



DEMOCRITOS

Developing the **Mobility Credits** Integrated Platform Enabling Travellers **TO**  
Improve Urban Transport **Sustainability**

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January 21st, 2010

## The project aims at enabling travellers to understand and reduce greenhouse emissions related to mobility working on their choices and behaviours

### The logical background

1. Providing information is not enough: understanding the problem is half the solution...but not the complete solution.
2. If we want to reduce GHG, travellers need a compelling proposition to adjust their behaviours and choices.

### The rationale (MCM)

A new context has to be provided with a mechanism including:

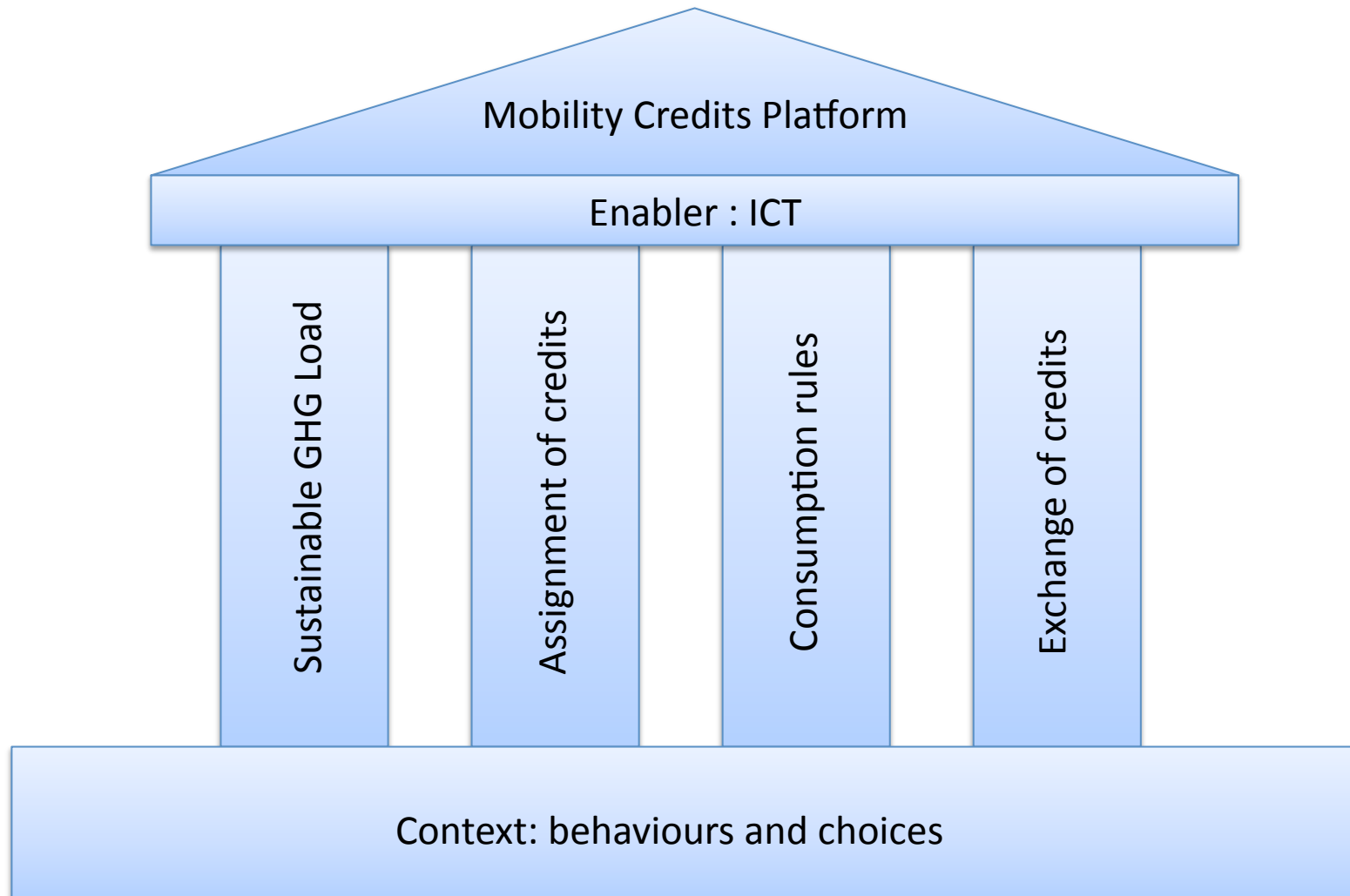
1. a quantitative target
2. a path to make the approach to the target measurable
3. a driving force (incentive or obligation) from the current status to the target.

### Technology as enabler (MCP)

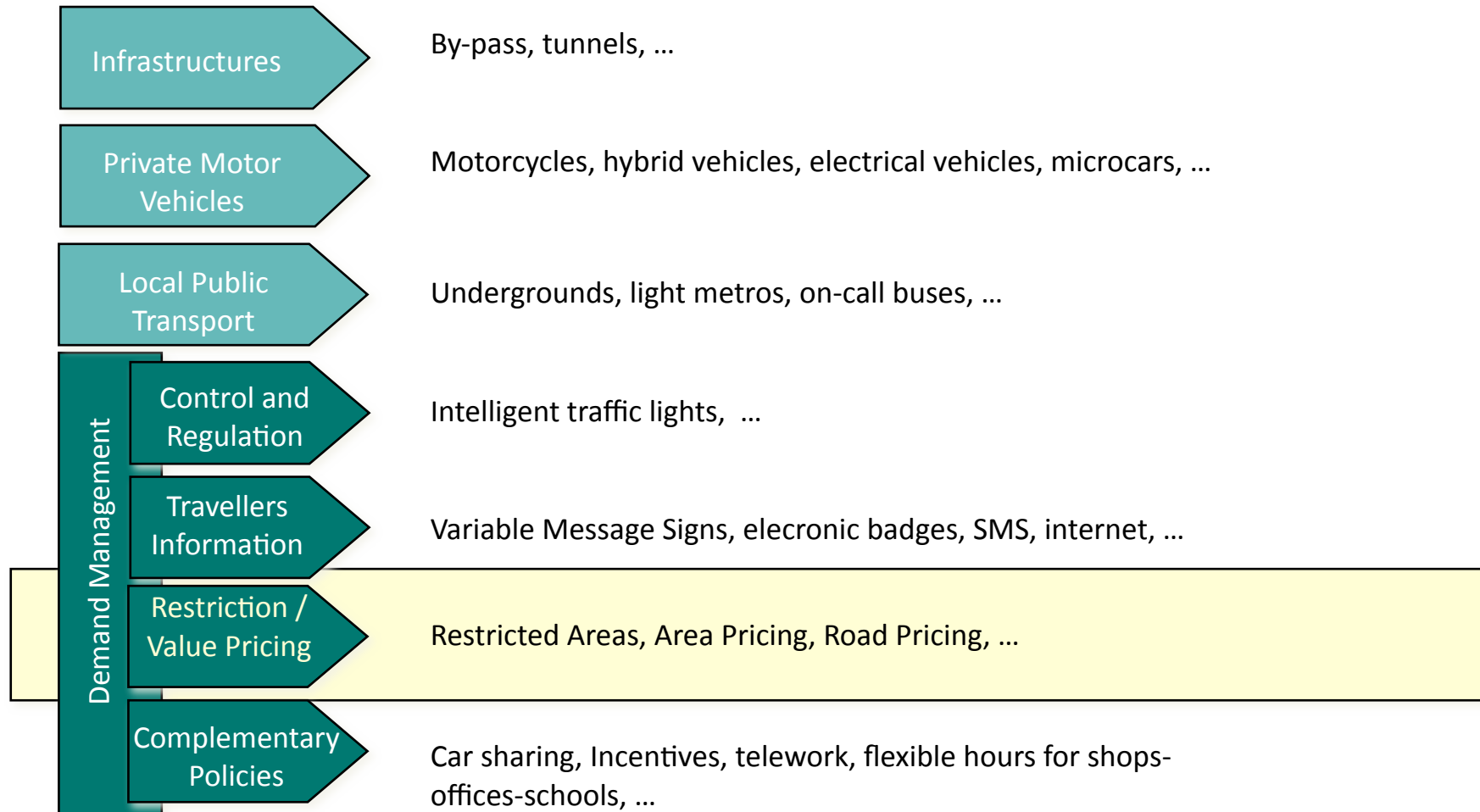
The need to have an electronic wallet brings from the MCM to the “**Mobility Credits Platform**” (“**MCP**”), that is the technical implementation of the model requiring the use of current and future ICT.

**The Mobility Credits Platform is enabled by ICT, is supported by four pillars with a foundation on the behaviours and choices of travellers**

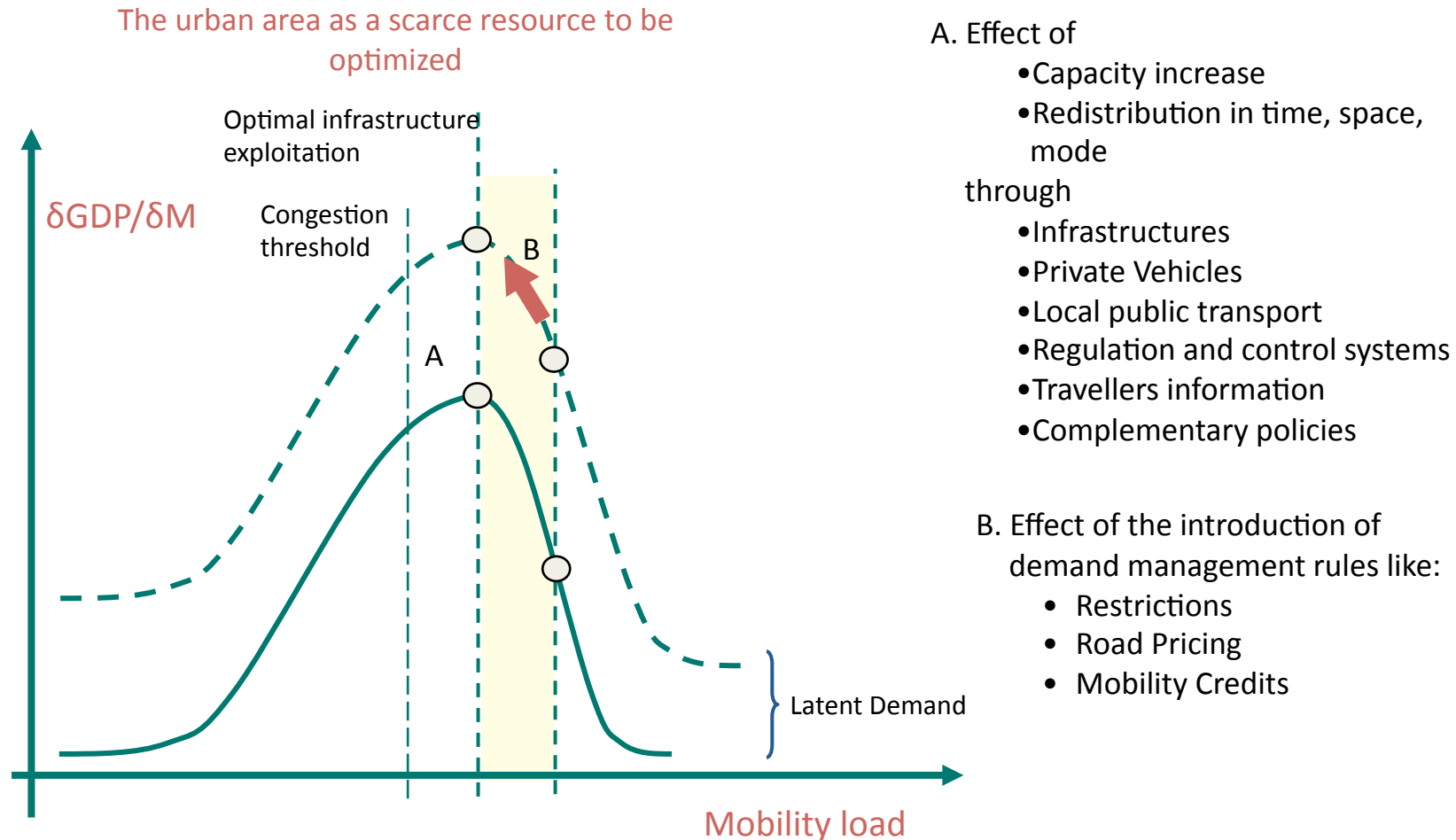
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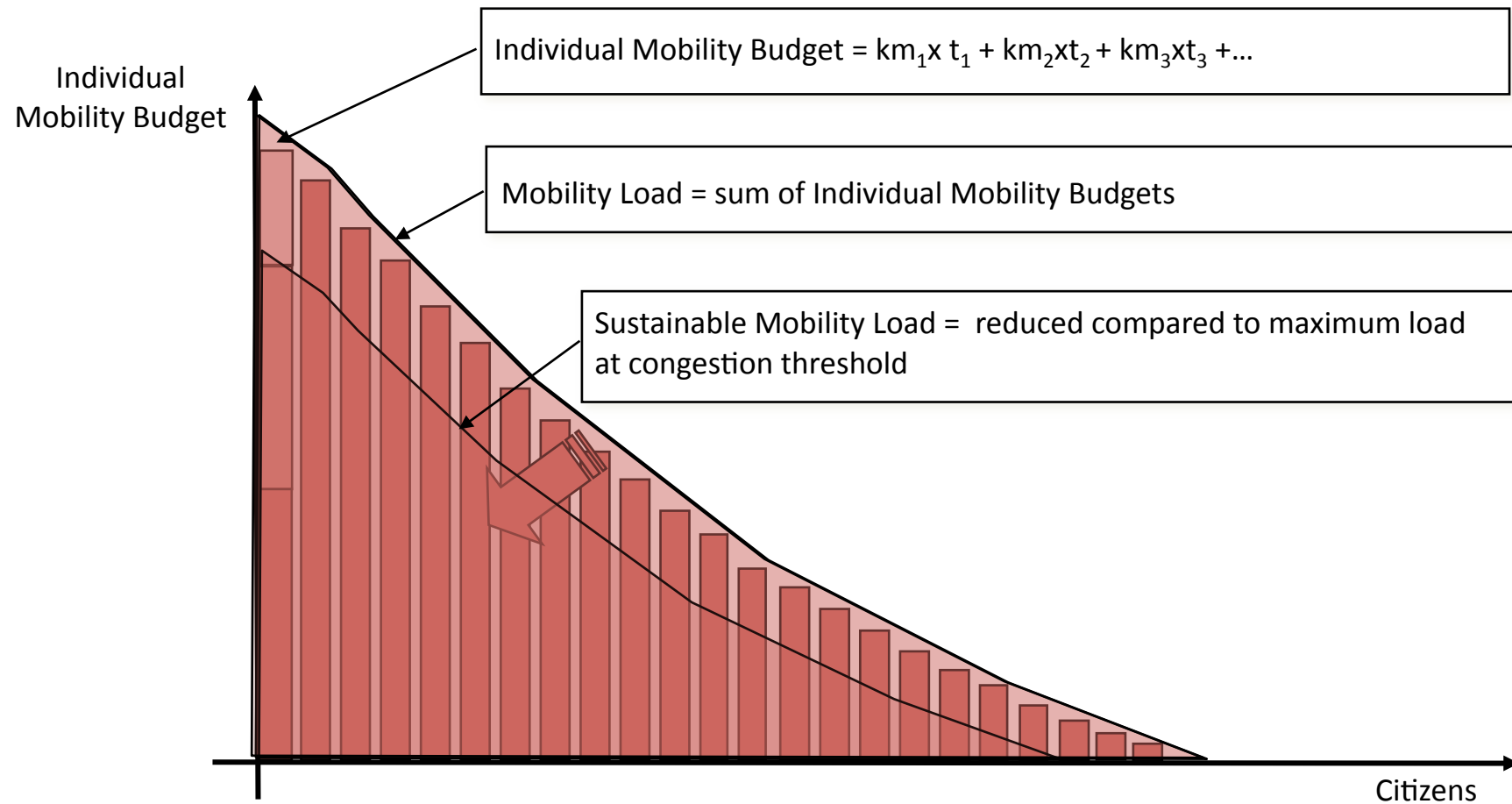
## To be more effective in congestion reduction, all mobility levers need to be integrated through ICT



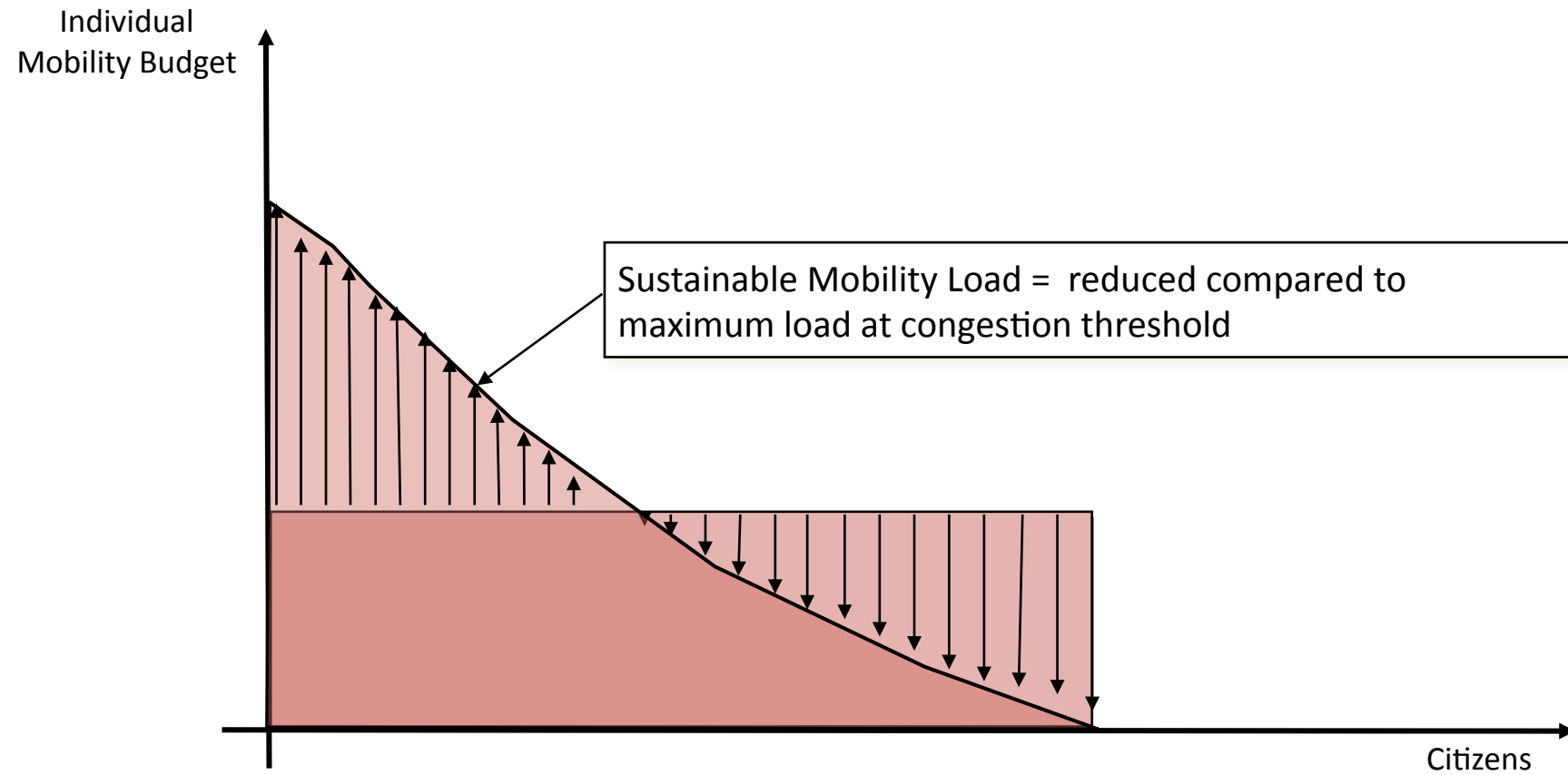
## Once the effects of increasing and exploiting the infrastructures capacity are exhausted, the only way to fight congestion is to introduce rules supported by ICT



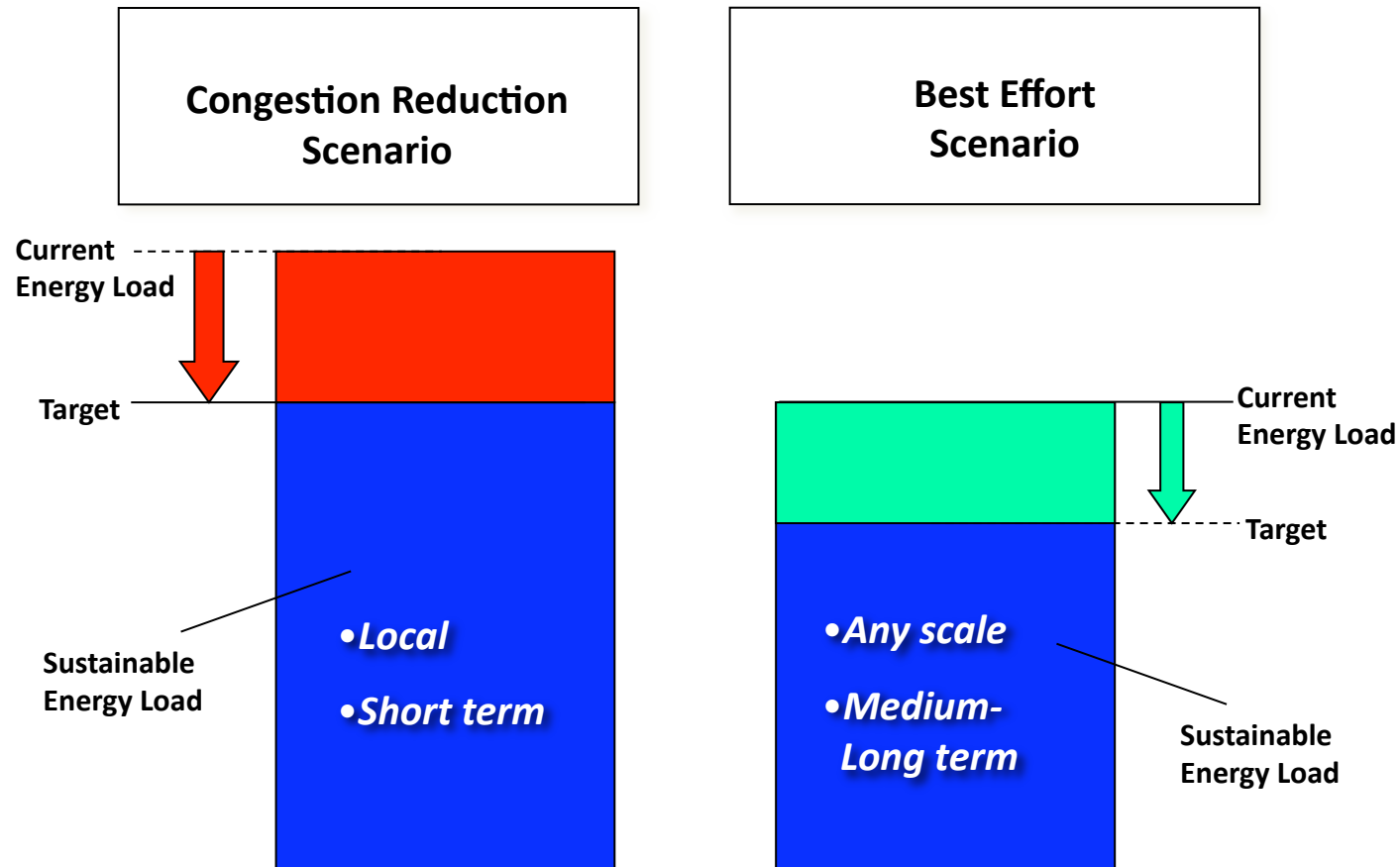
# The Mobility Load



## The Sustainable Mobility Load

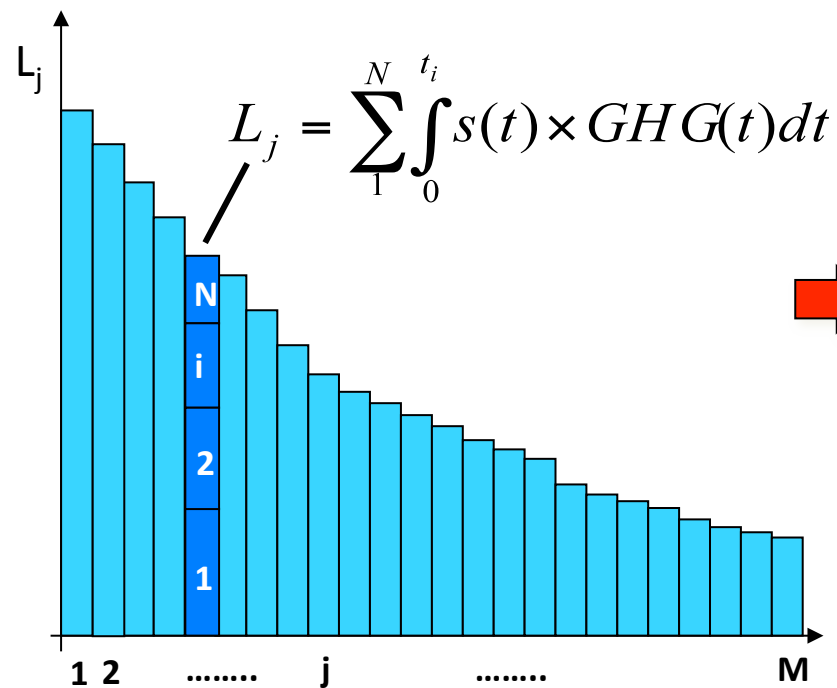


## Possible scenarios to identify the sustainable mobility load

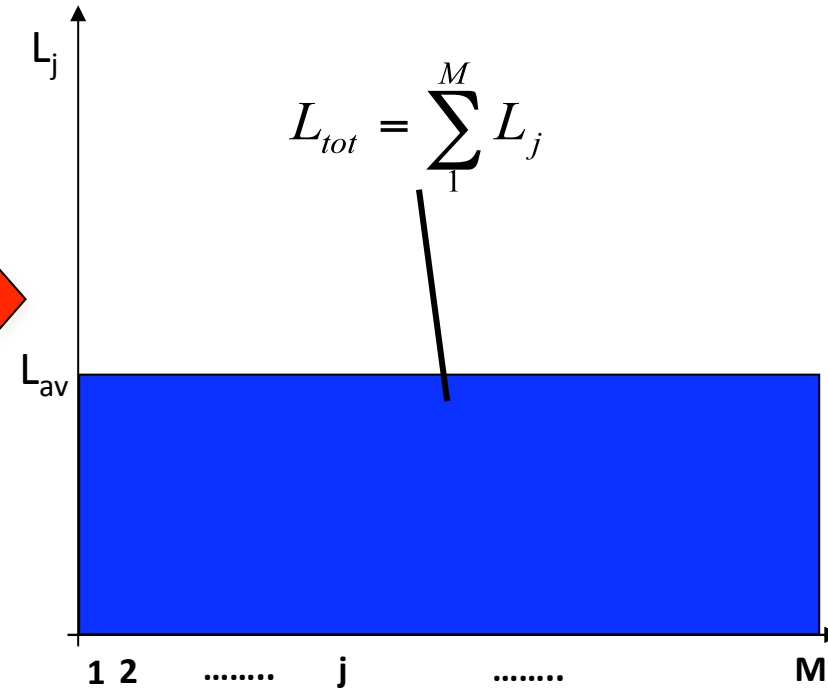


Sustainable energy consumption load in two basic scenarios

## The Green House Gases Load on a urban area

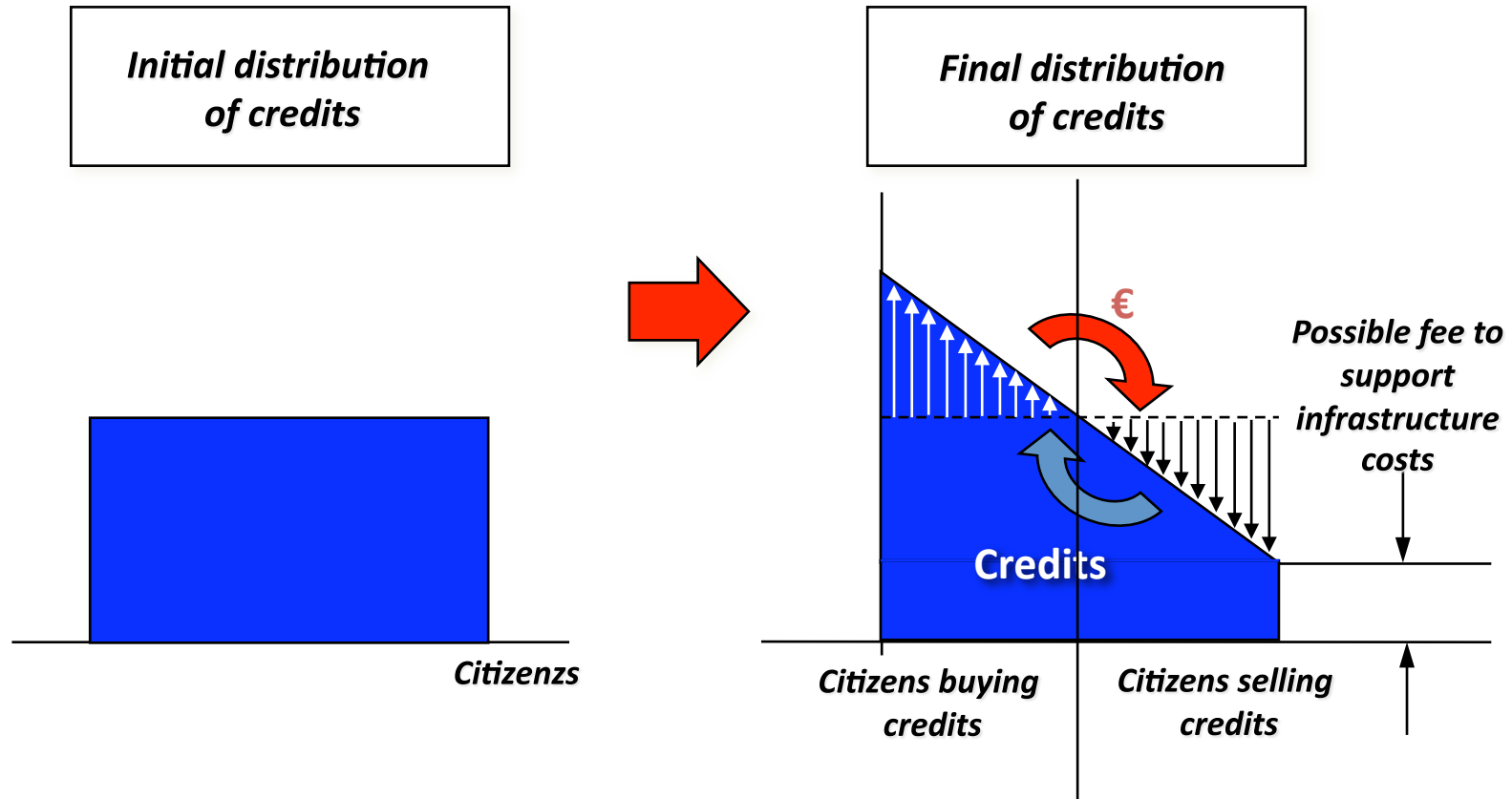


$L_j$  = individual GHG load [kg]  
 $N$  = individual number of trips  
 $M$  = number of subjects



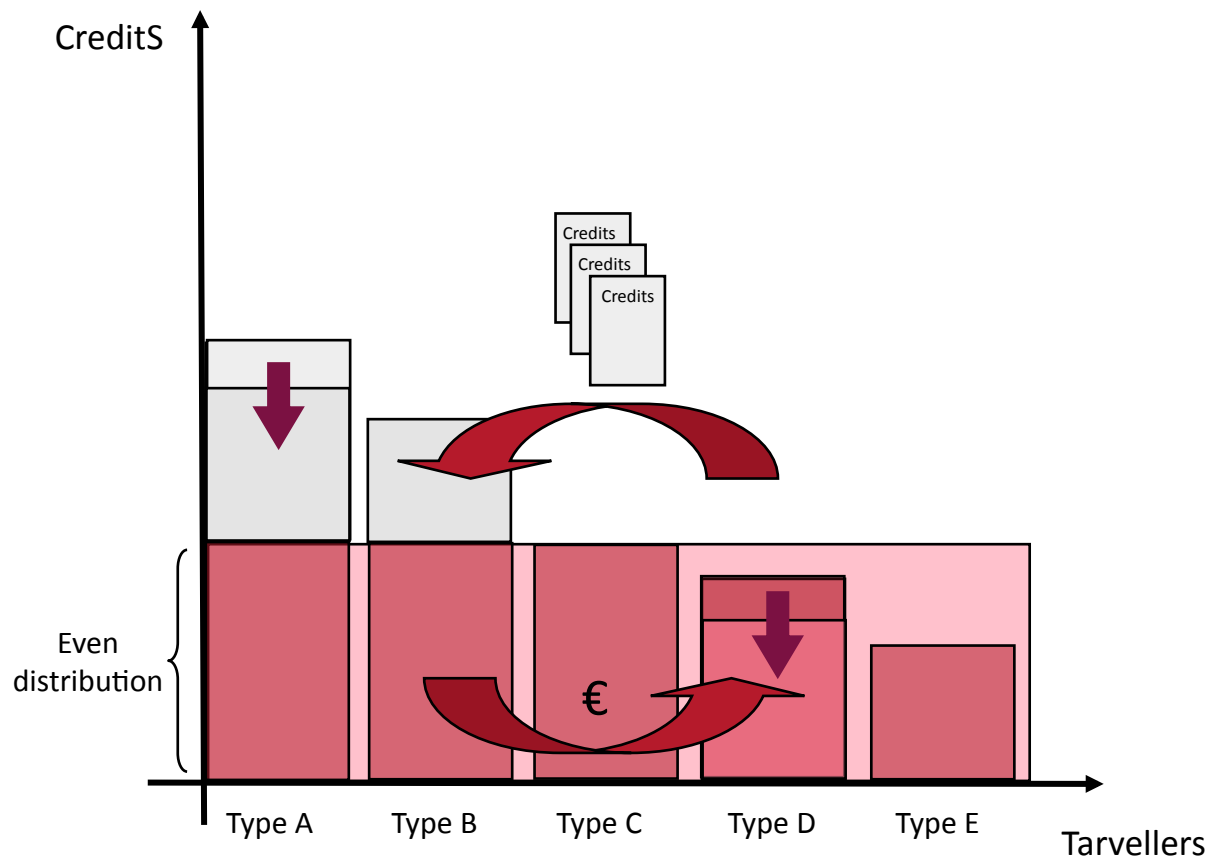
$s(t)$  = space travelled as a function of time [km]  
 $GHG(t)$  = instantaneous production of GHG [kg/km]  
 $L_{tot}$  = GHG load [kg]

**An even distribution of credits provides the largest perturbation to the mobility system, i.e. the most effective driving force**



**Even distribution of credits and exchange mechanism**

## Possible behaviours following an even distribution of credits



### Travellers behaviours

#### Traveller A

*Needs much more credits than assigned.*

Possible behaviours:

- buys credits
- changes behaviour with different transport modes

#### Traveller B

*Needs more credits than assigned.*

Possible behaviours:

- buys credits

#### Traveller C

*Needs are satisfied by assigned credits.*

Possible behaviours:

- neutral

#### Traveller D

*Needs less credits than assigned.*

Possible behaviours:

- improves even more his/her choices in order to sell credits

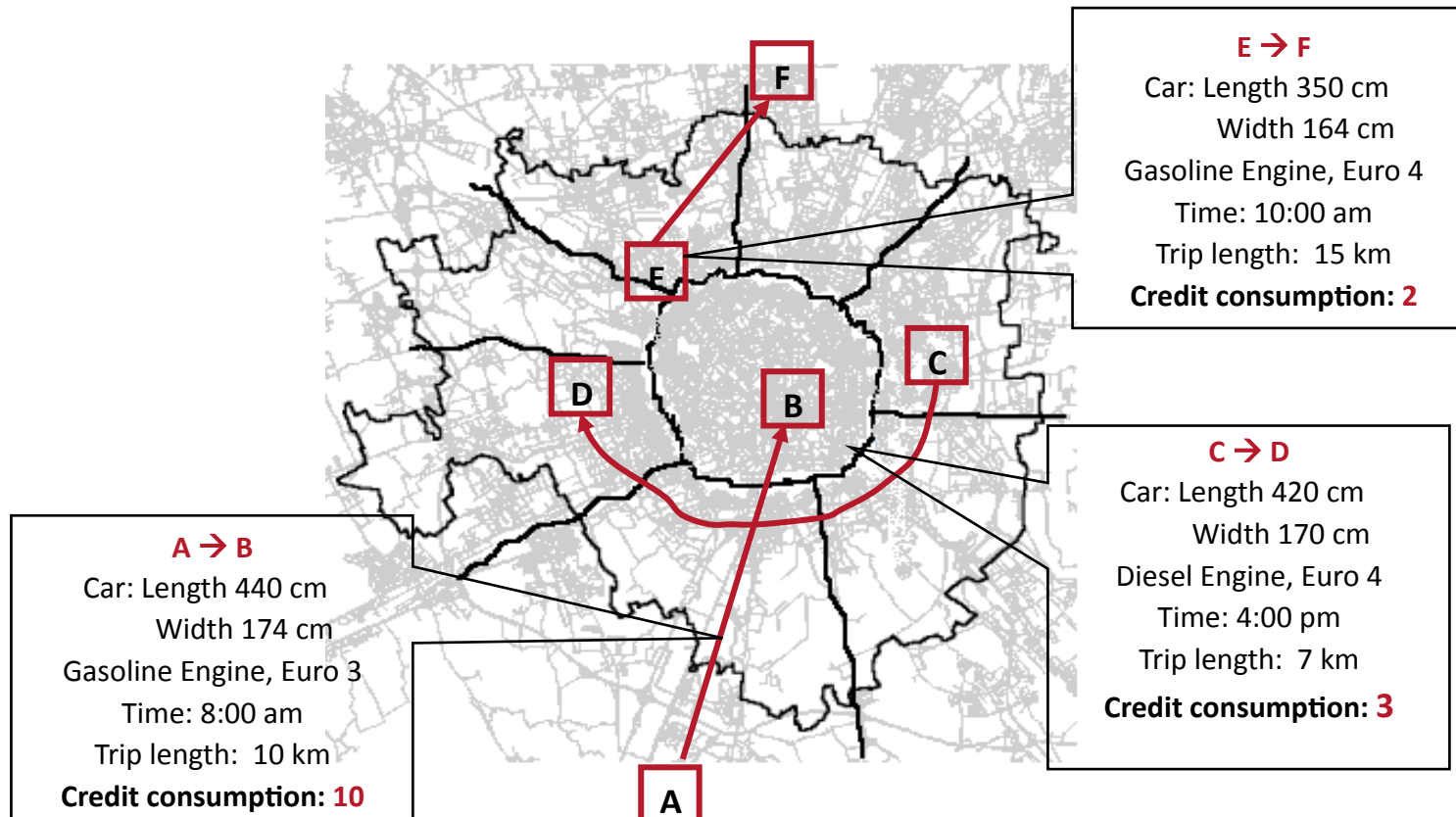
#### Traveller E

*Needs much less credits than assigned.*

Possible behaviours:

- sell credits

The rules of credit consumption are based on several parameters. The MCP enables to account for other externalities as



Rules of credits consumption

## The Mobility Credit Model subverts concept of “rule”: from prohibition to accountable behavior

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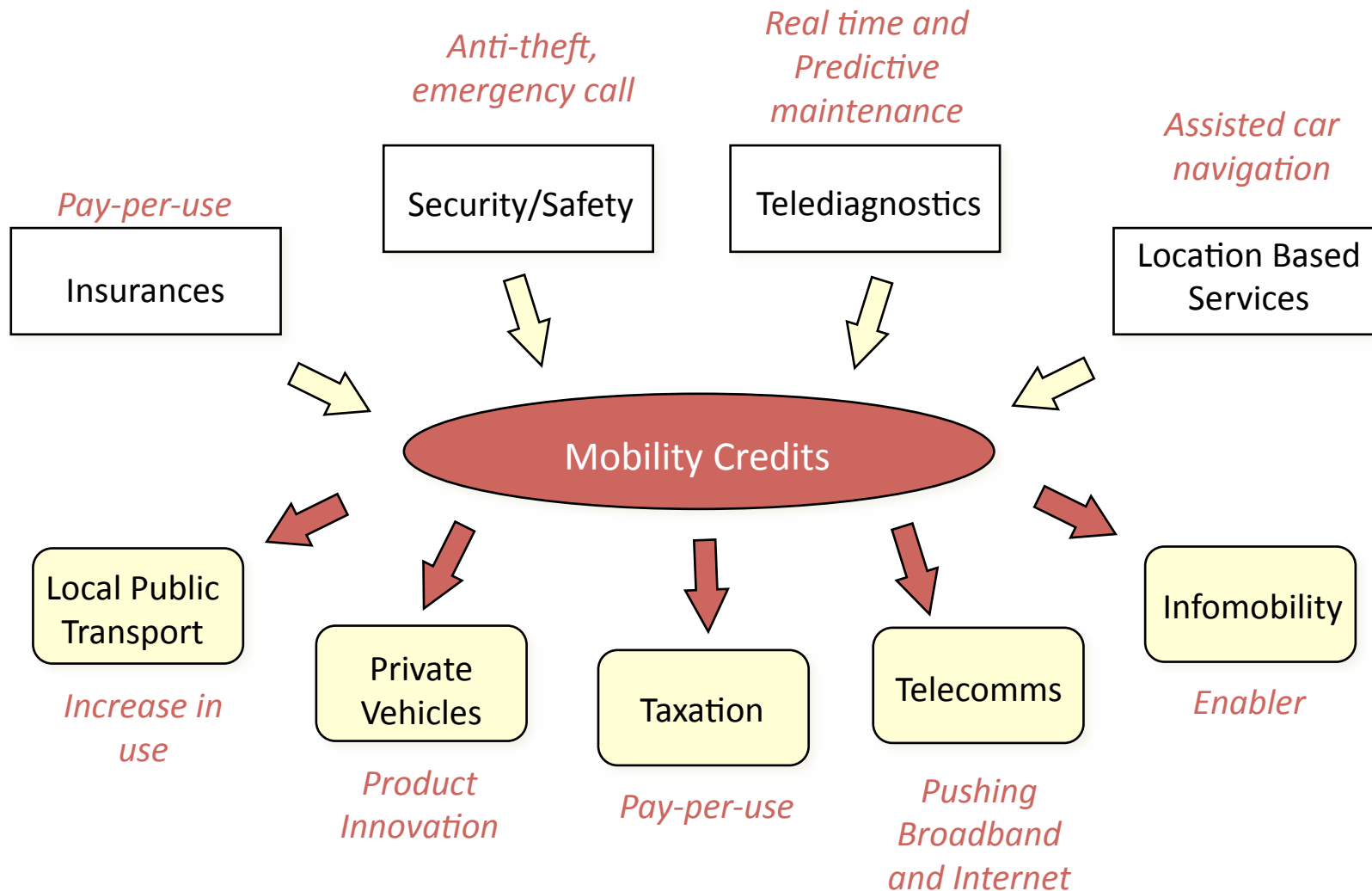
- To provide an integrated strategy able to use all levers available to the city administration and to stimulate market offering
  - ↳ *The model will not substitute any current policy: on the contrary it integrates and multiplicates the effects of current policies*
- To spur citizens to be more conscious about their choices, but at the same time avoiding any constraints to freely move in the city
  - ↳ *The model aims at providing a more equitable answer compared to prohibition, leveraging the concept of individual mobility budget*
- To employ available ICT technologies, making it easier to introduce the model
  - ↳ *The model requires localization and communication, but it is not dependent on specific technologies and can grow with them*

## Enablers and constraints

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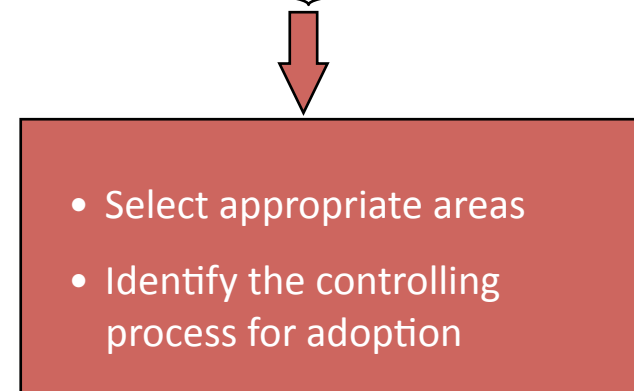
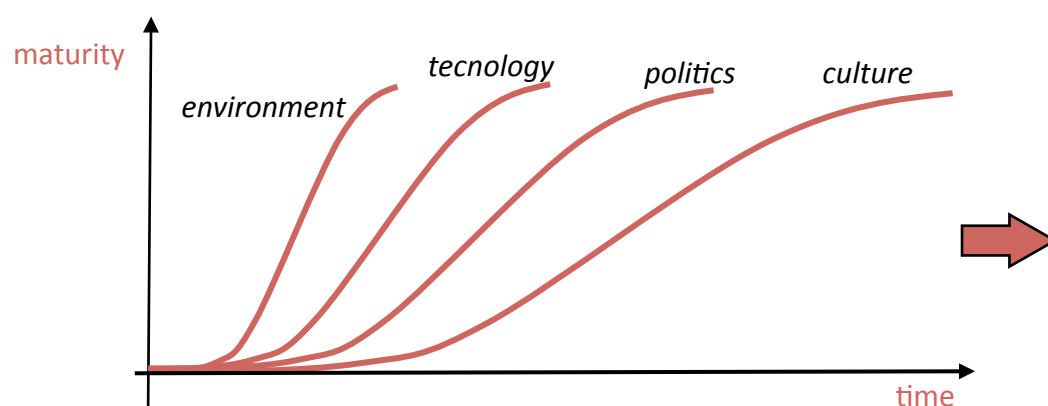
Pillars	Contexts	Enablers	Constraints
<ul style="list-style-type: none"> <li>• Charge area and quantify its “sustainable GHG load”</li> <li>• Assign the credits</li> <li>• Set the consumption rules</li> <li>• Exchange credits</li> </ul>	<ul style="list-style-type: none"> <li>• Enterprise</li> <li>• Social Networking</li> <li>• Demand Management</li> <li>• Information Platform</li> </ul>	<ul style="list-style-type: none"> <li>• Technology               <ul style="list-style-type: none"> <li>○ OBU</li> <li>○ Smart Phones</li> <li>○ Internet</li> </ul> </li> <li>• Location Based Services</li> <li>• Pay Per Use Insurance</li> <li>• Road Pricing</li> <li>• Security</li> <li>• Safety</li> <li>• Environmental sensibility</li> <li>• Virtual mobility</li> </ul>	<ul style="list-style-type: none"> <li>• Social Equity</li> <li>• Costs</li> <li>• Privacy concern</li> <li>• Diffusion time constants</li> <li>• Enforcement laws</li> <li>• Long term effects on urban area</li> </ul>

# The Mobility Credit Model is tuned to several drivers already active in the automotive world and is poised to provide remarkable industrial fallout

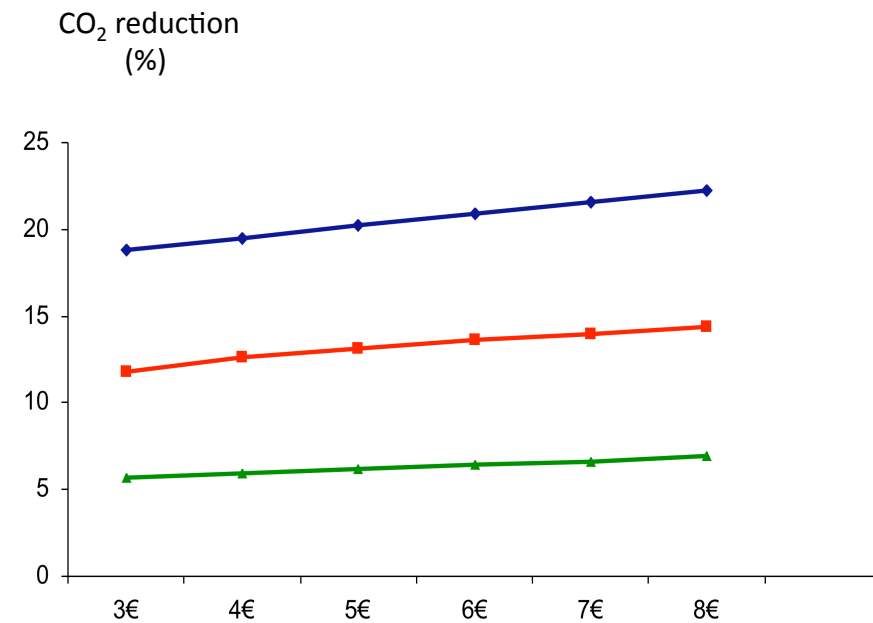
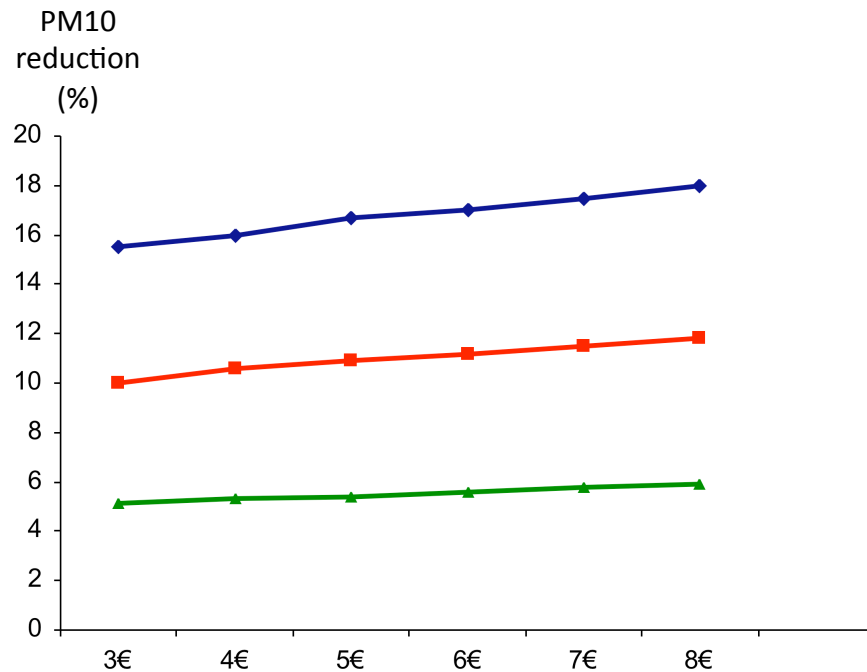


## Adoption dynamics

Equity and complexity	Privacy	Application Constraints	Costs	Interoperability
<ul style="list-style-type: none"> <li>• No prohibition</li> <li>• Capability to assess individual behavior</li> <li>• Rewarding Mechanism</li> </ul>	<ul style="list-style-type: none"> <li>• Vehicle Tracking</li> <li>• Database of trip data</li> </ul>	<ul style="list-style-type: none"> <li>• Available LPT alternatives</li> <li>• Possibility to avoid physical trips</li> </ul>	<ul style="list-style-type: none"> <li>• Scale-up with OBU diffusion</li> <li>• Minimum infrastructure costs</li> </ul>	<ul style="list-style-type: none"> <li>• Tuned to industry drivers</li> <li>• Autonomy of local bodies</li> </ul>



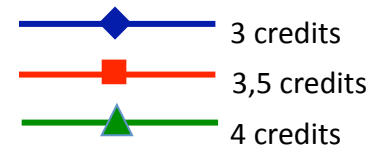
## PM10 e CO2 reduction (Genova case)



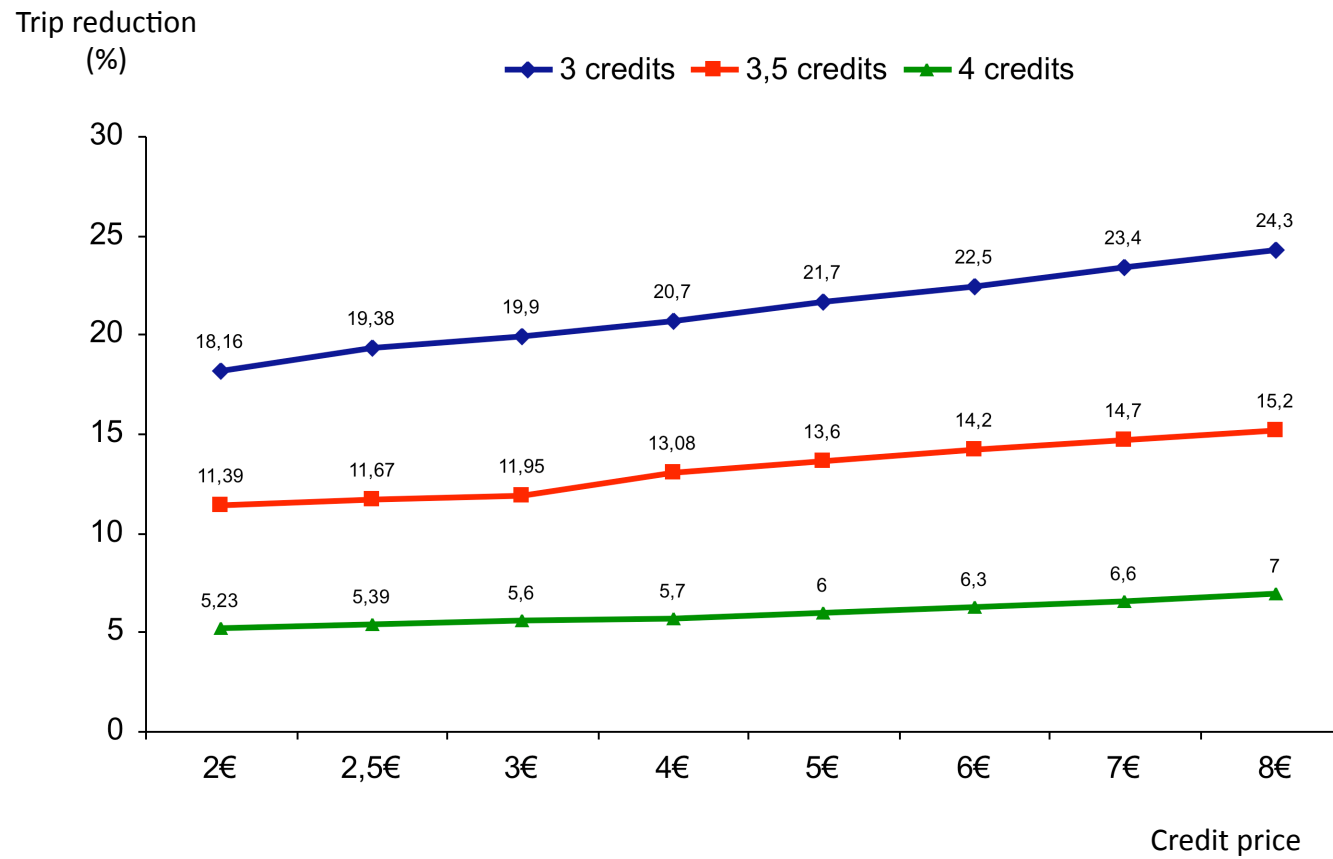
Credit price

Weekly grant of free credits

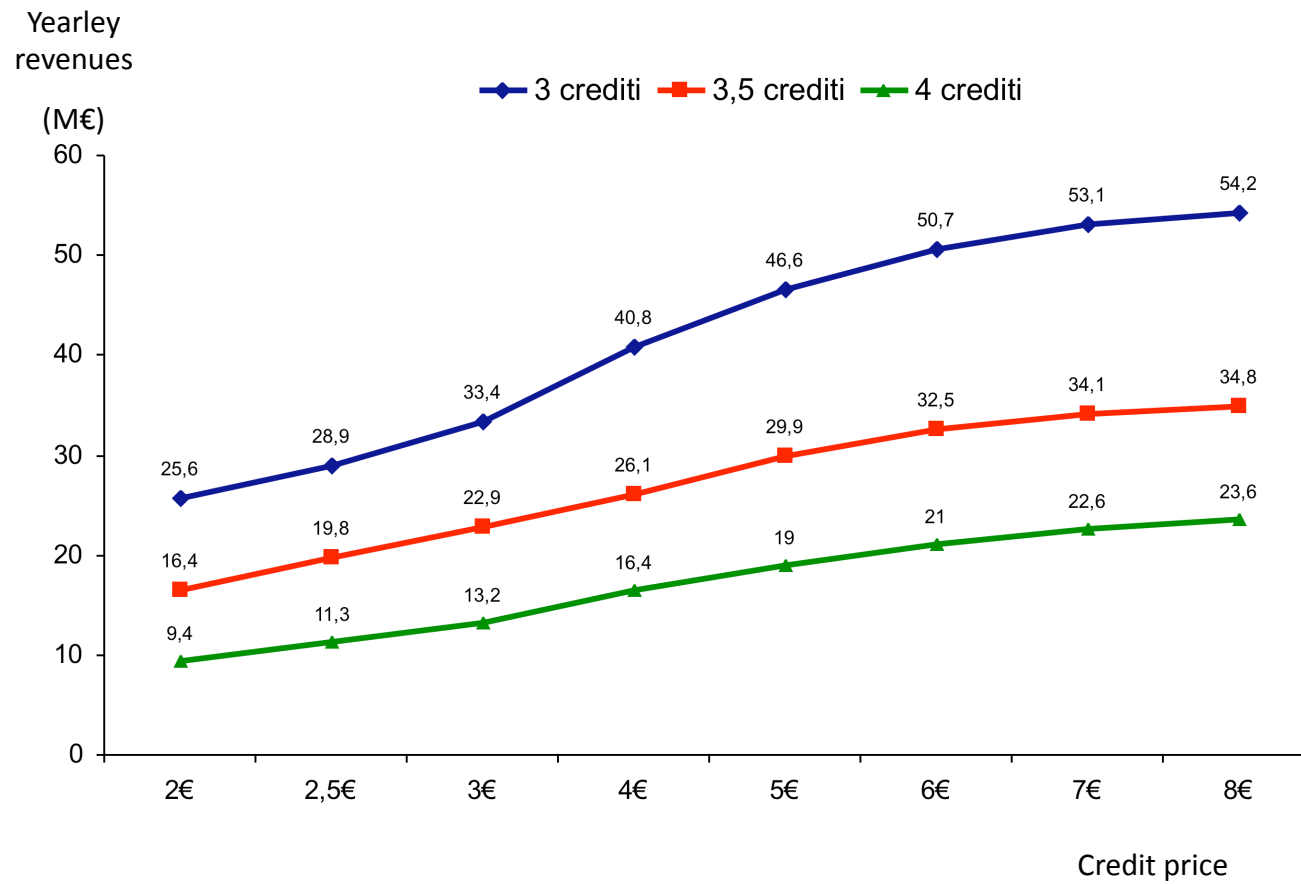
(5 credits correspond to 5 return trips per week)



## Trip reduction (Genova case)



## Yearley revenues (Genova case)



# System Architecture

