



Management of urban mobility to control climate change in cities

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1990-2010 EU (27 countries): **+20% GHG emissions from transport**

↑ Car dependence → **75% km travelled** in European urban areas

↓ Public transport patronage → **16%** in Europe

Cities decarbonization → **40%** of all transport-related CO₂ emissions

- **EU White Paper 2011:** *Towards a Competitive and Resource Efficient Transport System*
 - Actions to change current mobility patterns towards sustainability
 - **Modal Split** to public transport
 - More focus on facilitating **soft modes:** walking & cycling
- **Advantage:** dense cities = likely to use public transport

Case study: Spain

- Spanish daily transport:
 - 2000-07: **+11%** use of **car** for daily transport
 - **Reduction** of public transport use
 - **Advantage**: 30-45% of daily journeys by foot
- Urban Mobility Plans, Action Plans

Are urban mobility evolving towards a low-carbon transport?

- To measure the **trends of modal share** on **climate change** impacts
 - Overview of Spanish daily mobility trends from 2000 to 2006
 - To analyze the average daily emission per traveler: climate change impacts
- Enable **better assessment** of urban **mobility measures** to limit transport emissions in cities

- National Travel Surveys = **key tools** in mobility patterns & to propose policy recommendations

UK

- Stead (1999)
- Brand & Boardman (2008)

France

- Nicolas & David (2009)

UK vs Netherlands

- Susilo & Stead (2009)

Seoul

- Ko et al (2011)

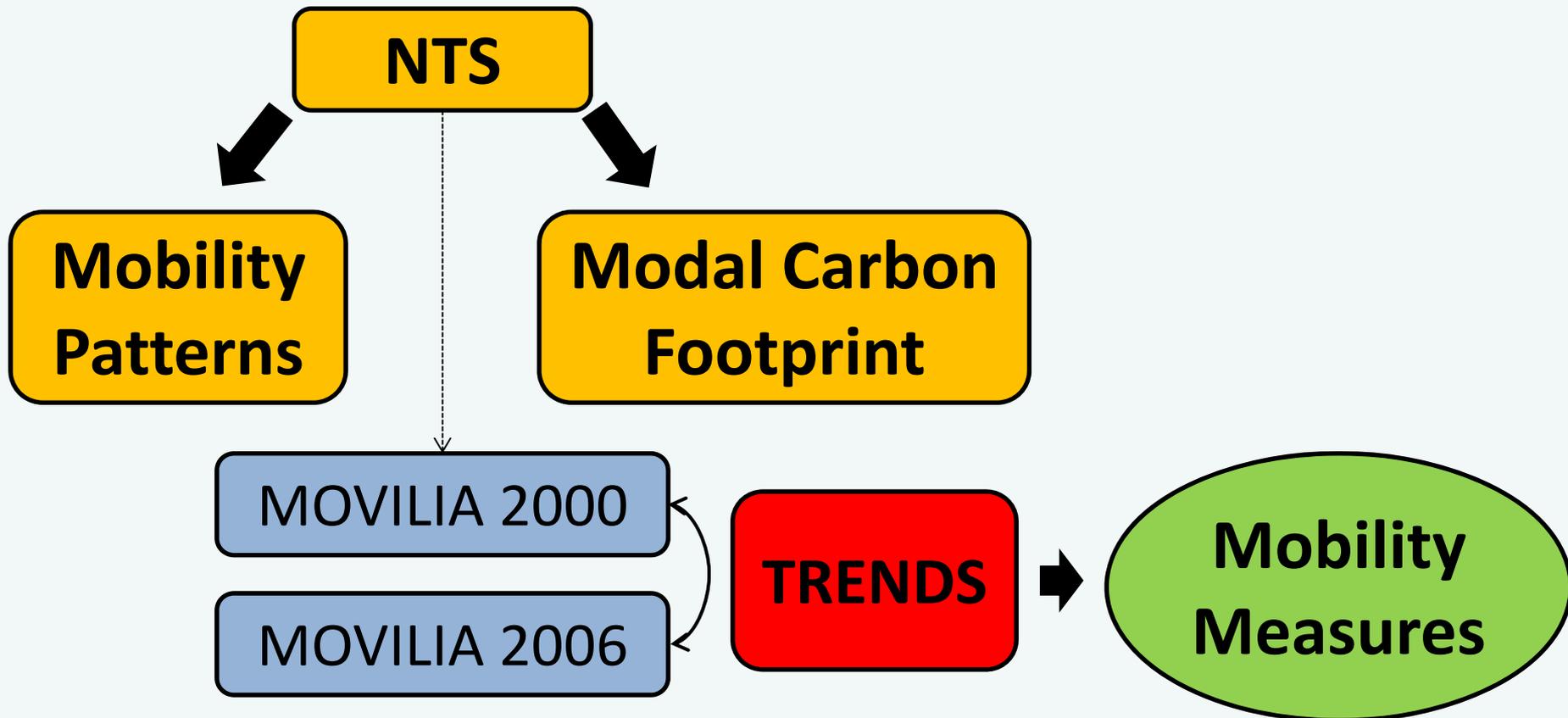
- Main recommendations:
 - Increasing occupancy & management transport capacity
 - Car fleet mix and technologies
 - Increasing car availability \approx emission increasing

- Spanish Household Travel Surveys:

	MOVILIA 2000	MOVILIA 2006
Statistical Unit	Household	Household
Trip definition	Movement from origin to destination for main purpose	
Main mode definition	The main mode is either a stated main mode or determined following a mode hierarchy where public transport (train>metropolitan bus>metro>urban bus)>car passenger>car driver>bicycle>on foot	
Trips excluded	Walking trips less than 10 min	Walking trips less than 5 min
Sampling method	Random sampling stratified by geographic region and household structure	
Survey mode	Daily mobility and HH characteristics: face to face survey	
Response rate	70%	55%

		MOVILIA 2000	MOVILIA 2006
SAMPLE SIZE	Household	23,635	49,027
SAMPLE SIZE	Individuals	62,473	49,027
WORKING DAY			
% Individual who travel		65.5%	83.5%
No. TRIPS (average of individual who travel)		2.9	3.3
Average travel TIME		71 min	73 min
WEEKEND DAY			
% Individual who travel		51.1%	72.0%
No. TRIPS (average of individual who travel)		2.5	2.9
Average travel TIME		76 min	80 min
USE OF MECHANICAL MODES			
	CAR/MOTO	79.4%	81.3%
	PUBLIC TRANSPORT	20.6%	18.7%

Are urban mobility evolving towards a low-carbon transport?

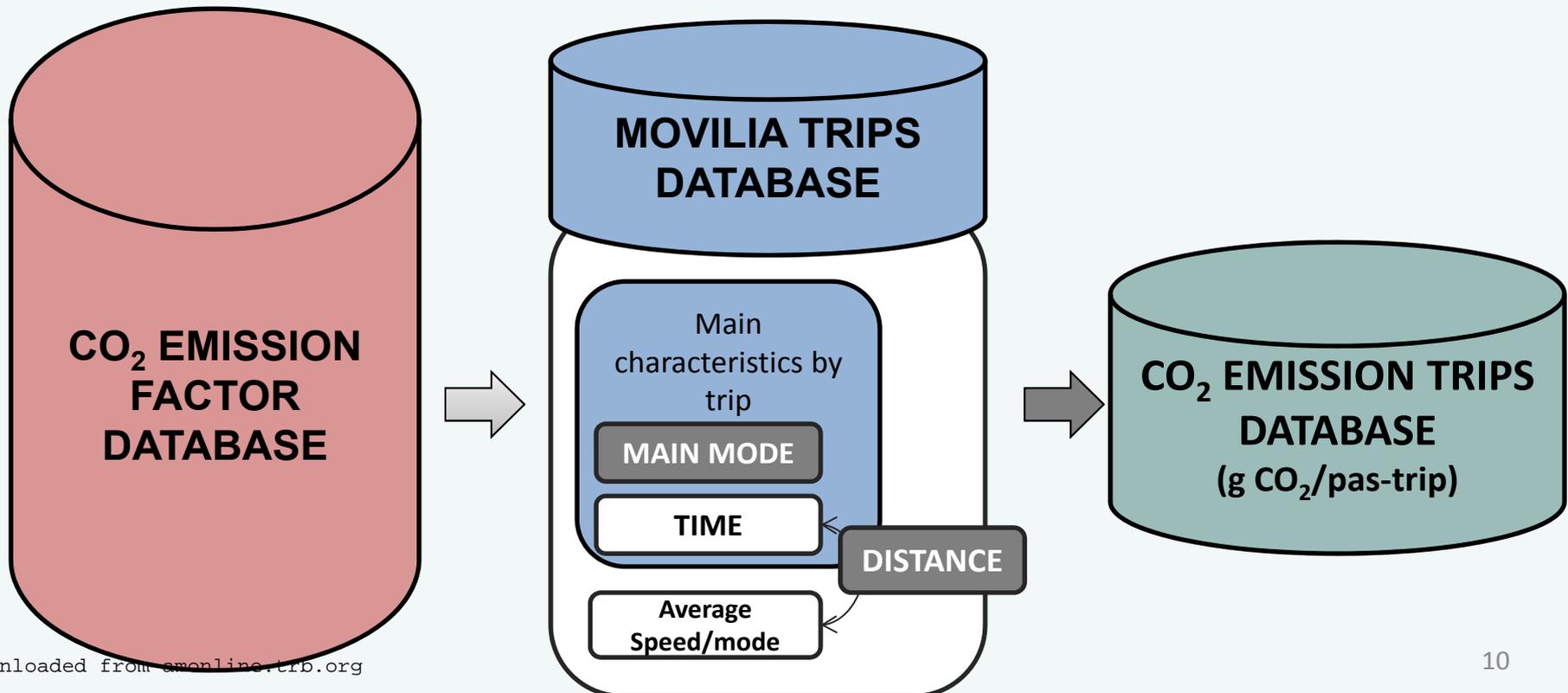


Estimating CO₂ emissions for urban trips

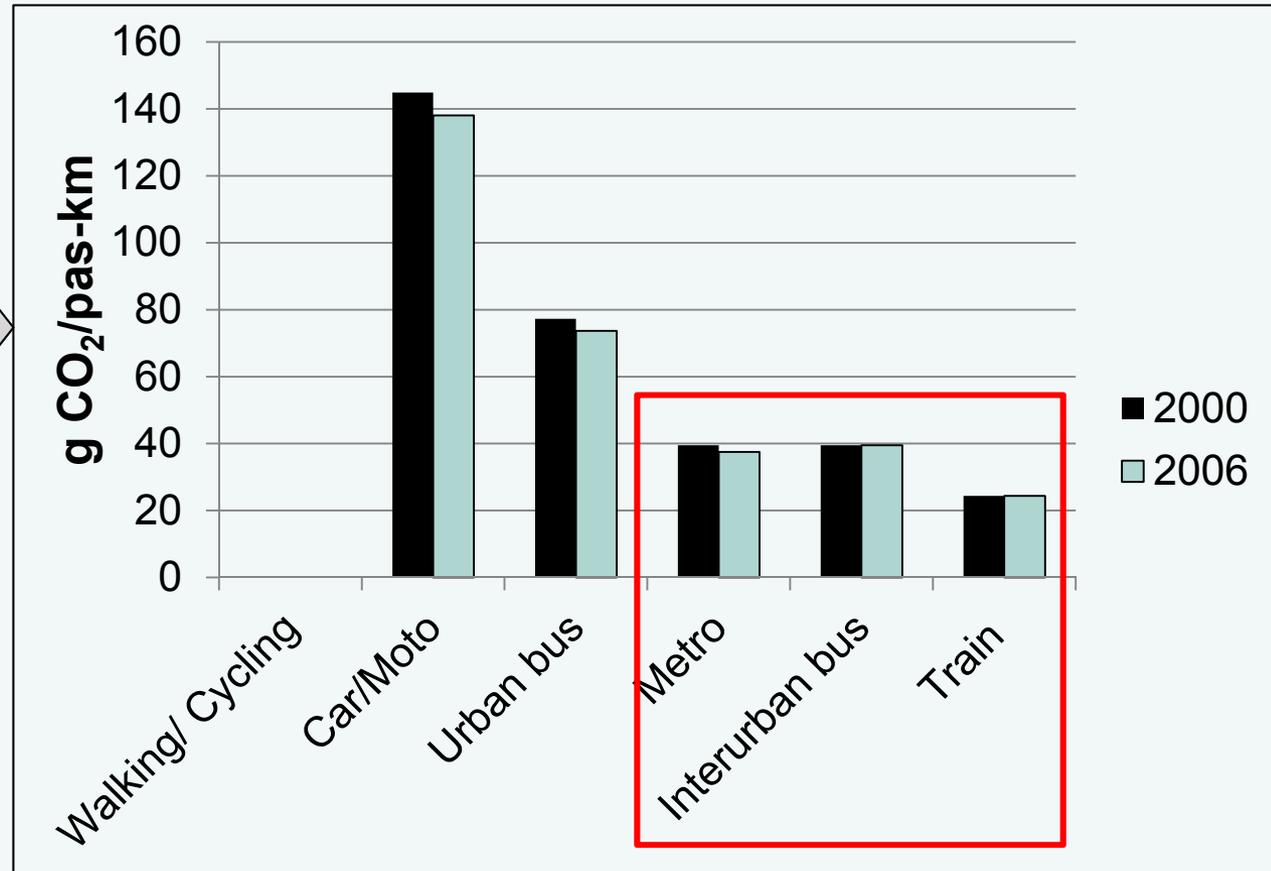
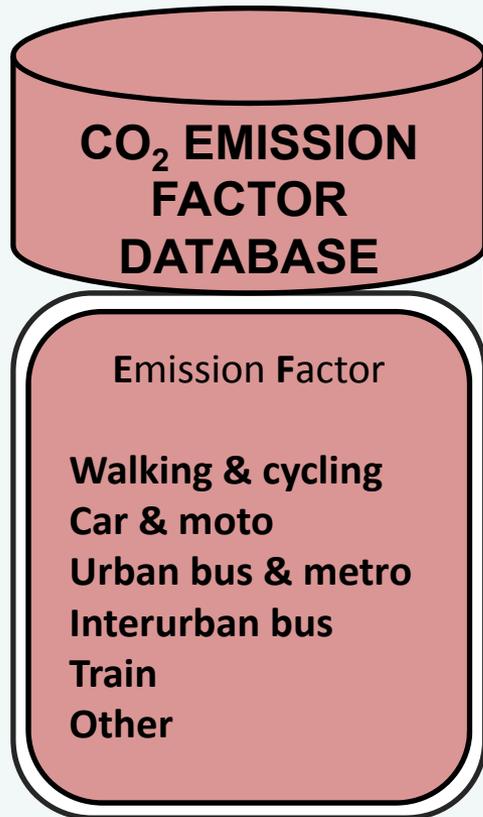
CO₂ emissions per passenger-trip (gCO₂/passenger-trip)

=

$$EF_i \text{ (gCO}_2\text{/passenger-km)} * D_t \text{ (km)}$$



Estimating CO₂ emissions for urban trips



Trends in modal split and climate change impacts in Spanish urban mobility

Traveler-average day		SOFT MODES	CAR/MOTO	PUBLIC TRANSPORT	OTHER	TOTAL
No. TRIPS	2000	0.83	1.09	0.22	0.08	2.22
	2006	1.44	1.19	0.15	0.06	2.84
	Δ%		9.2%	-31.8%	-25.0%	
TIME (min)	2000	15.30	19.59	7.34	1.91	44.14
	2006	24.84	24.51	8.93	1.89	60.16
	Δ%		25.1%	21.7%	-1.0%	
CO ₂ emissions (gCO ₂)	2000	0.00	1,797.45	188.32	180.42	2,166
	2006	0.00	2,142.75	222.52	170.95	2,536
	Δ%		19.2%	18.2%	-5.2%	17.1%

- **Results** reveal that:
 - **17% increase in CO₂ emissions**
 - **Car** = main contributor to emissions increase
 - **Improvements in vehicle technology and fuel efficiency are not enough**
 - Longer average **trip distances** → **urban sprawl**

→ **Actions should be taken to change current trend**

- More efforts to **prevent climate change** impacts of daily mobility
- Need of **low carbon & energy-efficiency strategies** in urban mobility
- Focusing on **modal shift** toward transit
- Reducing **car trip** dependency
- Controlling **urban sprawl**
- Developing **mix land uses**

- Evaluation of **climate change** impacts of **daily mobility** based on **NTS**
- **Spanish trends** in modal split and climate change impacts (**car vs. transit use**) has been analyzed from 2000 to 2006 → negative
- Findings are useful for measuring the changes in emissions/traveler/mode to design **policies for meeting emission reduction targets**



Thank you!

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