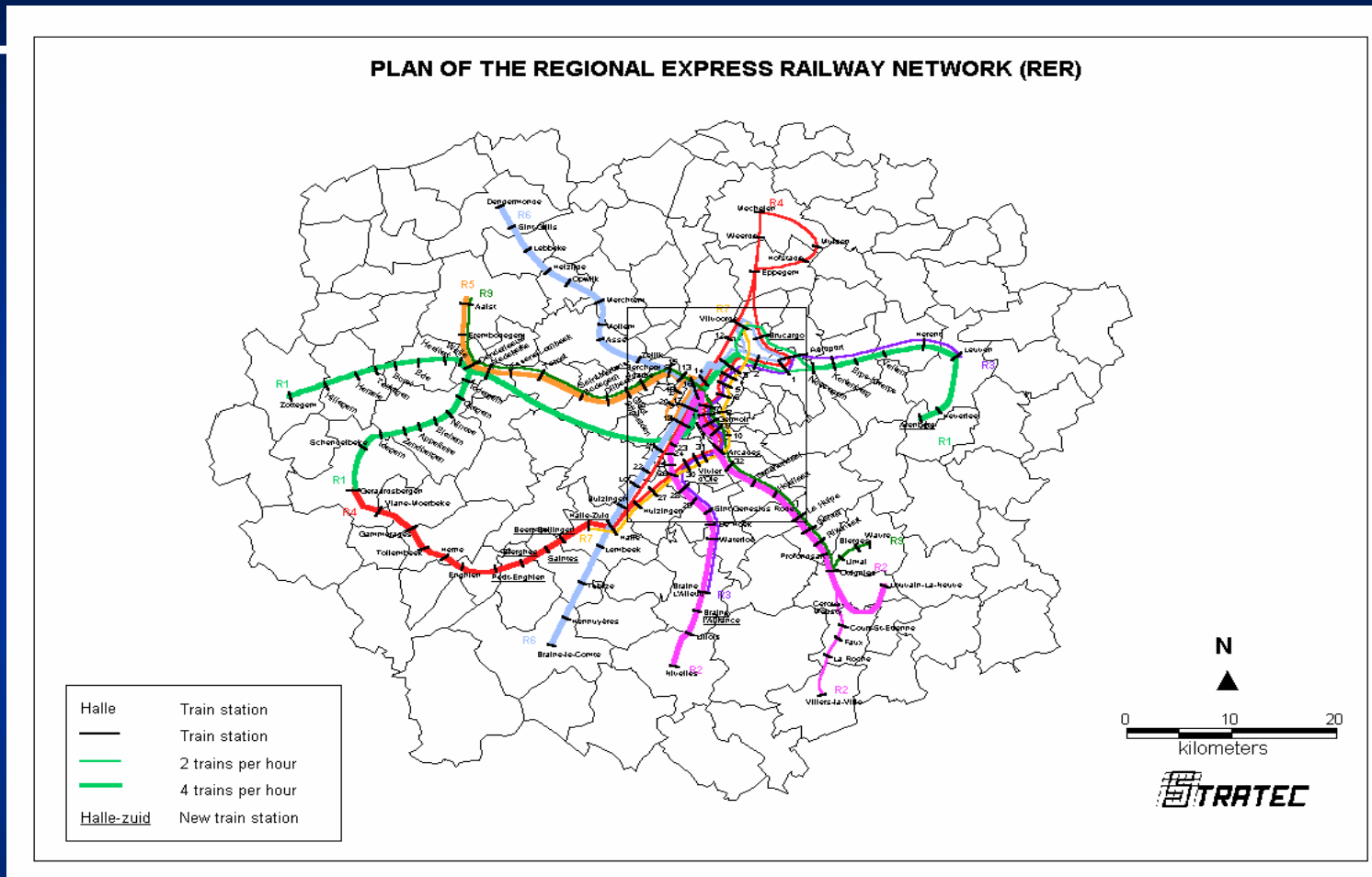
-lost 120 000 inhabitants in 30 years



■ ■ ■ = urban

■ = suburban or rural

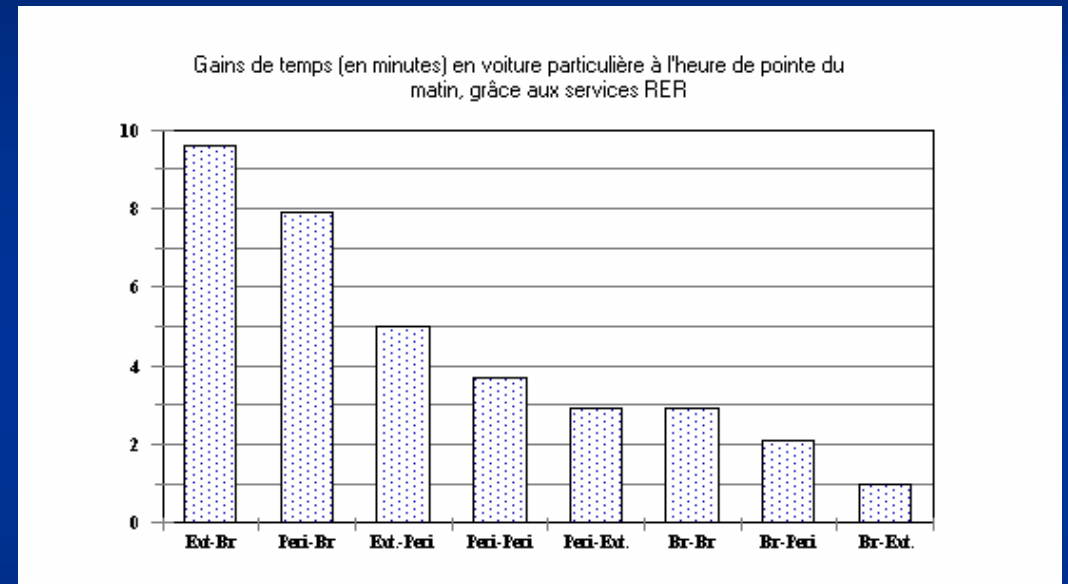
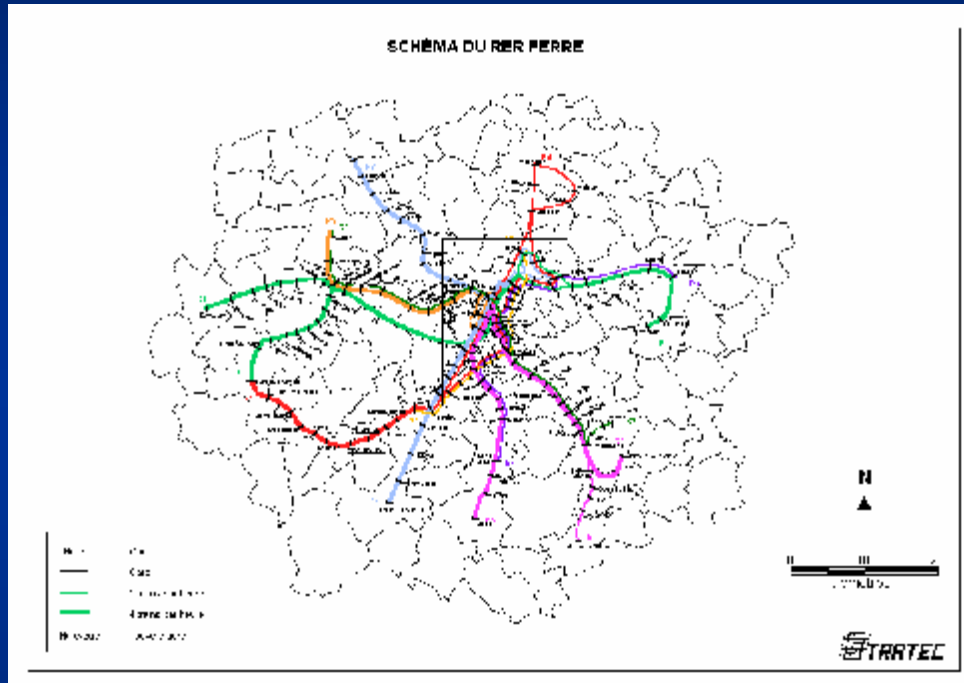
The future Regional Express railway Network (RER)



- ✓ High quality, rapid and frequent train services within a radius of 30 km around the centre of Brussels
- ✓ Investment cost: about 900 millions €-8 new lines

Why to design accompanying measures to the RER ?

- The RER : a remedy to congestion



- **Short run impact on mobility:** *strong modal shift towards public transport, decrease of travel times, decrease of fuel consumption, reduction of the emissions of pollutants and greenhouse gases*

- **Long run impact on spatial structure:** *risk of re-launch of urban sprawl, further urbanisation, lengthening of trips, re-increase of fuel consumption and emissions, re-increase of congestion (source: ESTEEM project)*

Public transport investments and sprawl

New public transport (PT) services which significantly improve the accessibility between the suburban areas and the urban centre **generate sprawl of population** and **concentration of employment**.

Households decide to out-migrate towards suburban areas not only because of the improved accessibility by PT, but also because of the **consequent better accessibility by road** (because congestion is to some extent alleviated).

These PT investments lead to a reduction of car mileage and emissions, **but the lengthening of the trip distances** (i.e. the urban sprawl) “consumes” a part of the potential benefits of the public transport investments.

→ There is a **need for accompanying measures**

to these new PT services.

Why is urban sprawl a problem ?

Land consumption

Loss of high quality open space and agricultural land, fragmentation of ecosystems, diminution of bio-diversity, change of water streaming coefficient

Other external costs

Higher costs of new infrastructures and equipments in suburban areas, compared to urban areas

Social effects

Social segregation, poor access to services for people with limited mobility

Increase of car use

Increase of fuel consumption, increase of emissions, congestion, increase of travel times

Conclusion of the diagnosis

- **To keep the benefits of the RER in the long term: necessity to implement accompanying measures ...**
- **... Whose objectives are to:**
 - counter-act the accelerating effect of the RER on urban sprawl
 - reinforce the modal shift from private car to public transport
 - → Build a strategy towards sustainable development in the area served by the RER

An advanced simulation tool to assess the accompanying measures and build an integrated strategy

Transport demand : persons and goods
flows from one point to another

LAND USE model

Where households and companies do locate, according to :

- accessibilities
- real estate market prices
- regulations
- land taxes

TRANSPORT model

Which mode, which path do the users use, according to :

- transport networks
- and their quality of service

Travel times and costs
between locations

Policies which were simulated (1/2)

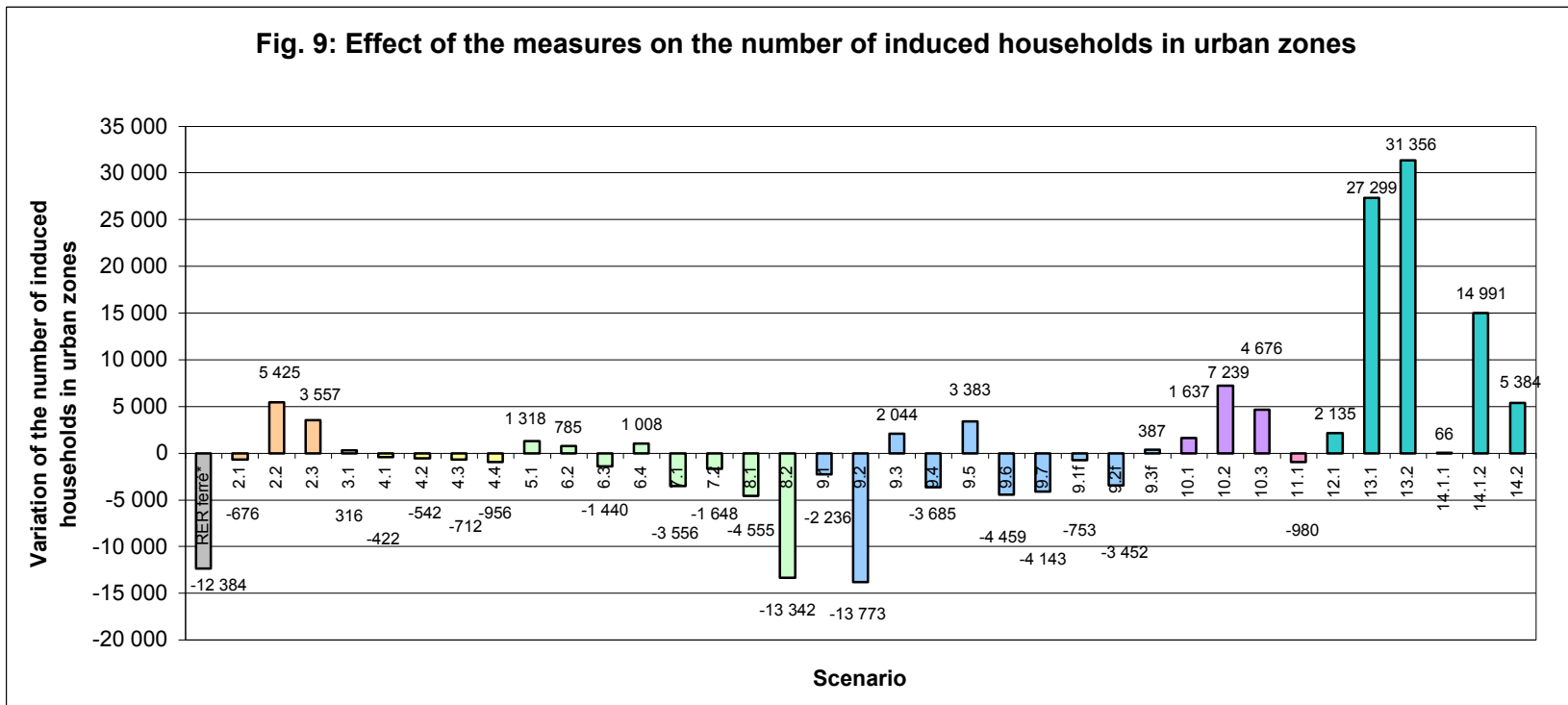
- **Increase of car use cost (cost/km, cordon pricing)**
- **Parking policies (capacity restriction, parking pricing)**
- **High-Occupancy-Vehicle dedicated lanes on motorways**
- **Regional express buses on highways**
- **Increase of the speed of public transport**
- **Improvement of the bus-rail inter-modality**
- **Public transport pricing policies**

Policies which were simulated (2/2)

- **Implementation of a hierarchy in the road network of the Brussels-Capital Region**
- **Improving the attractiveness of residential neighbourhoods in the inner city within the BCR**
- **Fiscal measures applied to housings (tax in suburban areas + fiscal incentive in urban areas)**
- **Fiscal measures applied to companies (offices)**
- **Regulatory measure applied to companies (offices)**

Effect on the number of households in the urban areas

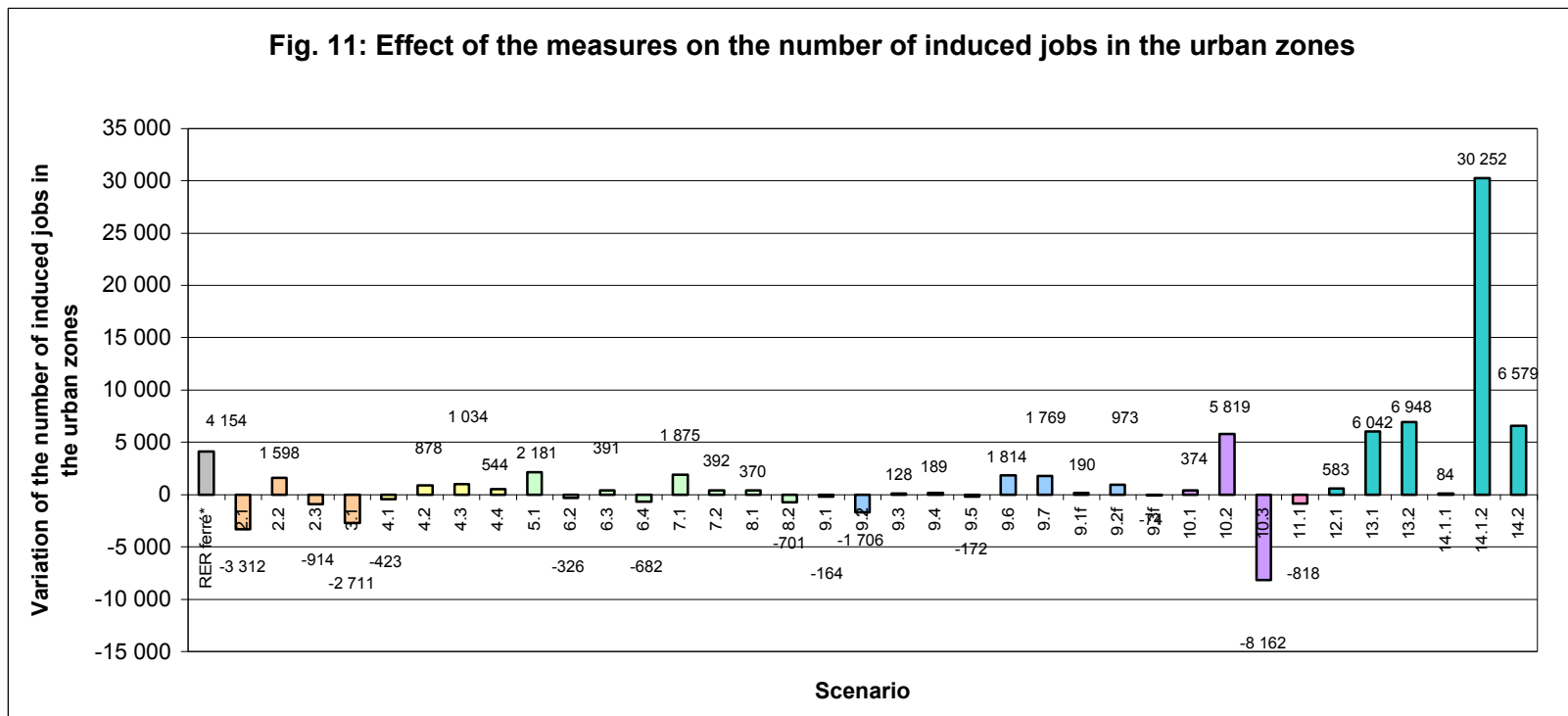
Fig. 9: Effect of the measures on the number of induced households in urban zones



* The effect of the RER is calculated by comparison with the 2021 reference scenario without RER. The effect of the other scenarios is calculated by comparison with the scenario 2021 with RER.

Effect on the number of jobs in the urban areas

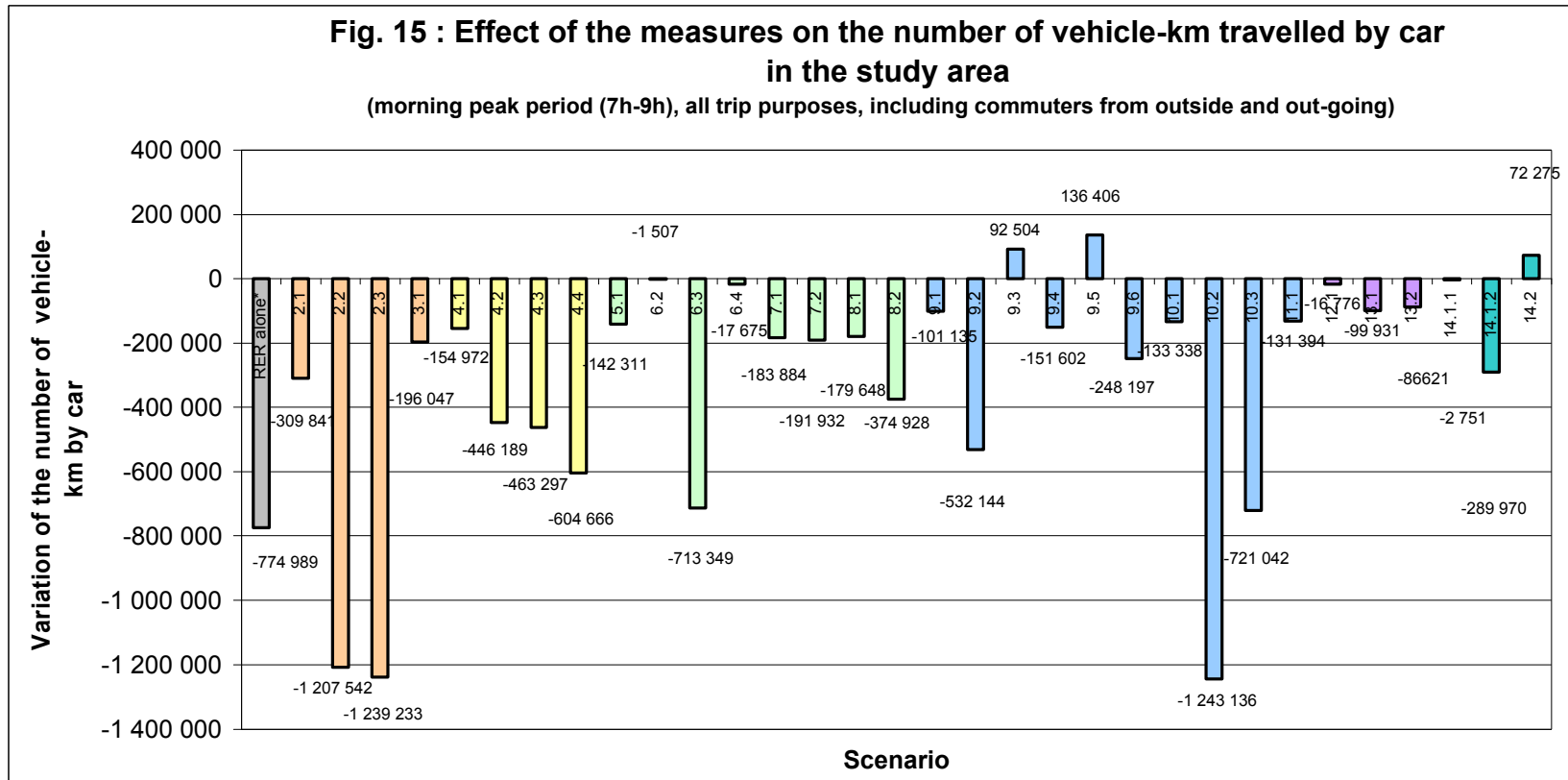
Fig. 11: Effect of the measures on the number of induced jobs in the urban zones



* The effect of the RER is calculated by comparison with the 2021 reference scenario without RER.
The effect of the other scenarios is calculated by comparison with the scenario 2021 with RER.

Effect on the vehicle-km travelled by car

Fig. 15 : Effect of the measures on the number of vehicle-km travelled by car in the study area
(morning peak period (7h-9h), all trip purposes, including commuters from outside and out-going)



* The effect of the RER is calculated by comparison with the 2021 reference scenario without RER.
The effect of the other scenarios is calculated by comparison with the scenario 2021 with RER.

Synthesis of results (1/3)

■ Most effective policies

(i) with regard to urban concentration and land consumption:

- Road pricing
(recommend congestion pricing rather than cordon pricing)
- Fiscal measures related to land use
(tax on suburban residential developments + fiscal reduction in urban areas)
- Regulatory land use measure on office location
(offices to be located around regional-level railway stations)

Synthesis of results (2/3)

(i) with regard to urban concentration and land consumption (cont.):

- **All policies decreasing the generalised transport cost incite to urban sprawl:**
 - Improvement of public transport commercial speed
 - Reduction of public transport fare
 - Decrease of access time to rail stations (inter-modality)
- **Decrease of the generalised transport cost limited to the central area makes it more attractive:**
 - See the results of the policy improving the PT commercial speed within the Brussels-Capital Region

Synthesis of results (3/3)

■ Most effective policies

(ii) with regard to fuel consumption and air quality:

- Road pricing
- Parking pricing + parking capacity restriction
- Express buses

■ Remarks:

- Cordon pricing:
 - ◆ Causes decrease of employment in the urban centre
- Parking policy:
 - ◆ Has negative effect on employment
 - ◆ Hence : spatial competition to be carefully considered when implementing such a policy

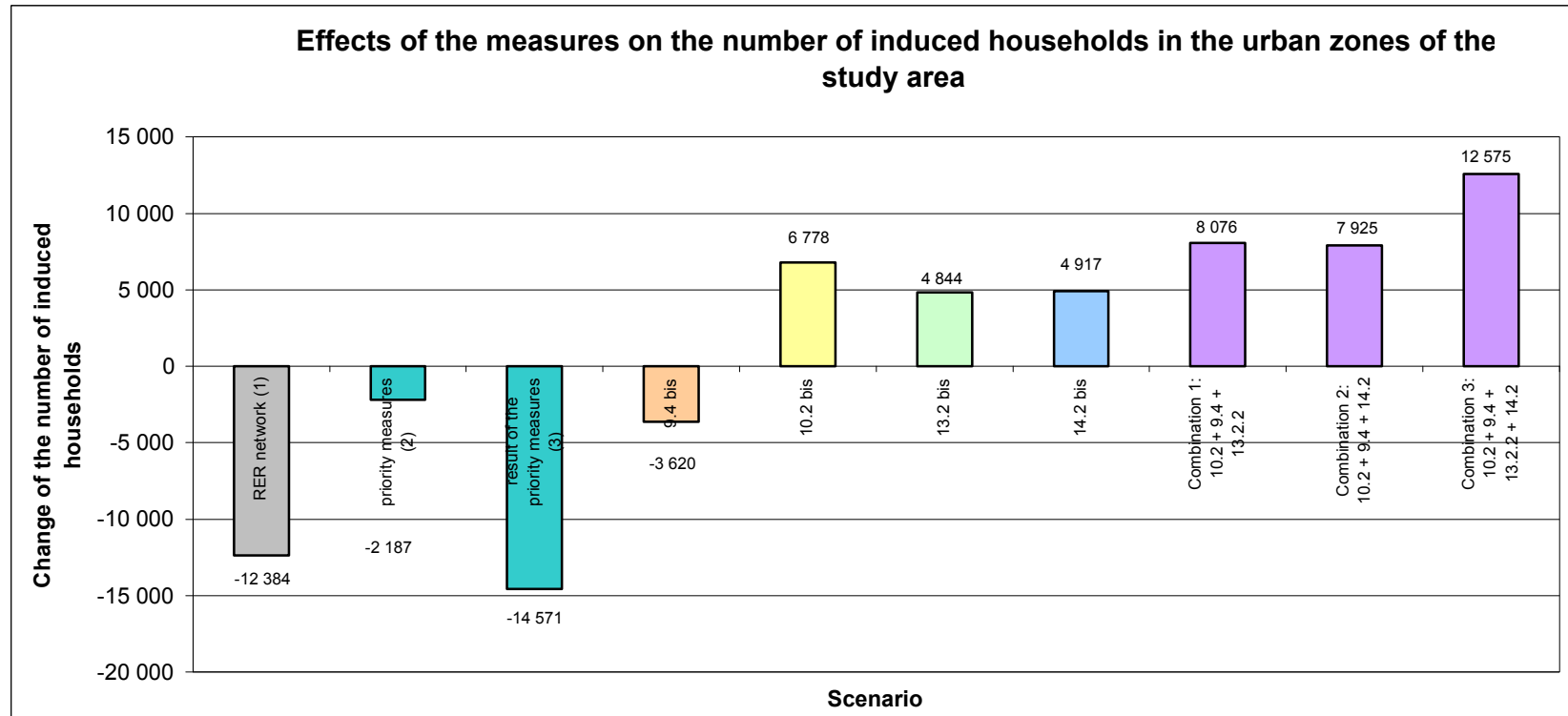
Next stage: combining measures (1/2)

- **Five measures were selected by the federal and regional authorities as “priority measures” to be implemented anyway**
 - Regional express buses (RER-buses)
 - Increase of PT speed in the Brussels-Capital Region
 - Increase of the speed of local buses bringing to the suburban RER stations
 - Hierarchisation of the road network in the Brussels-Capital Region
 - Implementation of “residential areas without road through-traffic” in the Brussels-Capital Region








Next stage: combining measures (2/2)

- **The consultant made a proposal of accompanying measures to these “priority measures”**
 - **increase of car use cost (+50 %)**
 - ◆ *congestion pricing: increase of car use cost during the peak hours in the area served by the RER*
 - **reduction of public transport fare for trips to work places (-20 %)**
 - ◆ *in principle: only in the urban centre*
 - **tax on suburban residential developments (impact fee) (13 000 €/housing) + fiscal reduction in urban areas**
 - **tax on offices (annual impact fee per employee) when located in areas poorly served by public transport (2 000 €/employee/year)**

Effect on the number of households in the urban areas

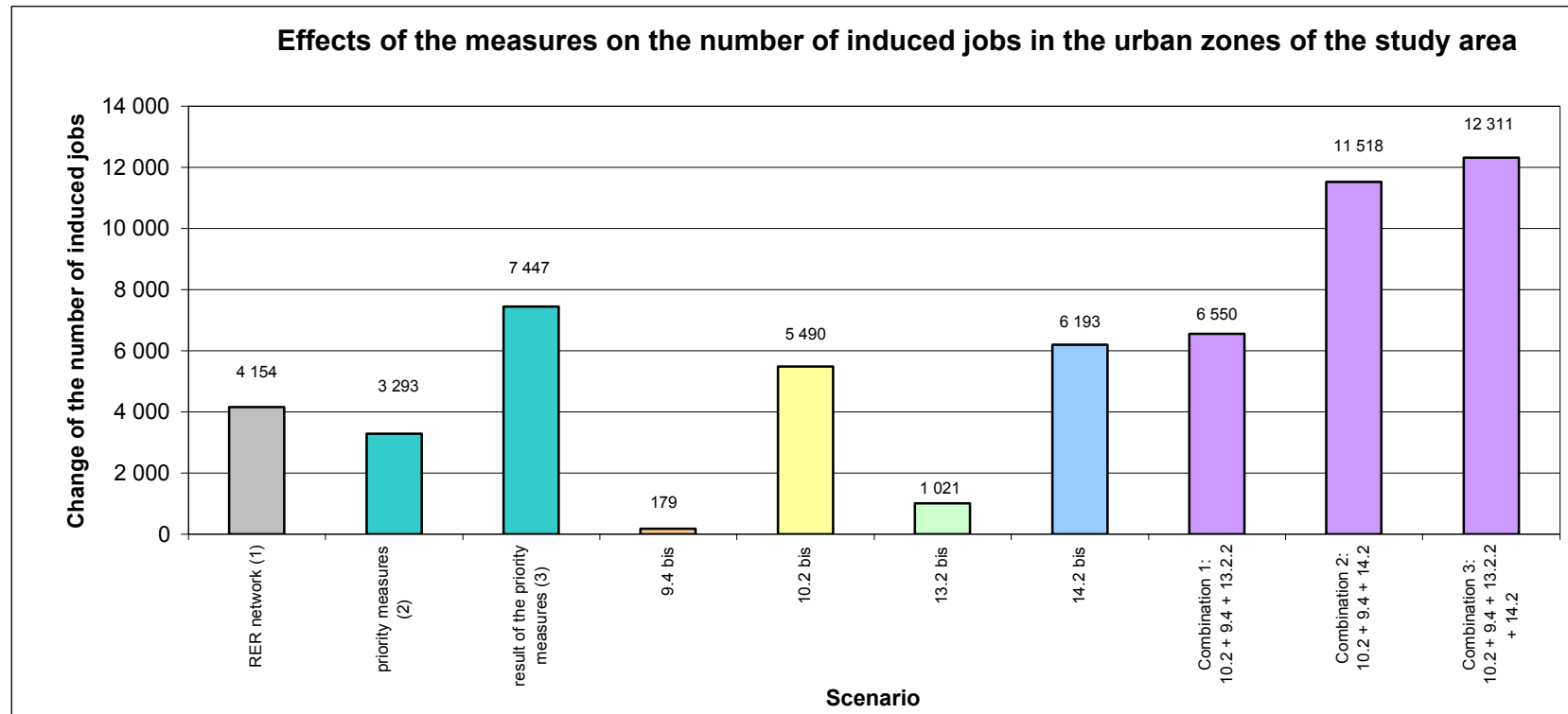


Types of scenarios:

	2015 RER network		Decrease of PT fare		Fiscal measure on households
	Priority measures (new 2015 reference)		Increase of car use cost		Fiscal measure on services to business
					Combination of measures

- (1) The effect of the RER network is calculated in comparison with the 2015 reference scenario
 (2) The effect of the priority measures is calculated in comparison with the 2015 RER scenario
 (3) The effect of the priority measures is calculated in comparison with the 2015 reference scenario
 The effects of the other measures are calculated in comparison with the priority measures

Effect on the number of jobs in the urban areas



Types of scenarios:



2015 RER network
Priority measures
(new 2015 reference)



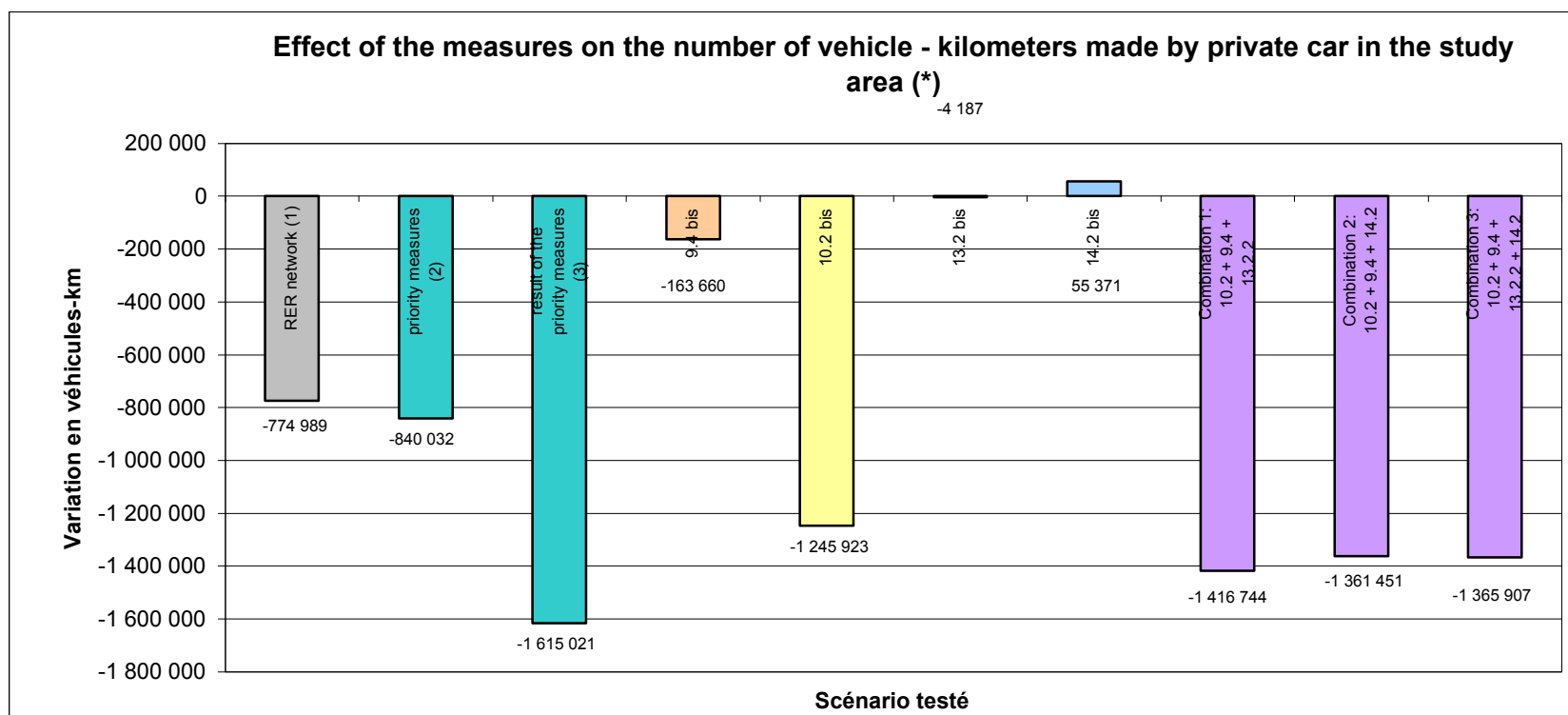
Decrease of PT fare
Increase of car use cost



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

- (1) The effect of the RER network is calculated in comparison with the 2015 reference scenario
- (2) The effect of the priority measures is calculated in comparison with the 2015 RER scenario
- (3) The effect of the priority measures is calculated in comparison with the 2015 reference scenario
The effects of the other measures are calculated in comparison with the priority measures

Effect on the vehicle-km travelled by car



Types of scenarios:



2015 RER network
Priority measures
(new 2015 reference)



Decrease of PT fare
Increase of car use cost



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

- (1) The effect of the RER network is calculated in comparison with the 2015 reference scenario
 - (2) The effect of the priority measures is calculated in comparison with the 2015 RER scenario
 - (3) The effect of the priority measures is calculated in comparison with the 2015 reference scenario
- The effects of the other measures are calculated in comparison with the priority measures

(*): Vehicle-kilometers made by private car in the study area, including the entering and outgoing traffic, at the morning peak hour (7 a.m.-9 a.m.), for all travel purposes

Conclusions

- **Recommended strategy :**
 - Implement the RER
 - + the priority measures
 - + the 4 supplementary selected measures

- **Other accompanying measures recommended:**
 - Implement an “observatory of sustainable development” covering the RER-area
 - Monitor and follow-up the impacts of the accompanying measures