



Ajuntament  
de Barcelona

# Renewing Barcelona's Urban Mobility Plan: Towards a new city model

Introduction, Diagnosis and Scenarios

Barcelona's Sustainable Urban Mobility Plan 2013-2018

October 2012



# 00

## Content

### I. General considerations SUMP 2013-2018

1. SUMP scope
2. Frame of reference
3. Plan goals

### II. Balance of the current SUMP (2007-2011)

N

B

C



00

## Content

### III. Diagnosis - conclusions

1. The territory
2. The mobility of the people in Barcelona
3. Pedestrian mobility
4. Bicycle mobility
5. Public transport mobility
6. Private vehicle mobility
7. Externalities of the mobility system

### IV. Definition of scenarios

N

B

C



I.

# General considerations SUMP 2013-2018

1. SUMP scope
2. Frame of reference
3. Plan goals

B

C



## 1. SUMP scope

---

- The city of Barcelona, recognizing its metropolitan reality.
- Horizon 2018, with a vision for 2024.

Indicator	Year	
Population	2011	1.615.448
Area (km <sup>2</sup> )	--	101,4
Density (hab./km <sup>2</sup> )	2011	15.939,3
Births	2010	14.967
Deaths	2010	15.031
GDP per capita (thousands €)	2008	39,9
Registered unemployment (annual average)	2011	107.521,4



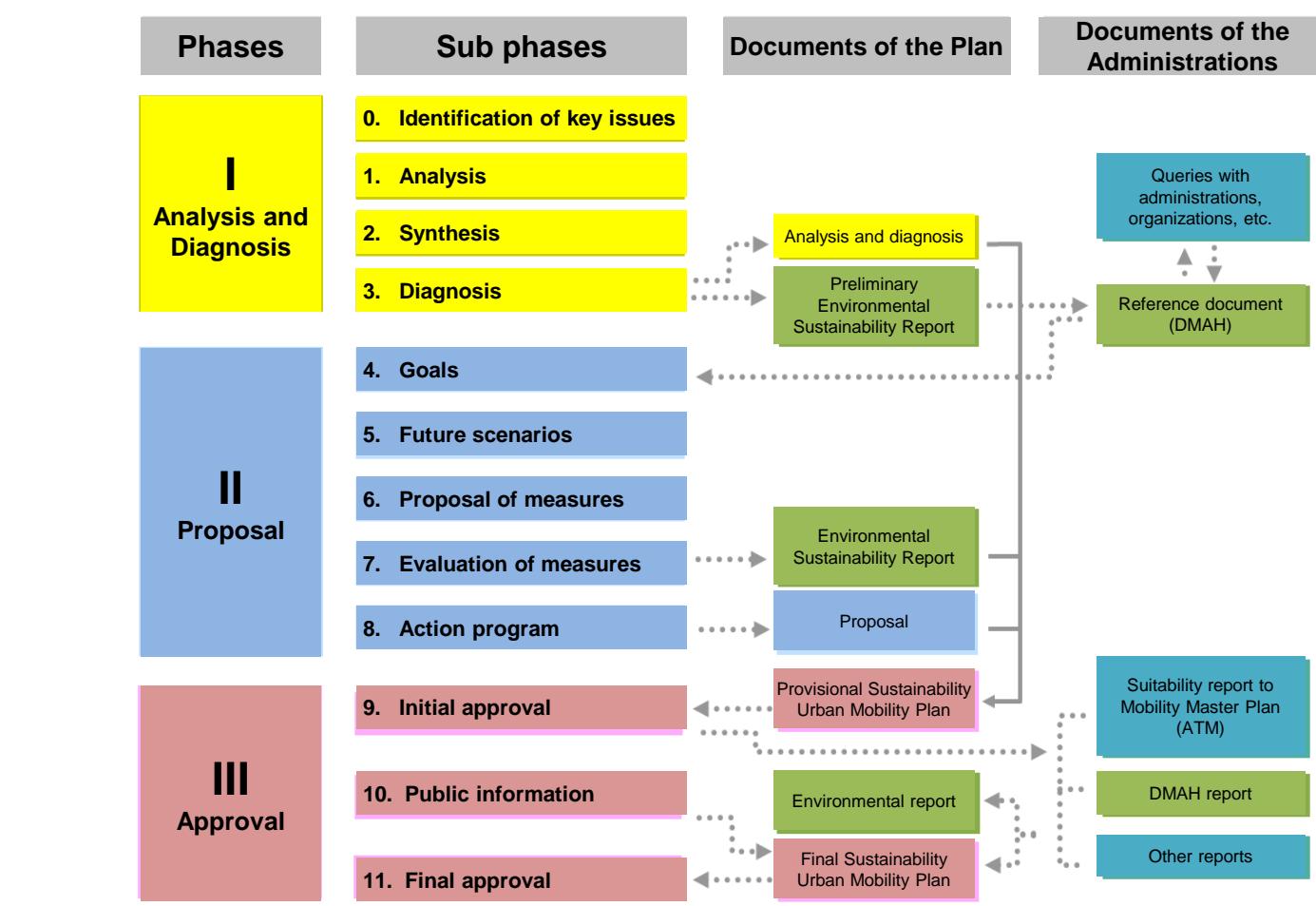
## 2. Frame of reference

It starts from SUMP 2006-2012, and takes into account:

	Territorial and urban planning	Mobility and accessibility	Environment
Legislation	Decret 1/2005, text refós de la Llei d'urbanisme  Decret 305/2006, Reglament de la Llei d'urbanisme	Llei 9/2003, de 10 de juny, de la mobilitat  Decret 344/2006, dels estudis d'avaluació de la mobilitat generada  Decret 135/1995, Codi d'accessibilitat de Catalunya	Decret 266/2006, declaració de z. de prot. especial de l'ambient atmosfèric (i Directiva 2008/50/CE)  Llei 16/2002 de contaminació acústica  Llei 6/2009 d'Avaluació Ambiental de Plans i Programes
Planning Related instruments	Pla Territorial General de Catalunya  Pla Territorial Metropolità de Barcelona (PTMB)  Pla General Metropolità (PGM)	Directrius Nacionals de Mobilitat (DNM)  Pla Director de la Mobilitat de la Regió Metropolitana de Barcelona (pdM)  Pla Director d'Infraestructures de la RMB	Pla de l'energia i canvi climàtic de Catalunya 2012-2020  Pla d'actuació per a la millora de la qualitat de l'aire  Pla d'Energia, Canvi climàtic i Qualitat atmosfèrica de Barcelona (PECQ 2010-2020)  Pla per a la Reducció de la Contaminació Acústica de la Ciutat de Barcelona 2010-2020



## 2. Frame of reference. SUMP procedure

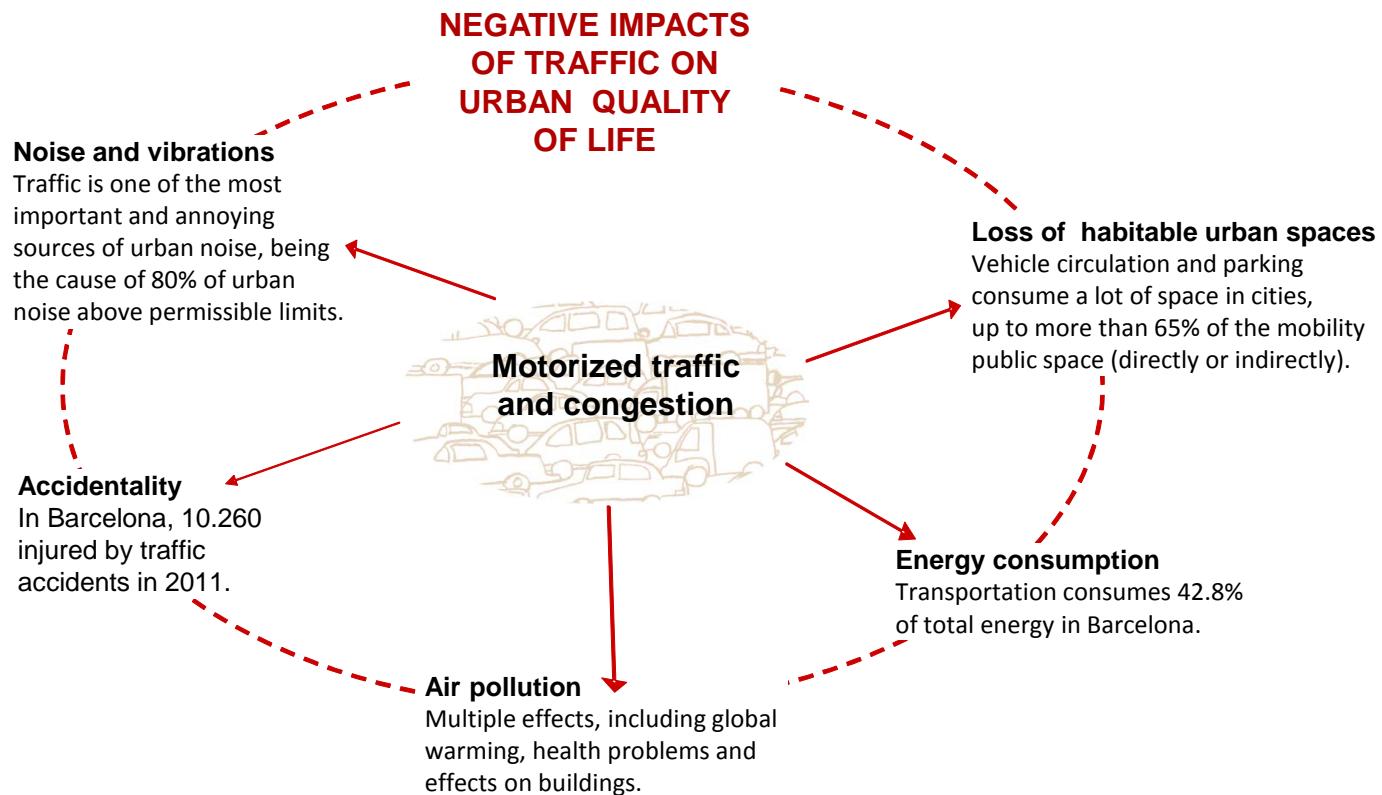




### 3. Plan goals

---

#### Problems associated with the current mobility model





### 3. Plan goals

---

Strategic objectives:

1. **Safe mobility.** Reduce accidents.
  2. **Sustainable mobility.** Reducing the need for private motorized mobility.
  3. **Equitable mobility.** Guarantee the right for mobility for all people.
  4. **Efficient mobility.** Reduce the economic/ congestion costs of the transport system.
-



II.

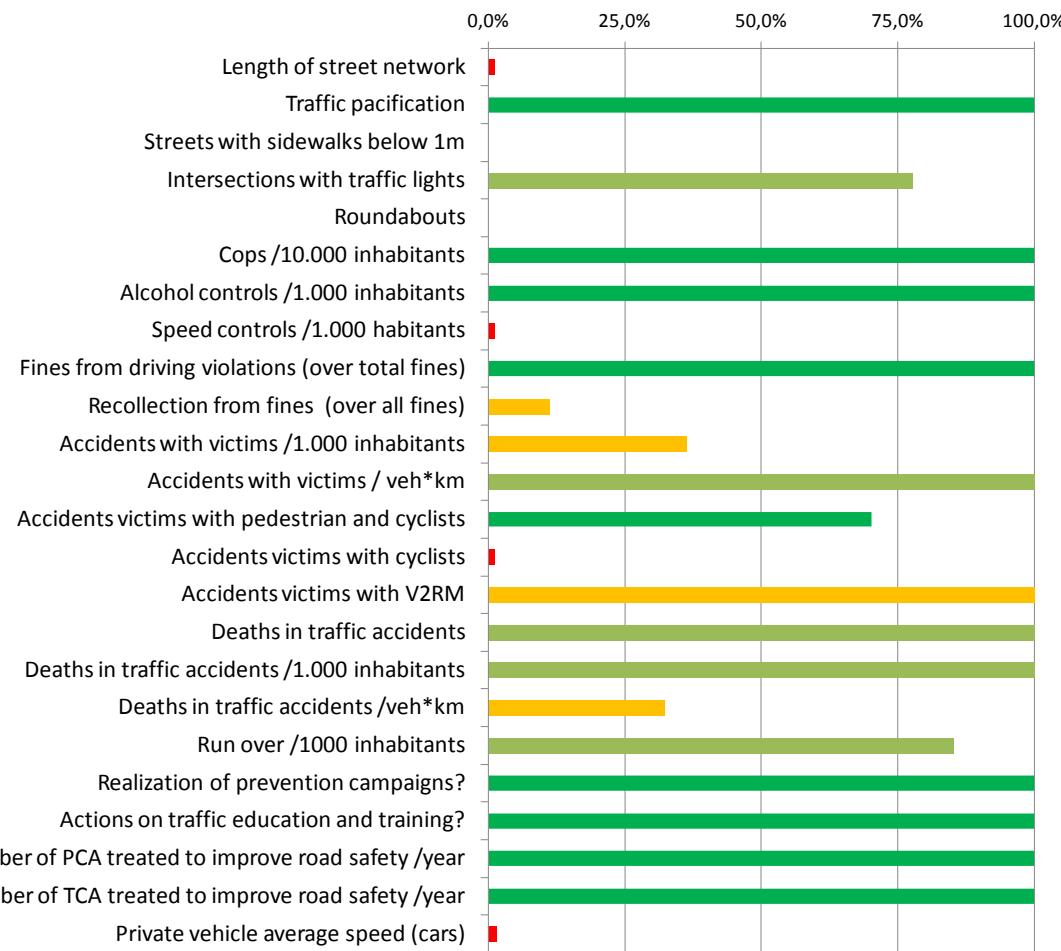
## Balance of the current SUMP (2007-2011)

B

C



## Balance of the current SUMP (2007-2011). Safe mobility

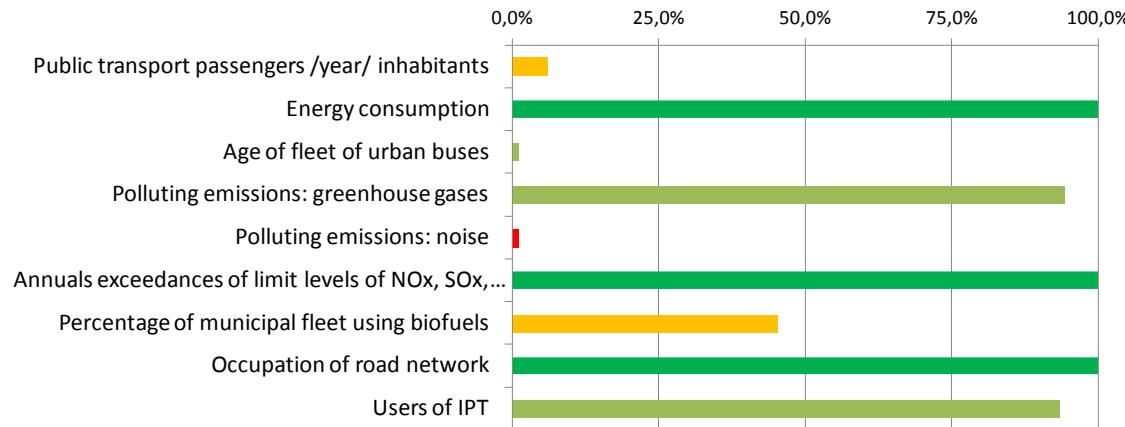


**72,2%**  
fulfillment  
2011



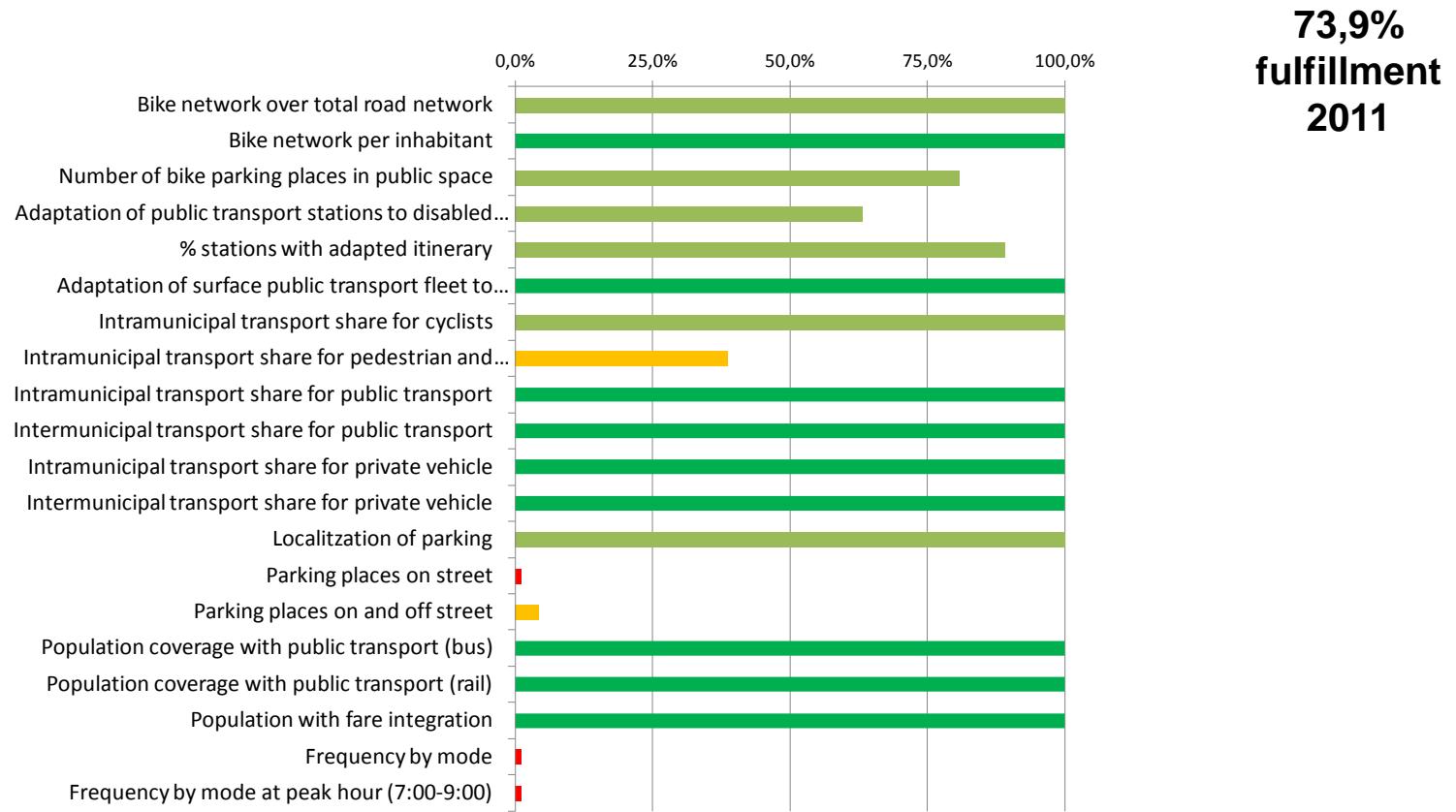
## Balance of the current SUMP (2007-2011). Sustainable mobility

60% fulfillment 2011





## Balance of the current SUMP (2007-2011). Equitable mobility

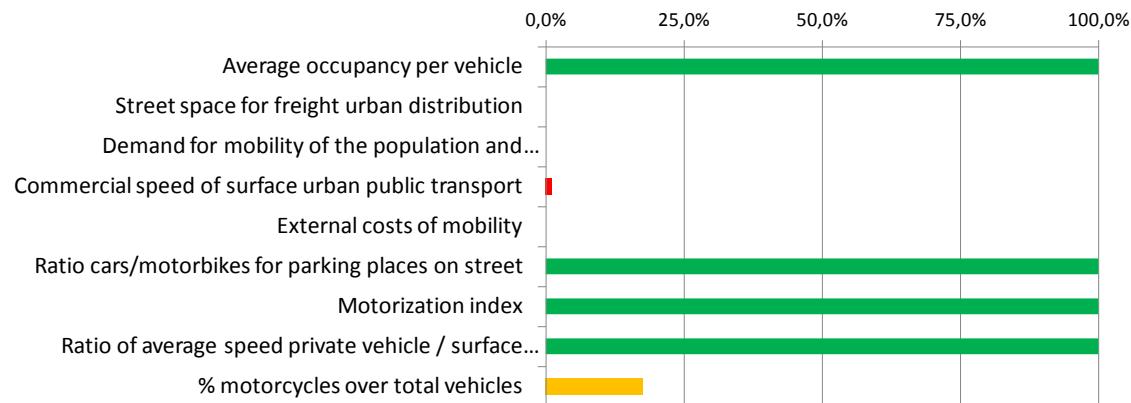


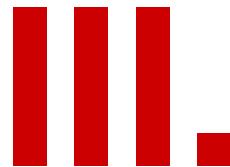


## Balance of the current SUMP (2007-2011). Efficient mobility

---

**69,7% fulfillment 2011**





# Diagnosis

1. The territory
2. The mobility of the people in Barcelona
3. Pedestrian mobility
4. Bicycle mobility
5. Public transport mobility
6. Private vehicle mobility
7. Externalities of the mobility system

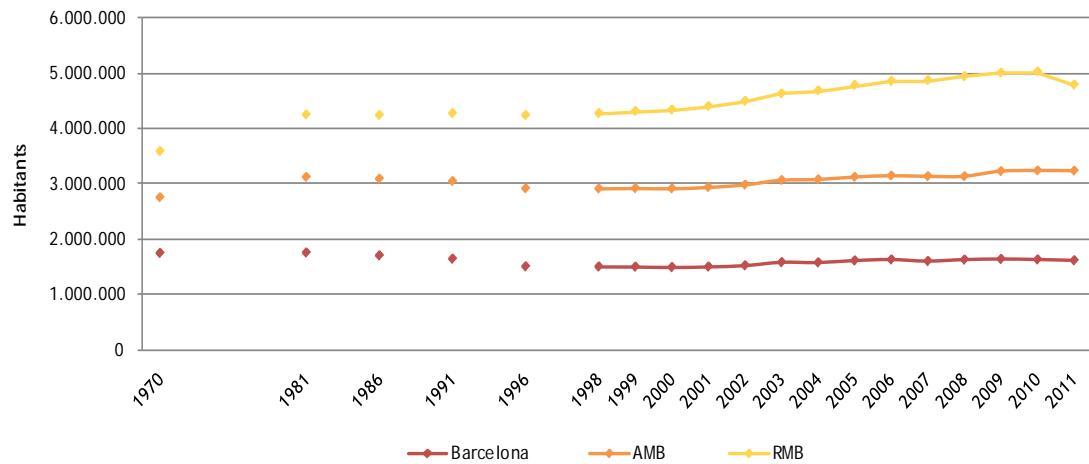
N

B

C

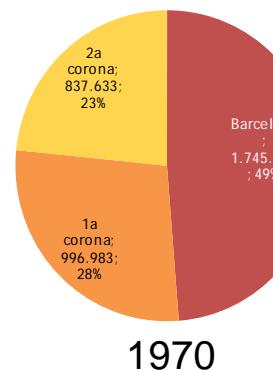


# 1. The territory – RMB: Demographic dynamics

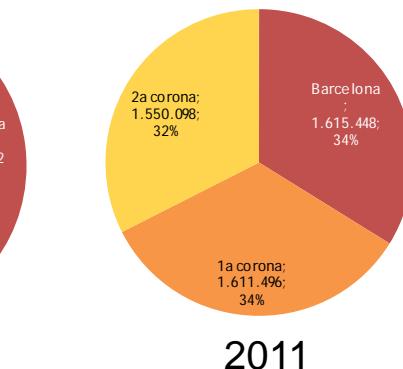


Year	Barcelona	AMB	RMB
1970	1.745.142	2.742.125	3.579.758
2011	1.615.448	3.226.944	4.777.042

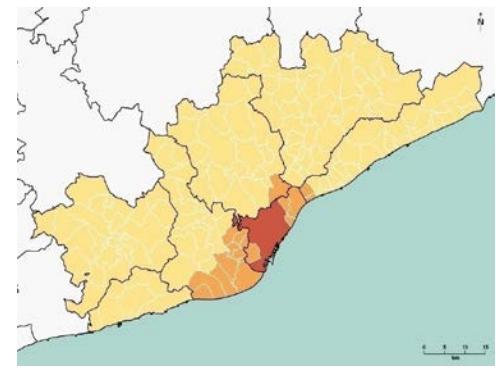
Year	Barcelona	1st ring	2nd ring
1970	1.745.142	996.983	837.633
2011	1.615.448	1.611.496	1.550.098



1970



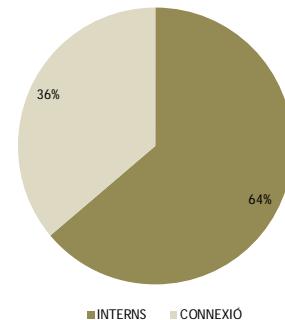
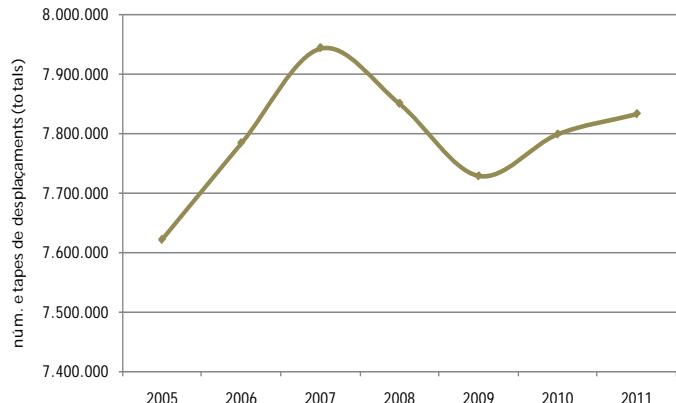
2011



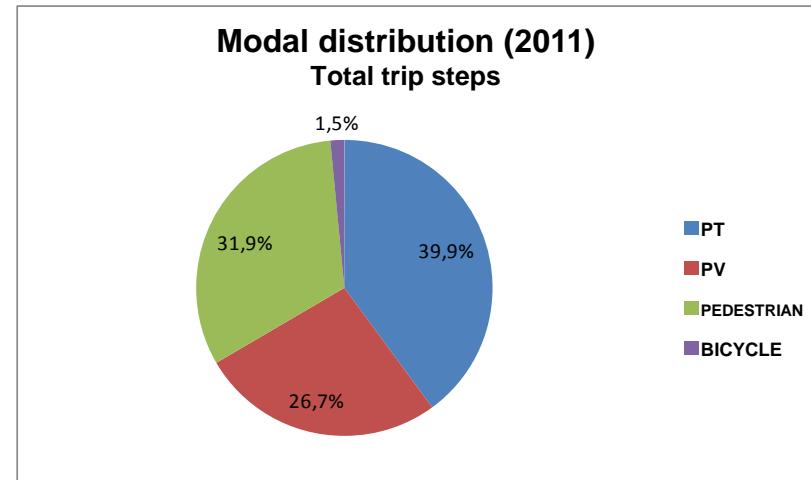
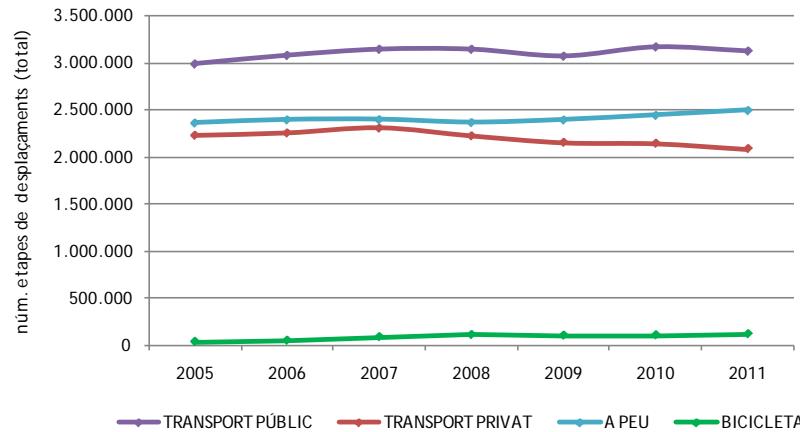
Àmbits territorials

- Barcelona
- 1a corona - EMT
- 2a corona - RMB
- Limit comarcal

## 2. The mobility of the people – Trip steps 2011

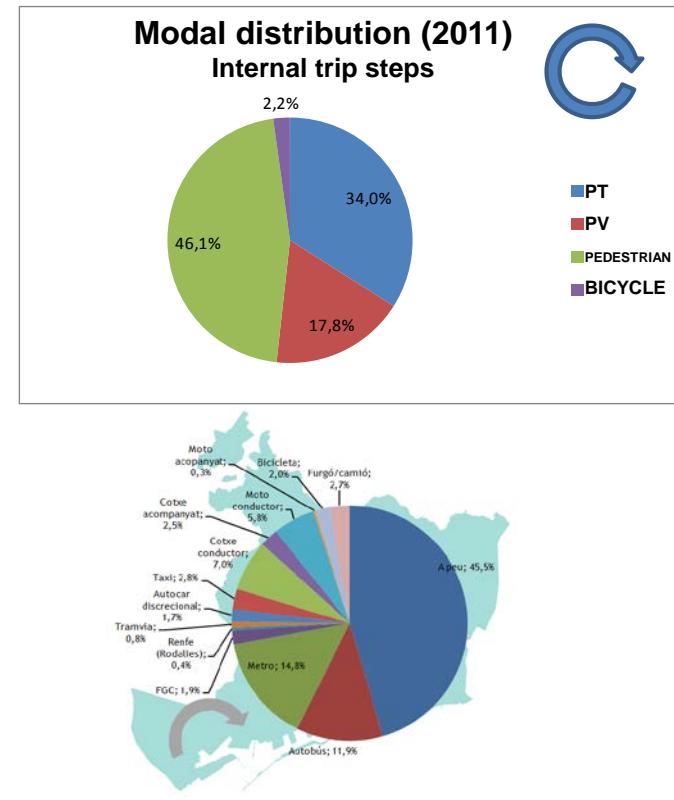
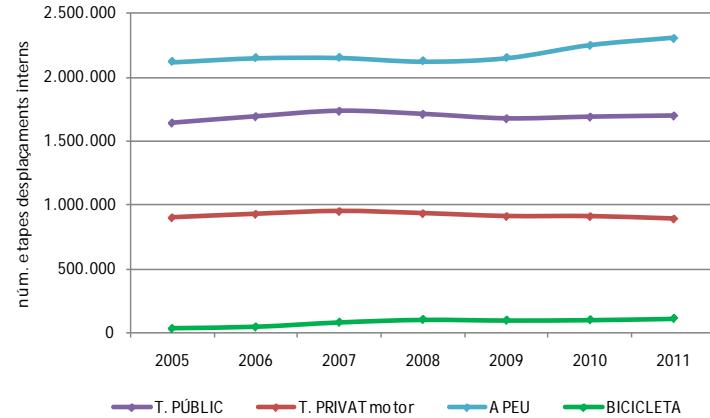
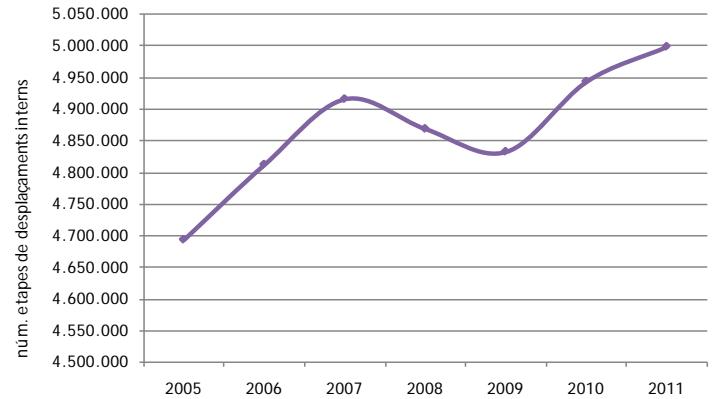


**7.833.495 trip steps/day**  
(64% are internal)





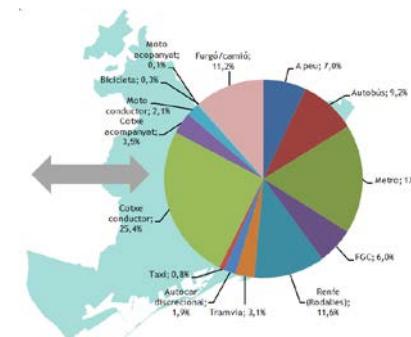
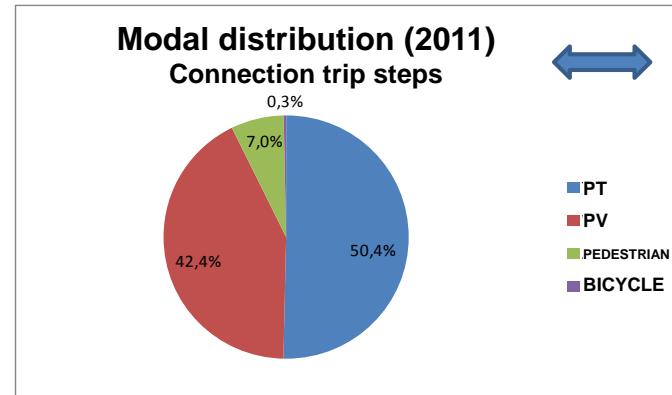
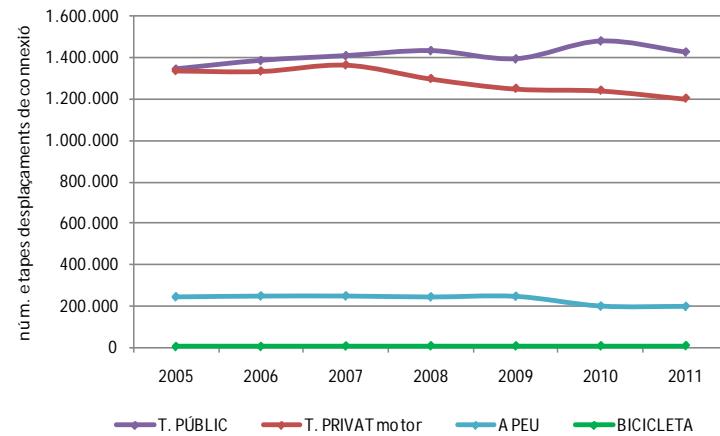
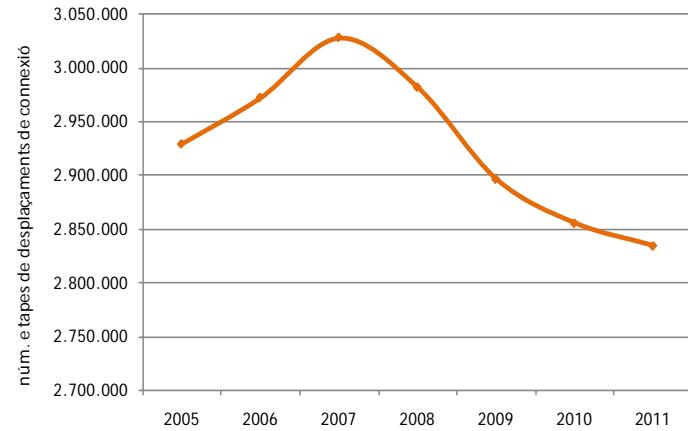
## 2. The mobility of the people – Internal trips 2011



**4.999.324 trip steps/day**  
**27% trips are labor purpose (EMEF)**



## 2. The mobility of the people – Connection trips 2011

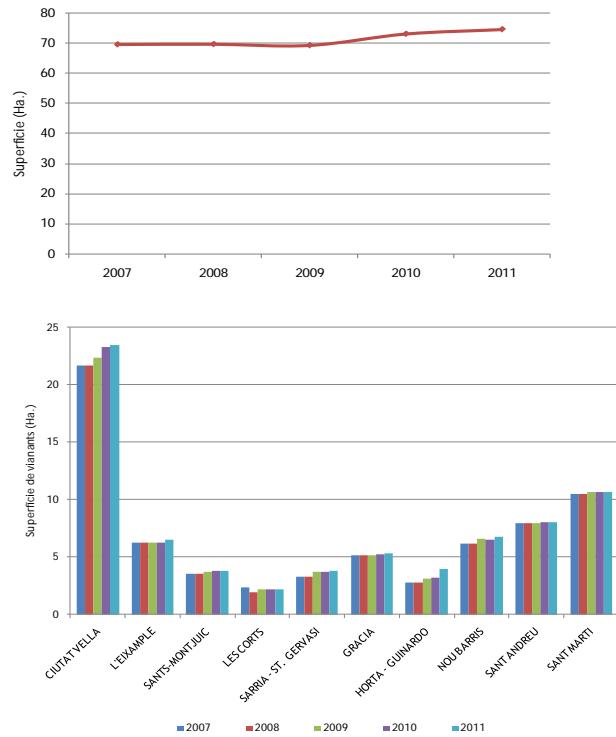


**2.834.171 trip steps/day**  
**60% trips are labor purpose (EMEF)**



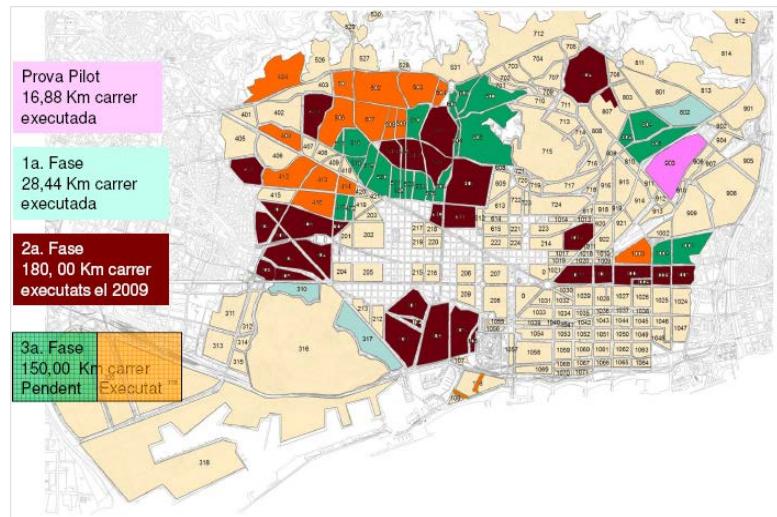
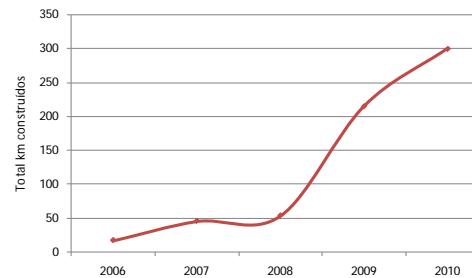
### 3. Pedestrian mobility. Pedestrian areas and '30 areas'.

#### Pedestrian areas, and bollard access:



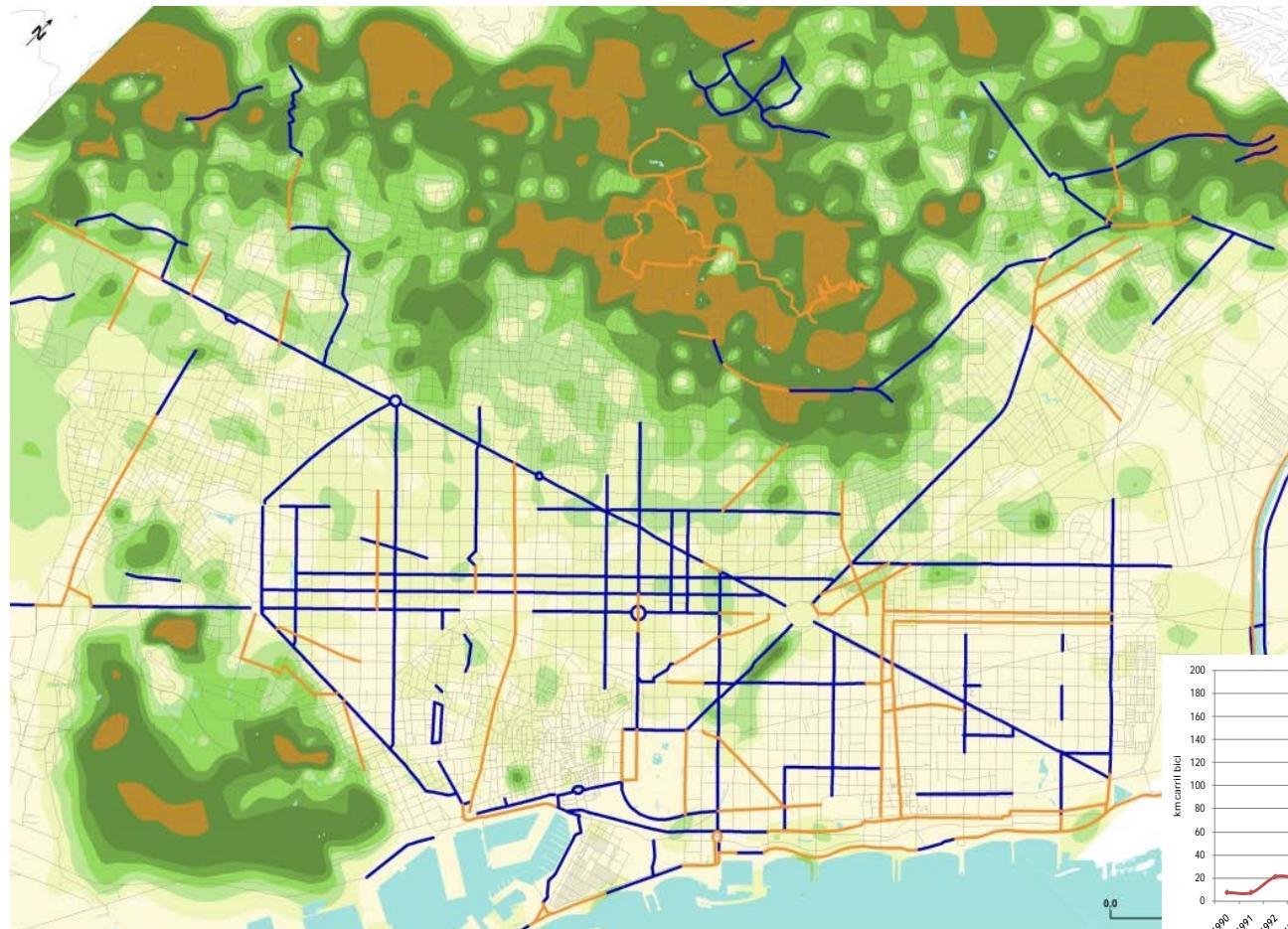
ANY	2005	2006	2007	2008	2009	2010	2011	%10/09	%10/07
Nº ZONES CONTROLADES	18	21	21	21	21	22	21	-4,5%	0,0%
entrades	49	64	67	67	74	73	-1,4%	9,0%	
sortides	28	30	30	30	38	38	0,0%	26,7%	

#### '30 areas':

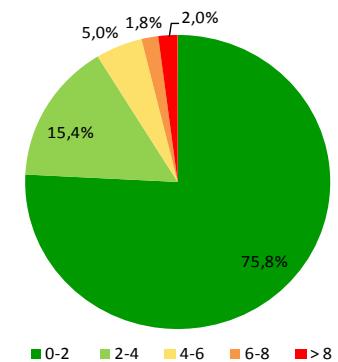




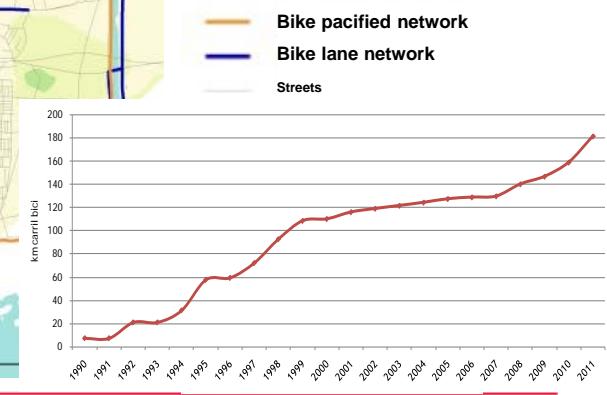
## 4. Bicycle mobility. Bike lane network and slopes 2011



Street section slope,  
Bike lane network 2012:

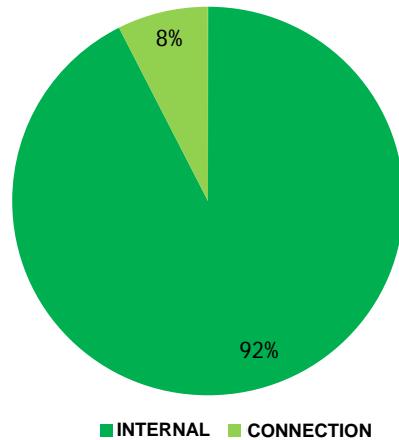


Bike network 2012 and slopes





## 4. Bicycle mobility. DEMAND. Trips 2011

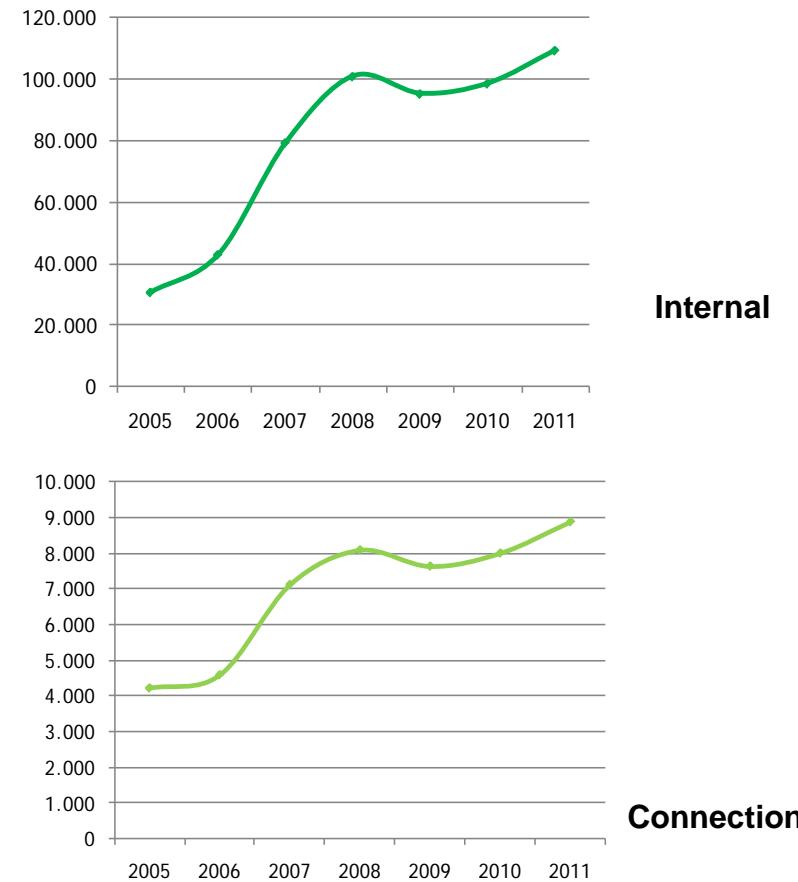


**Total bicycle trip steps:**

**118.151 total**

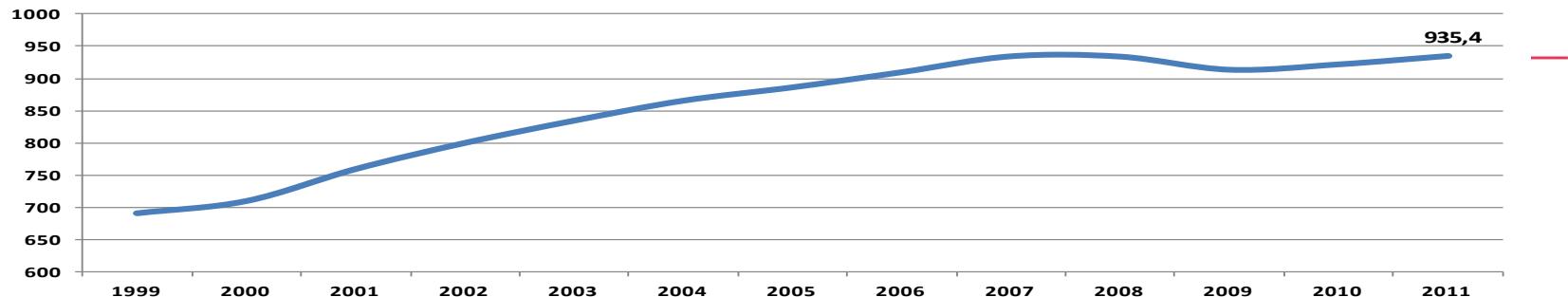
**109.282 internal**

**39.736 (36% of internal), from 'Bicing'**



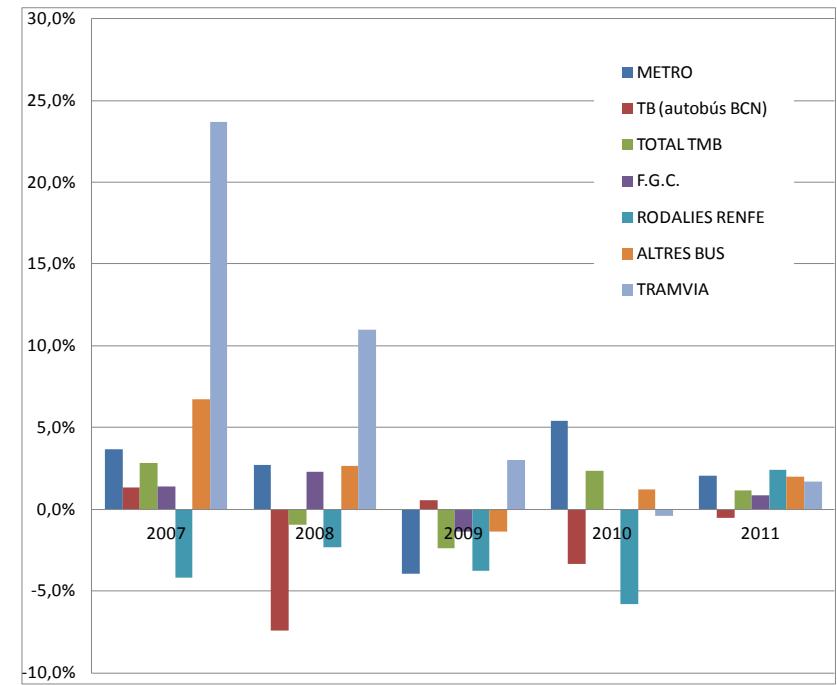


## 5. Public transport mobility – Evolution of demand for the RMB



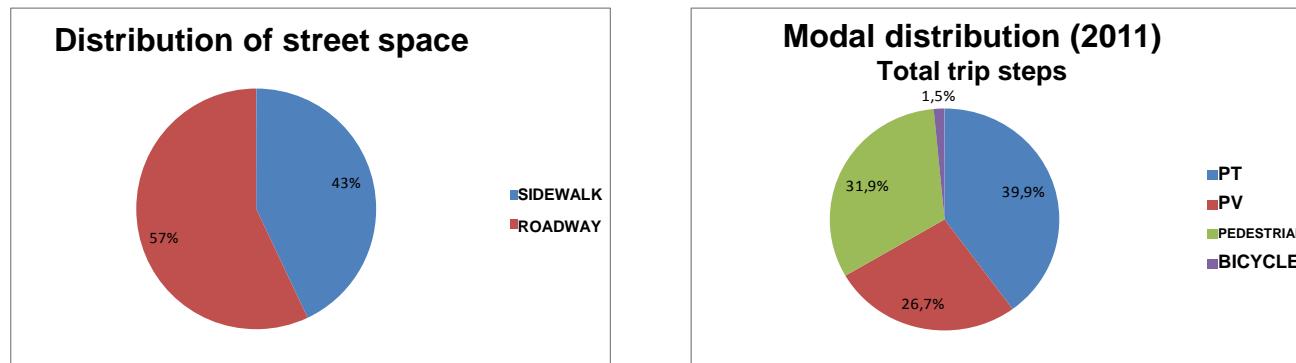
### Validations in public transport

OPERATOR	2007	2008	2009	2010	2011	Δ%11/10	Δ%11/07
METRO	366,4	376,4	361,6	381,2	389,0	2,0%	6,17%
TB (bus BCN)	210,5	194,9	196	189,4	188,4	-0,5%	-10,50%
TOTAL TMB	576,9	571,3	557,6	570,7	577,4	1,2%	0,09%
F.G.C.	79,1	80,9	79,8	79,8	80,5	0,8%	1,77%
RODALIES (Renfe)	117,1	114,4	110,1	103,7	106,2	2,4%	-9,31%
OTHERS BUS	140,9	144,6	142,6	144,3	147,2	2,0%	4,47%
TRAMWAY	20,9	23,2	23,9	23,8	24,2	1,7%	15,79%
<b>TOTAL</b>	<b>934,9</b>	<b>934,4</b>	<b>914,0</b>	<b>922,3</b>	<b>935,4</b>	<b>1,4%</b>	<b>0,05%</b>

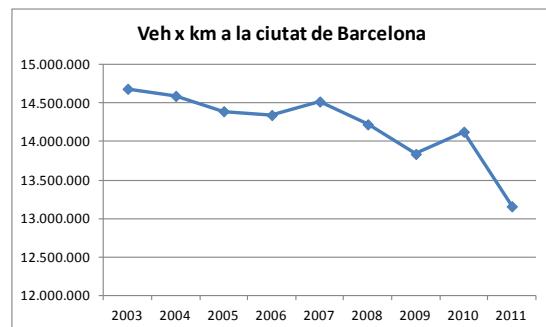


## 6. Private vehicle mobility

- Street space for private vehicle use is 57%, but private vehicle represents only 26,7% of mobility.



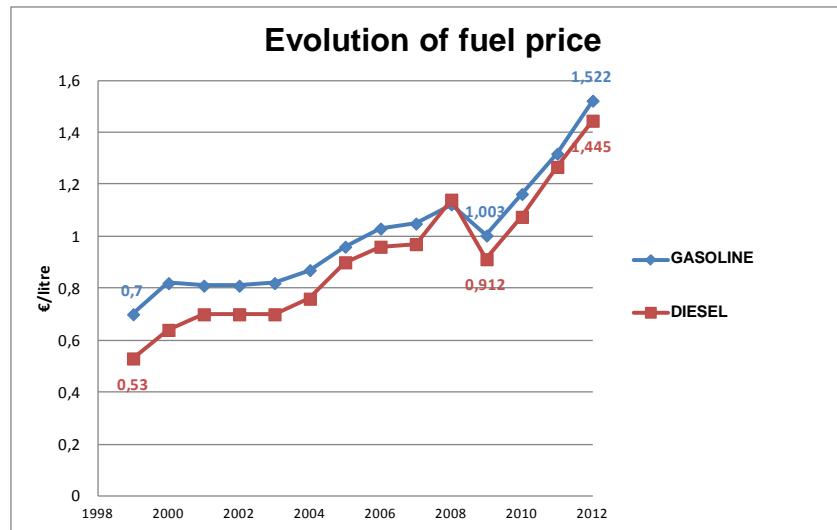
- The modal distribution of private vehicle has decreased from 29,1% to 26,7% between 2007 and 2011 (8,4% reduction). Veh. x km has decreased from 14.520.000 in 2007 to 13.160.000 in 2011.





## 6. Private vehicle mobility

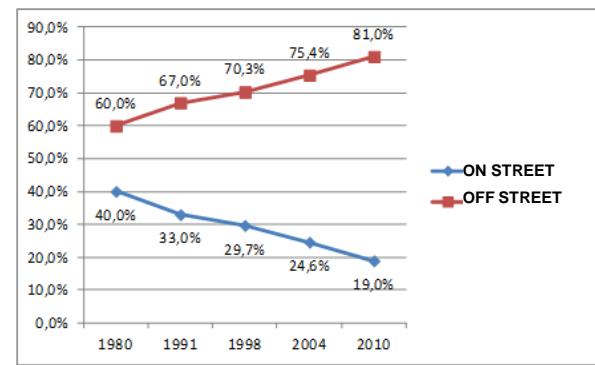
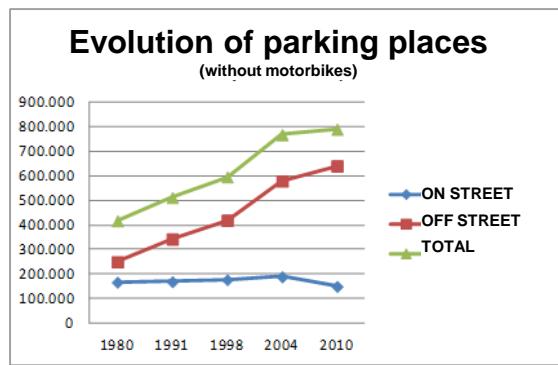
- Private vehicle mobility represents 18% of internal trips, but up to 42% of connection trips.
- Between 1999 and 2012, fuel price has more than doubled (almost tripled in the case of diesel), and between 2009 and 2012 the increase has been 50%. The future trend will be similar (or worse).





## 6. Private vehicle mobility

- The occupancy factor of the car is still very low (1,21).
- Parking places on street has decreased from 167.000 in 1980 to 150.000 in 2010. Parking off street has increased from 250.000 in 1980 (579.000 in 2004) to 640.000 in 2010. The ratio on street / off street has changed from 40-60% in 1980 to 19-81% in 2010.



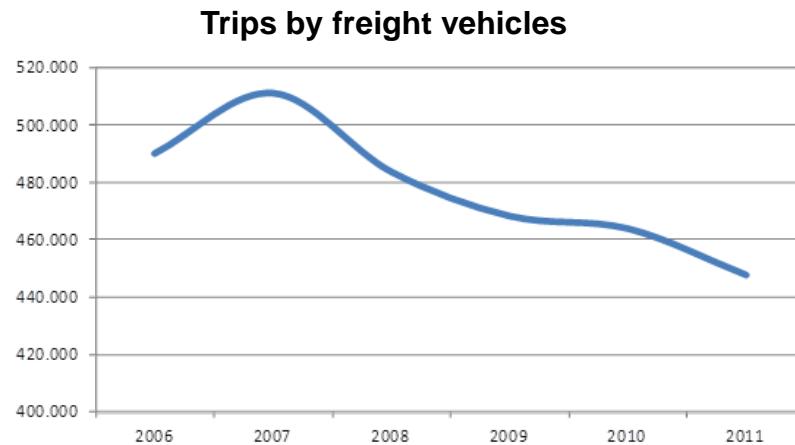
- The establishment of the “Green Area” parking policy has decreased parasite traffic looking for free parking and is a deterrent for the use of car. It has improved traffic fluidity, environmental quality (air pollution and noise), and has allowed for a better management of public space.



## 6. Urban freight distribution

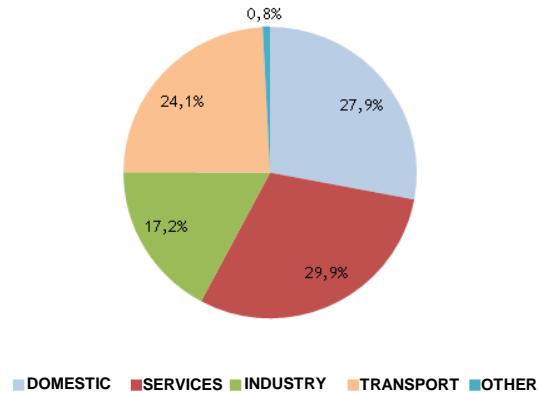
---

- Urban freight distribution represents approximately 21,4 % of city traffic (447.815 trip steps over 2.088.347 trip steps in private vehicle).
- Most of the traffic generated by urban freight distribution comes from connection trips (70,9%), compared to internal trips in Barcelona (29,1%).
- The crisis has significantly affected the number of operations (reduction of 12,4% between 2007 and 2011).



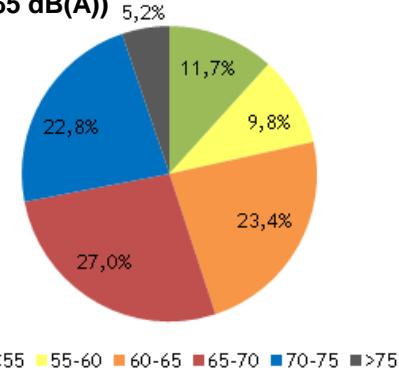
## 7. Externalities of the mobility system: Energy and pollution

### Energy consumption

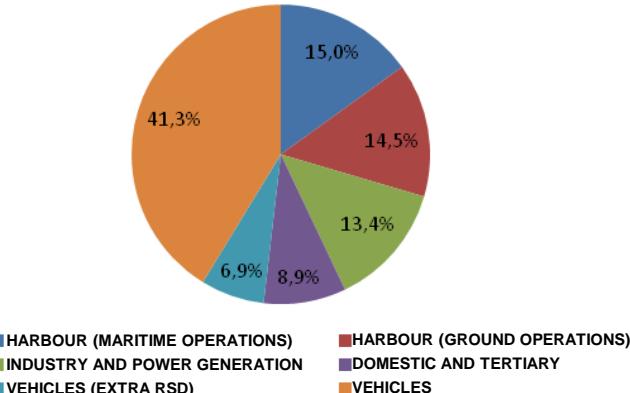


### Noise (Lden). Affected population

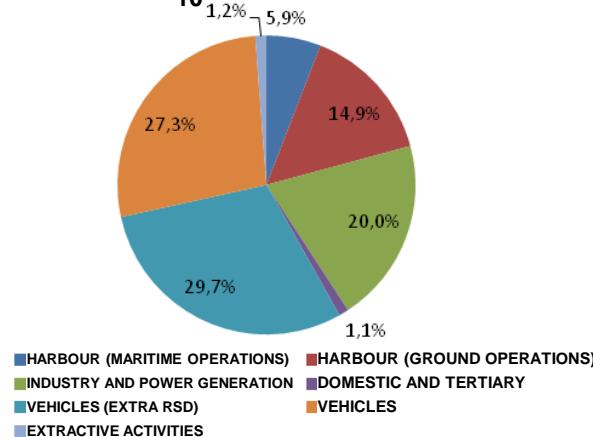
(threshold: 65 dB(A))



### NO<sub>x</sub> emissions

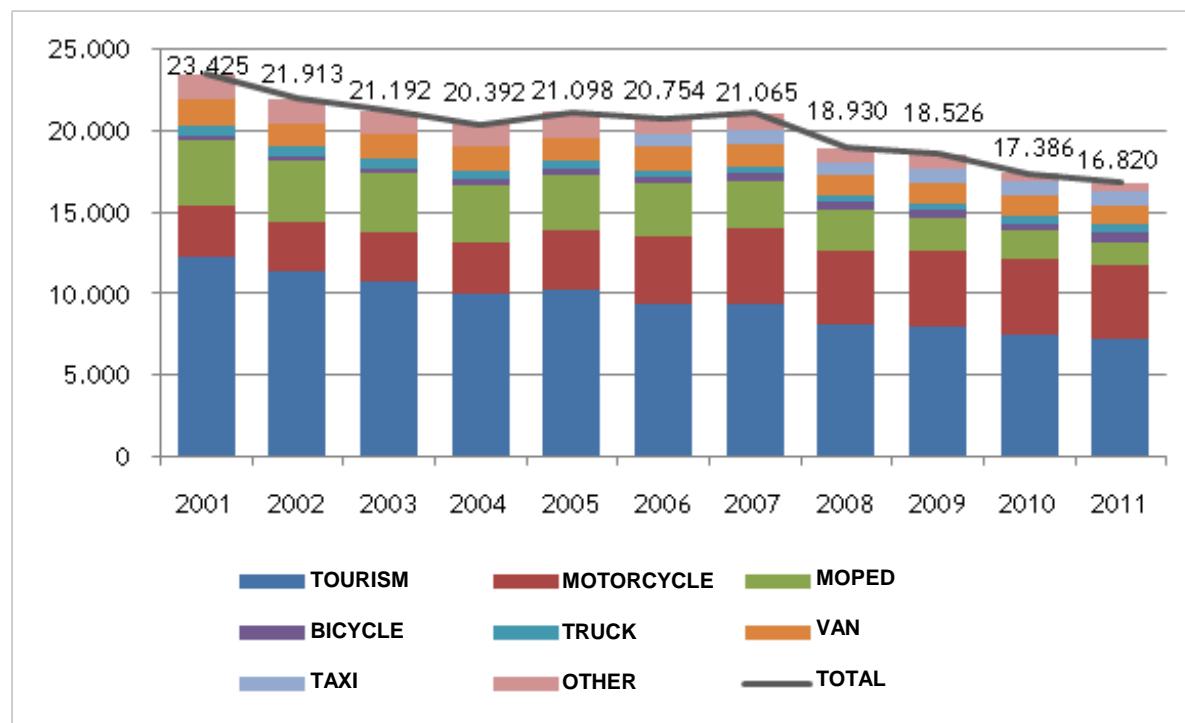


### PM<sub>10</sub> emissions



## 7. Externalities of the mobility system: Street safety

**Number of accidents by type of vehicle involved 2001-2011, Barcelona**





# IV.

## Definition of scenarios

N

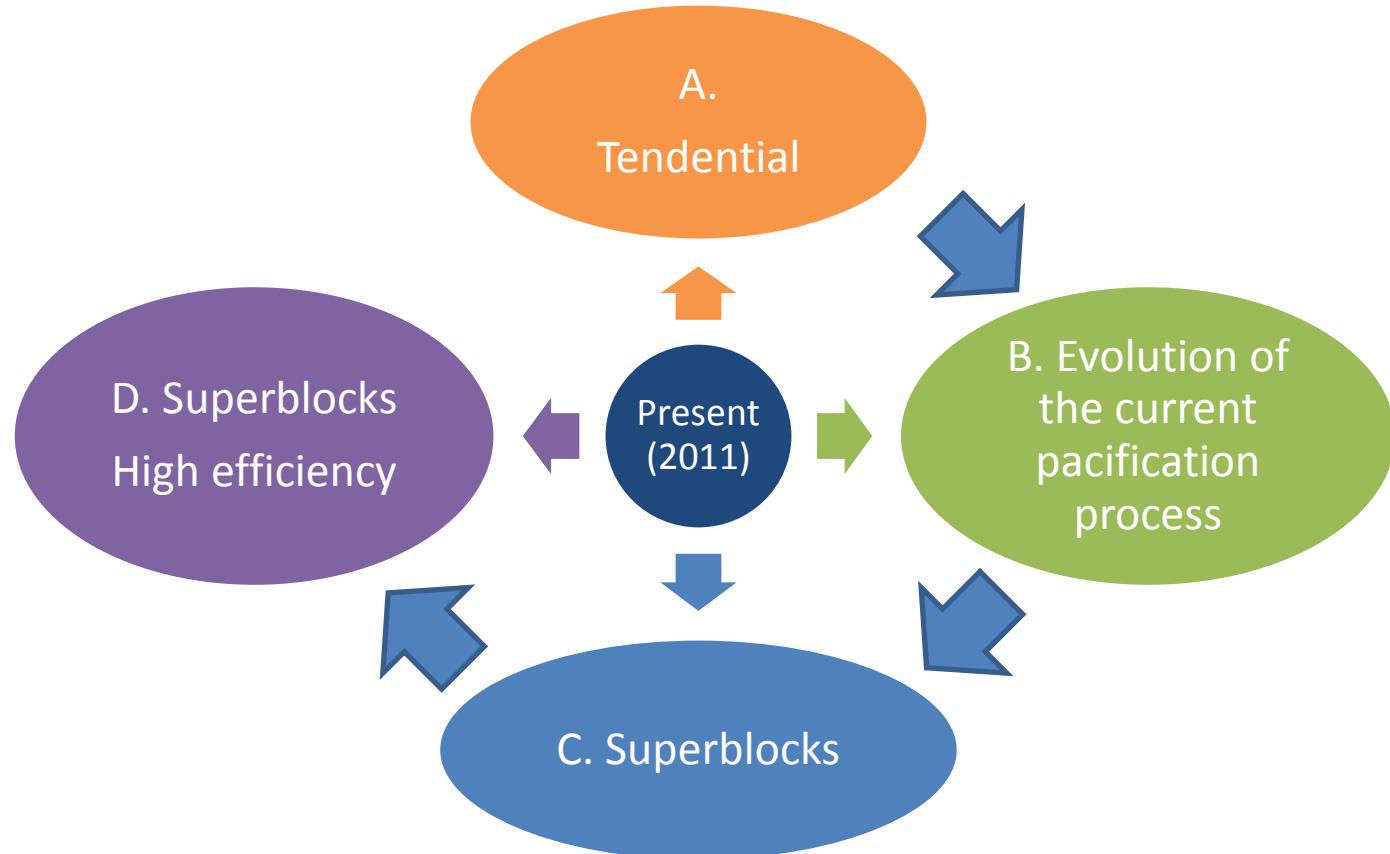
B

C



## Definition of scenarios

Analysis for 2024, with a picture of the state of development for 2018.



# Definition of scenarios

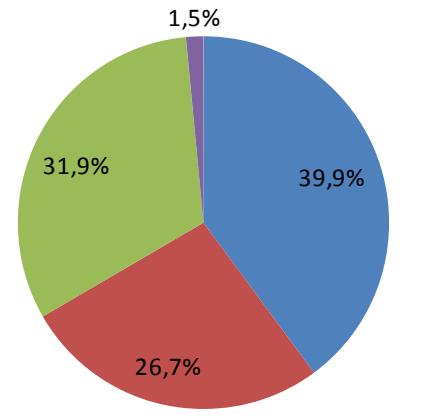
## 0. Present Scenario

- Baseline scenario. It collects the latest mobility data available (2011).

## A. Tendential scenario

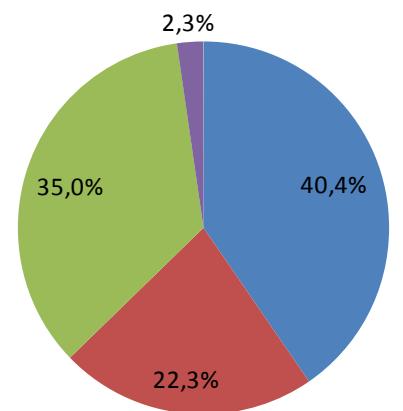
- Continuity of the current traffic pacification process.
- 2018: Extrapolates the trend of trip steps 2007-2011, due to:
  - Weak economic recovery.
  - Upward trend of fuel prices continues (according to OECD forecasts).
- Extrapolating the 2007-2011 trend would change the total number of trip steps. Since it is assumed that the total number of trip steps does not vary, the pure tendential scenario is adjusted respecting its modal distribution.
- 2018-2024: Stability of mobility (total and by mode).

2011



■ PT ■ PV ■ PEDESTRIAN ■ BICYCLE

2018 (A)



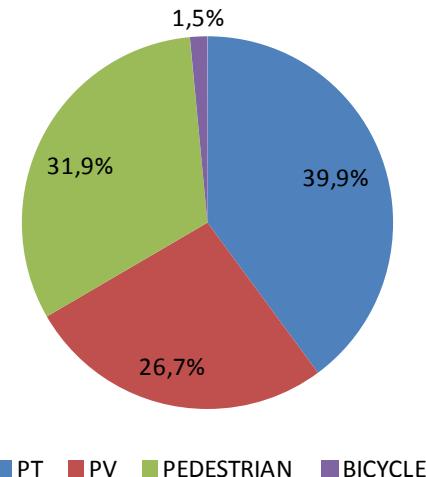


## Definition of scenarios

### B. Evolution of the current pacification process

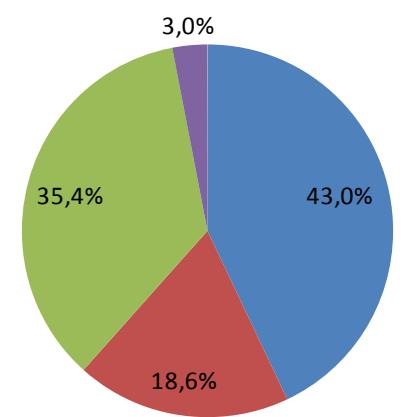
- Achieving pacification with a traffic level of service similar to the present.
- Compliance with policy environmental quality parameters: EU directive, Kyoto, etc. (annual average limit values: NO<sub>2</sub>: 40µg/m<sup>3</sup>, PM<sub>10</sub>: 40µg/m<sup>3</sup>, PM<sub>2,5</sub>: 25µg/m<sup>3</sup>).
- Reduce noise from traffic in 30% of public space.
- Reduce traffic victims.
- Increase to 50% street space for pedestrians.
- Reduction of the number of private vehicle trip steps to 18,6% of the modal distribution.

2011



PT PV PEDESTRIAN BICYCLE

2018 (B-C)



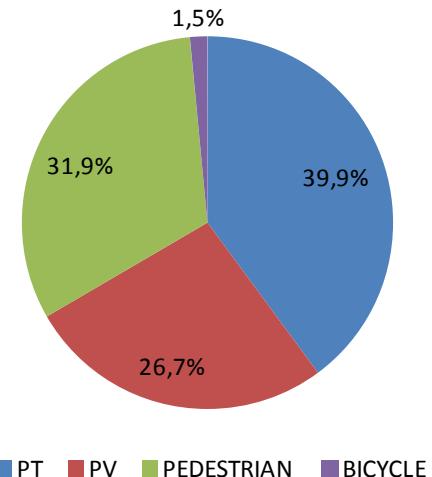


## Definition of scenarios

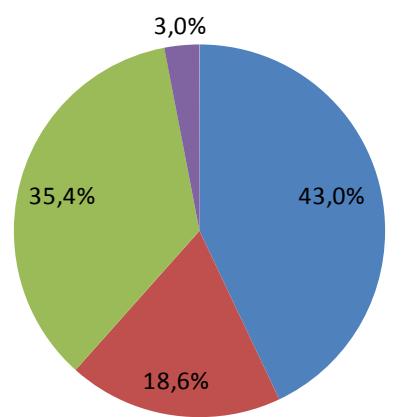
### C. Superblocks scenario

- Achieve a greater pacification than in scenario B with a traffic level of service similar to present.
- Compliance with policy environmental quality parameters: EU directive, Kyoto, etc. (annual average limit values: NO<sub>2</sub>: 40µg/m<sup>3</sup>, PM<sub>10</sub>: 40µg/m<sup>3</sup>, PM<sub>2,5</sub>: 25µg/m<sup>3</sup>).
- Reduce noise from traffic in 60% of public space.
- Reduce traffic victims.
- Increase to 58% street space for pedestrians.
- Reduction of the number of private vehicle trip steps to 18,6% of the modal distribution.

2011



2018 (B-C)



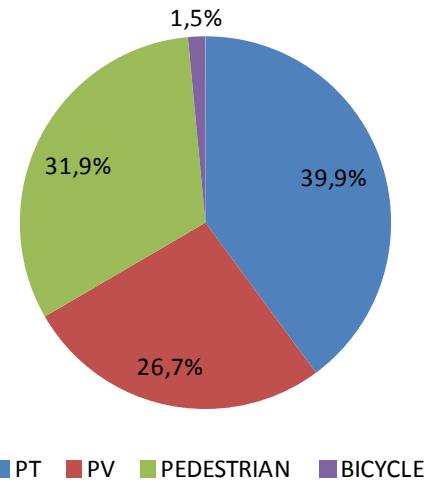


## Definition of scenarios

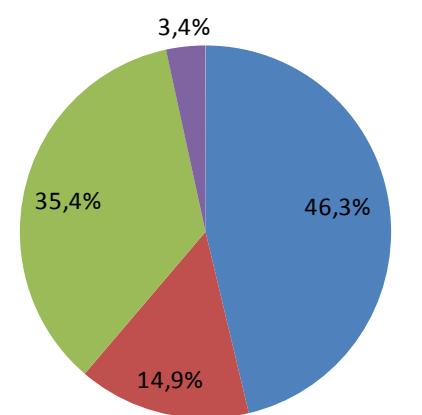
### D. Superblocks High Efficiency Scenario

- Keep the traffic pacification of scenario C with a level of service better than present.
- Compliance with policy environmental quality parameters and WHO recommendations (recommendations which are currently under consideration in the EU): (annual average limit values: NO<sub>2</sub>: 40µg/m<sup>3</sup>, PM<sub>10</sub>: 20µg/m<sup>3</sup>, PM<sub>2,5</sub>: 10µg/m<sup>3</sup>).
- Reduce noise from traffic in 60% of public space.
- Reduce traffic victims.
- Increase to 58% street space for pedestrians.
- Reduction of the number of private vehicle trip steps to 14,9% of the modal distribution.

2011



2018 (D)

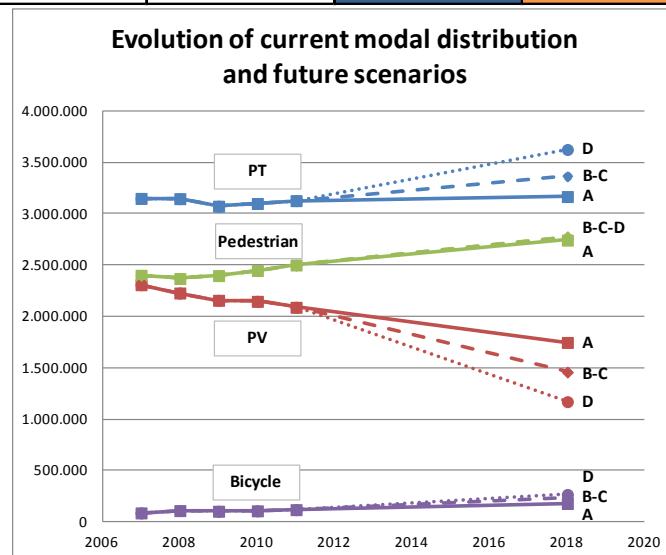




# Definition of scenarios

## Total trip steps

SCENARIO	TOTAL TRIP STEPS					SCENARIO A	SCENARIO B	SCENARIO C	SCENARIO D
	2007	2008	2009	2010	2011				
PT	3.148.519	3.146.085	3.072.831	3.099.286	3.126.796	3.166.620	3.365.700	3.365.700	3.624.759
PV	2.308.337	2.227.403	2.156.460	2.146.537	2.088.348	1.746.293	1.457.873	1.457.873	1.169.445
PEDESTRIAN	2.400.266	2.368.561	2.396.983	2.447.050	2.500.200	2.742.499	2.773.099	2.773.099	2.773.099
BICYCLE	86.406	108.924	102.824	106.521	118.151	178.082	236.822	236.822	266.192
TOTAL	<b>7.943.528</b>	<b>7.850.973</b>	<b>7.729.098</b>	<b>7.799.394</b>	7.833.495	7.833.495	7.833.495	7.833.495	7.833.495
TRANSCAD VEHICLES	<b>2.668.732</b>	<b>2.575.162</b>	<b>2.493.143</b>	<b>2.481.671</b>	2.414.397	2.018.938	1.778.588	1.778.588	1.419.905



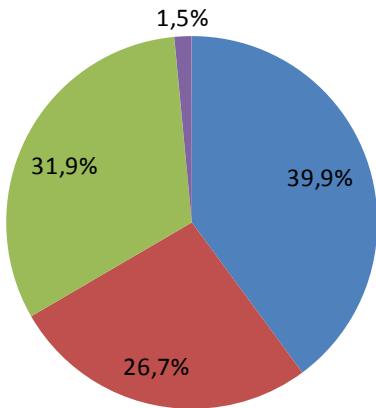


# Definition of scenarios

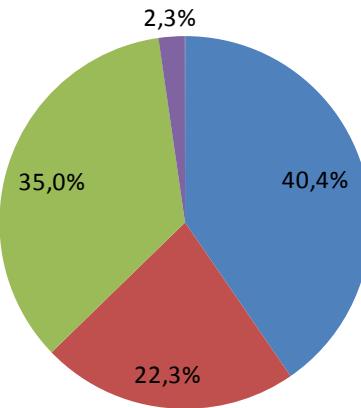
## Modal distribution

SCENARIO	TOTAL TRIP STEPS. MODAL DISTRIBUTION (%)								
	EXISTING MOBILITY DATA					SCENARIO A	SCENARIO B	SCENARIO C	SCENARIO D
	2007	2008	2009	2010	2011	2018 (A)	2018 (B)	2018 (C)	2018 (D)
PT	39,64%	40,07%	39,76%	39,74%	39,92%	40,42%	42,97%	42,97%	46,27%
PV	29,06%	28,37%	27,90%	27,52%	26,66%	22,29%	18,61%	18,61%	14,93%
PEDESTRIAN	30,22%	30,17%	31,01%	31,37%	31,92%	35,01%	35,40%	35,40%	35,40%
BICYCLE	1,09%	1,39%	1,33%	1,37%	1,51%	2,27%	3,02%	3,02%	3,40%
TOTAL	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%

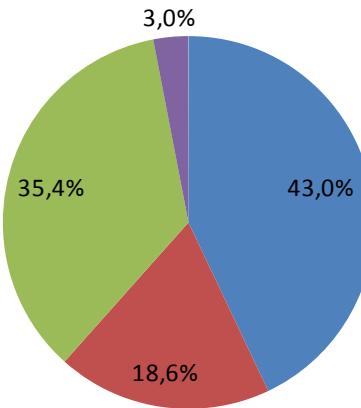
2011



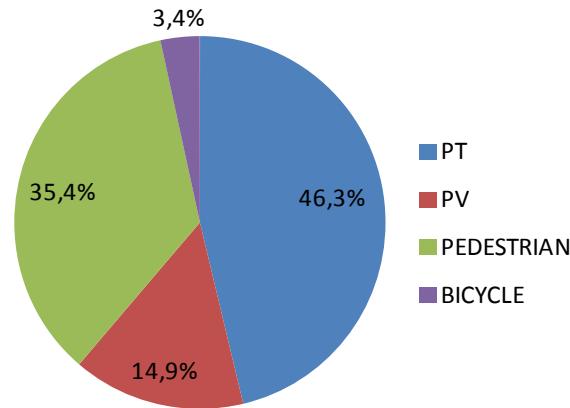
2018 (A)



2018 (B-C)



2018 (D)





Ajuntament  
de Barcelona