EMTA BAROMETER OF PUBLIC TRANSPORT IN EUROPEAN METROPOLITAN AREAS (2009)

February 2012

Presentation

All sectors of activity across Europe have suffered these past years the impact of the economic crisis. Mobility in metropolitan areas is no exception. Increasing population pressure in built up metropolitan areas and accompanying problems like pollution and energy consumption, safety and security, etc. are placing the European Union at a crossroads and demand a quick and effective response from authorities and public bodies at all levels.

As a result, the European Commission adopted the Action Plan on Urban Mobility in 2009. The Action Plan proposes twenty measures to encourage and help local, regional and national authorities in achieving their goals for sustainable urban mobility. Among them, "Upgrading data and statistics" and "Setting up an urban mobility observatory" are very much linked with this EMTA Barometer: *"The Commission will help stakeholders capitalise on existing experience and support the exchange of information, in particular on model schemes developed through Community programmes. Action at EU level can be decisive in ensuring* ***the collection, sharing and comparison of data, statistics and information****. These are currently missing but are necessary for the proper design of policies (...)"*.

Later the European Commission in 2011 published a new White Paper on Transport Policy *"Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system",* aiming to address a range of the problems mentioned before. In a way unprecedented in previous policy documents, the 2011 White Paper integrates the Urban dimension and deploys a series of measures among which Urban Mobility Plans place Public Transport as a key actor in reaching the targets of efficiency and sustainability.

With the same objectives, EMTA (European Metropolitan Transport Authorities) gathers the Public Transport Authorities of 28 of the European largest metropolitan areas plus Montreal (Canada) responsible for planning, coordinating and financing the public transport systems. They promote the exchange of management and organizational information and the dissemination of good practices in the field of public transport. EMTA also aims to contribute to solutions for the different European institutions by developing recommendations on the common approach of organisational, tactical and financial issues defining the public transport challenges at hand and to propel a sustainable mobility.

Public Transport Authorities have developed the necessary broad view on urban mobility as the multimodal and multioperator transport activities they must integrate to work as one system. As a first step to better understand the differences in local circumstances of every single transport authority, a *Barometer of Public Transport* was published in 2002 with the aim to present the most important indicators of the socio-economic backdrop and transport developments in the associated metropolitan areas. Since then editions of the barometer have been published (2002, 2004, 2007, 2009 and 2012). The present report shows absolute data obtained from a questionnaire but also makes comparisons and sets ratios. It is thus **a useful source of information**.

The methodological difficulties we have found on gathering the data to produce the report are:

- the definition of the indicators is not similar in many cities and countries, in spite of the fact that a manual was delivered with the questionnaire trying to define the meaning of each figure requested, and although repeated data collection should have helped to clarify each indicator;
- the availability of data is very heterogeneous depending on cities, and sometimes even between modes within the same city;
- even when the data exist, it is rare that a single organisation has them all. Their collection therefore requires a considerable amount of work;
- lastly, the comparison of data is a hazardous exercise since it requires comparable contexts. This means that the analysis of raw figures needs to observe carefully at the geographical, institutional and social characteristics that define the backdrop of the territories involved, before one is able to carefully draw any valid conclusions. As in the previous editions, the data in the Barometer are based on the territories where the public transport authorities that submitted them have their particular competences.

These difficulties and biases are well known from experts. EMTA thinks it is time for a process of harmonisation of definitions at European level, in cooperation with the representatives of the public transport sector. **It is desirable the indicators used in the *Barometer* become more harmonised in the coming years for the concerned metropolitan areas**.

The **24 metropolitan areas that have collaborated to this edition** of the *EMTA Barometer of Public Transport* by providing data based on the year 2009 are: Stadsregio Amsterdam, Barcelona Metropolitan Region, Berlin-Brandenburg, West-Midlands (Birmingham), Brussels Metropolitan, Central Hungarian Region (Budapest), Cadiz Bay, Greater Copenhagen, Helsinki, Greater London, Lyon Urban Community, Madrid Community, Greater Montreal, Paris Ile-de-France, Middle Bohemia Region (Prague), Metropolitan Area of Seville, South Yorkshire (Sheffield), County of Stockholm, Stuttgart Region, Turin Metropolitan Area, Valencia Metropolitan Area, VOR Region (Vienna), Vilnius and Warsaw.

We would like to thank the responsible persons in transport authorities that have contributed to the update of this Barometer because we are aware collecting all the information required is a thoroughly complex and laborious piece of work.

Lastly, Consorcio Regional de Transportes de Madrid (Madrid Transport Regional Consortium) deserve our special thanks, namely Carlos Cristóbal Pinto, Quality Director, and Antonio García Pastor, Head of Planning and Studies Department, who both supervised the document, and Laura Delgado Hernández responsible for aggregating the data, giving consistency and producing the *Barometer of Public Transport*.

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1. Basic Socio-Economic Data of PTA Areas

In this report "PTA area" (Public Transport Authority Area) refers to the territorial framework the Public Transport Authority has competences on, although it does not always coincides with municipal or regional boundaries. This leads to different administrative and institutional organisation of so called local authorities, highlighting the differences between metropolitan areas where public transport systems are co-ordinated on a regional basis (large parts of rural areas are integrated in the provision of services), like in Germany, and those where public transport is organised on a more urban and local scale. Nevertheless the configuration of these PTA Areas is a result of socio-geographical and economic processes as well as the underlying administrative structure in each country. The figures object of this Barometer report usually refer to the "main city" as the most important city of the area or the capital of the region, and the "PTA area" or "metropolitan area" as the territory of competence of the Public Transport Authority.

These basic data of the 24 metropolitan areas participating in the present report have two main purposes:

- on one hand, they show a picture of the metropolitan areas and different contexts;
- on the other hand, they will be used as reference indicators that enable to compare the transport figures described along the present report in relative terms, which means that the data among the different PTA areas can be easier collated.

EU27 countries and EMTA Members by 2012

This Barometer edition keeps the same number of participants (24) compared to the previous one, however Manchester and Frankfurt are excluded while Cadiz and Lyon are included.

1.1. Metropolitan areas characteristics

The metropolitan areas included in this report sum 74,560,879 inhabitants (15% of the EU-27 total population) and 128,885 km^2 of surface (3% of the EU-27 territory). The PTA areas are very heterogeneous in every socio-economic aspect considered (Table 1). For example, in terms of population, Paris Ile-de-France is the most populated region (11,729,613 inhabitants) and Cadiz Bay the least (707,245 inhabitants), 17 times less populated. Greater London has the second greatest number of inhabitants (7,753,600 inhabitants) followed by Madrid Community (6,458,684 inhabitants) and Berlin-Brandenburg (5,954,200 inhabitants). Concerning the surface area, Berlin-Brandenburg has the biggest PTA area (30,372 km^2), then Paris Ile-de-France (12,012 km^2) and Vilnius (9,731 km^2), while the Urban Community of Lyon has 515 km^2.([1])

Table 1. Basic socio-economic data of metropolitan areas (2009)

	Population (inhabitants)	PTA* area surface (km^2)	Density (total surface) (inhab / km^2)	Urbanised surface (km^2)	Annual GDP per capita (€)	Unemployement rate (%)	Family size
Stadsregio Amsterdam	1,406,500	1,003	1,402		30,200	3.2%	2.1
Barcelona Metropolitan Region	5,010,000	3,239	1,547	597	26,350	17.0%	2.5
Berlin-Brandenburg	5,954,200	30,372	196	3,295	24,189	12.5%	1.8
West Midlands (Birmingham)	2,619,600	901	2,907	435	(2) 20,259	10.3%	2.4
Brussels Metropolitan	3,100,000	5,000	620	1,100	63,382	6.0%	2.4
Central Hungarian Region (Budapest)	2,951,436	7,597	389	2,544	16,194	6.6%	2.6
Cadiz Bay	707,245	2,898	244	80			3.2
Greater Copenhagen	2,500,835	9,133	274	1,973	41,735	3.3%	2.1
Helsinki	1,033,933	791	1,307	408	54,593	8.1%	2.0
Greater London	7,753,600	1,579	4,910	1,042	35,326	9.1%	2.3
Lyon Urban Community	1,285,942	515	2,497	211		10.6%	2.3
Madrid Community	6,458,684	8,026	805	1,037	31,577	14.0%	2.7
Greater Montreal	(3) 3,596,283	3,980	904		29,649	9.2%	2.9
Paris Ile-de-France	11,729,613	12,012	976	2,534	46,984	8.4%	2.3
Middle Bohemia Region (Prague)	1,876,292	3,860	335		24,537	5.0%	
Metropolitan Area of Seville	1,442,734	4,221	342	337	10,709	24.7%	2.8
South Yorkshire (Sheffield)	1,317,300	1,552	849	326	14,850	4.9%	2.2
County of Stockholm	2,019,182	6,491	311				3.5
Stuttgart Region	2,421,250	3,012	804	603	33,164	5.1%	
Turin Metropolitan Area	1,555,778	837	1,859	246	20,781	8.3%	2.2
Valencia Metropolitan Area	1,800,031	1,415	1,272	325	21,462	21.2%	2.5
VOR Region (Vienna)	2,769,117	8,441	328		36,582	6.3%	2.1
Vilnius	850,324	9,731	87	449	14,801	14.3%	3.2
Warsaw	2,401,000	2,279	1,054		13,193		
TOTAL	**74,560,879**	**128,885**					

* Public Transport Authority

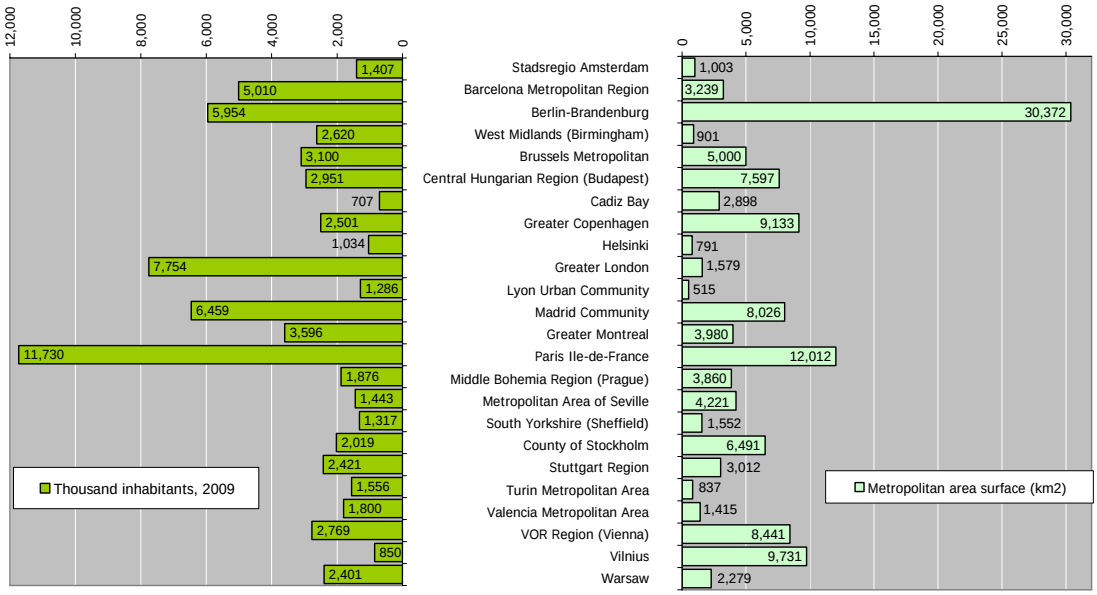
(2) The value in West Midlands is GVA (Gross Value Added) per inhabitant (3) 2006 population

It is worthy to highlight the tendency of metropolitan areas to enlarge their territorial scope (i.e. metropolitan ears of Seville and Cadiz Bay) compared to previous years, with new municipalities joined in the PTA area. In the case of Greater Copenhagen, the increase in population is due to a merge of smaller areas.

([1]) *In order to compare easily between the different tables and graphs contained in this report, all the metropolitan areas that have contributed to this updating of the EMTA Barometer appear in all tables and graphs in the same order. When a particular data is not available, there is an empty space beside the name of the metropolitan area*

On average, the size of the families is 2.5 persons/family, but in the metropolitan areas of Spain, Budapest, Montreal and Vilnius the size is larger (2.5-3.2 persons/family) than in the rest of European cities, where it is less than 2.4 (Stockholm is not considered because they only count families with children, no singles included). These figures reveal the low birth rate of the metropolitan areas, thus the serious ageing problem of the population. This fact is raising the challenge, among others, of facing the mobility problems and needs this sector of population has.

Graph 1. Metropolitan areas population and surface



Regarding the annual GDP per capita, the average is 29,072 €, with great differences from Brussels Metropolitan (63,382 €/inhabitant-year) to Seville (10,729 €/inhabitant-year referred to the whole province of Seville, with wide rural areas), 6 times lower. In addition, Helsinki, Paris Ile-de-France and Greater Copenhagen have a GDP over 40,000 €/inhabitant-year. It is meaningful that the average GDP on the lasts Barometer editions (figures from 2004, 2006 and 2008) were 25,255 - 27,942 - 28,529 €/inhabitant-year respectively, what shows the economic growth Europe experienced on that period, right before the appearance of the crisis effects.

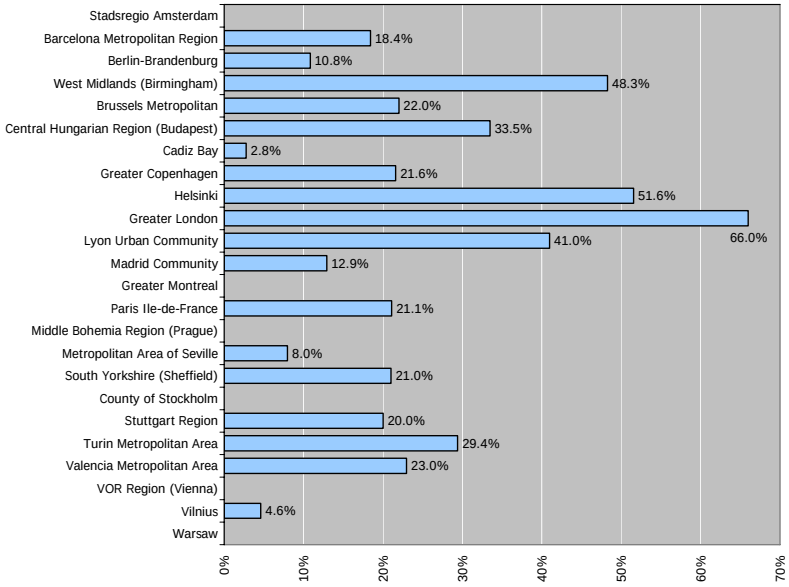
Unemployment rates are also related to the economic structure of each region. Again Spanish Metropolitan areas show the highest score (24,7% in Seville, 21,2% in Valencia, 17% Barcelona or 14% Madrid). On the other side, Amsterdam with only 3,2% and Copenhagen with 3,3% have the lowest unemployment rates of the areas among the available data. These data are closely linked to the economical structure in each region, but there can be differences in comparison coming from different labour legislation.

1.1.1. Urbanised area in metropolitan areas

A remarkable figure is the urbanised surface in the areas of our study (Graph 2). Where data are available, it is an indicator of the nature of the region, whether it has wide rural areas or covers mostly built-up zones.

Though the definition of "urbanised area" might vary slightly in different cities we can notice that Greater London and Helsinki have the greatest ratios comparing the urbanised surface with the total metropolitan area surface (66.0% and 51.6%), followed by West Midlands (Birmingham) (48.3%) and Lyon Urban Community (41%). The rest of the regions have urbanised areas ranging from 10% to 30%, with the exception of Cadiz Bay, Vilnius and Seville where there are extended non-built areas.

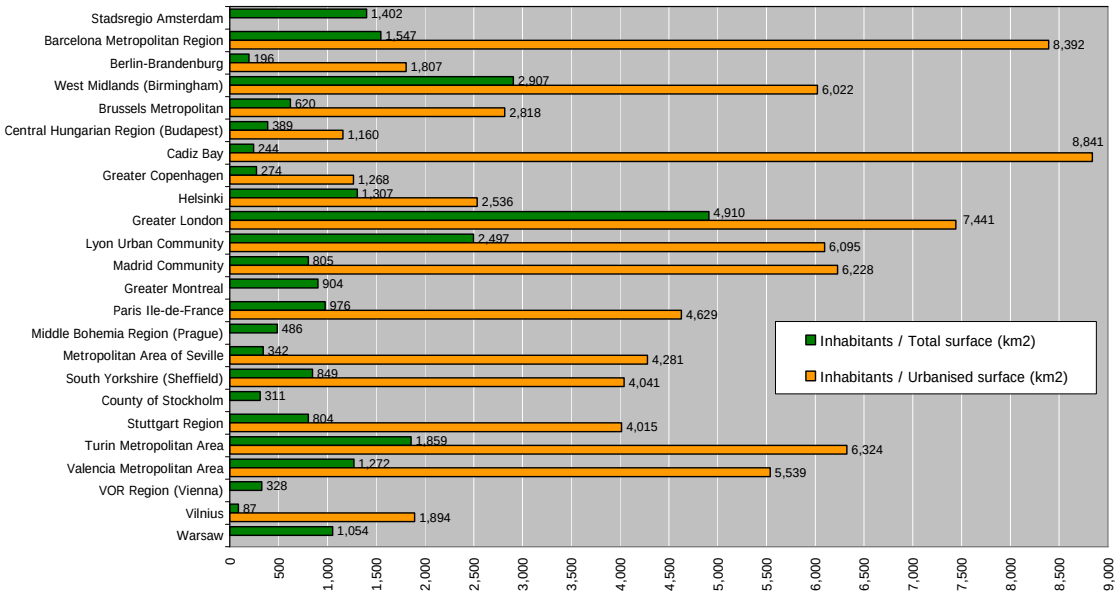
Graph 2. Urbanised surface on metropolitan area / metropolitan area surface (%)



Nevertheless this indicator must be analysed together with the density, since large urbanised areas, like Helsinki, can have lower densities due to the type of housing development.

1.1.2. Density of population in metropolitan areas

Graph 3. Population density in metropolitan area (inhabitants/km^2)



Metropolitan areas whose administrative boundaries cover mostly urbanised areas like Greater London (4,910 inhabitants/km^2), West Midlands (Birmingham) (2,907 inhabitants/km^2) or Lyon Urban Community (2,497 inhabitants/km^2) reach much higher gross densities than those including large rural parts as Vilnius (87 inhabitants/km^2), Berlin-Brandenburg (196 inh/km^2) or Cadiz Bay (244 inh/km^2) (Graph 3).

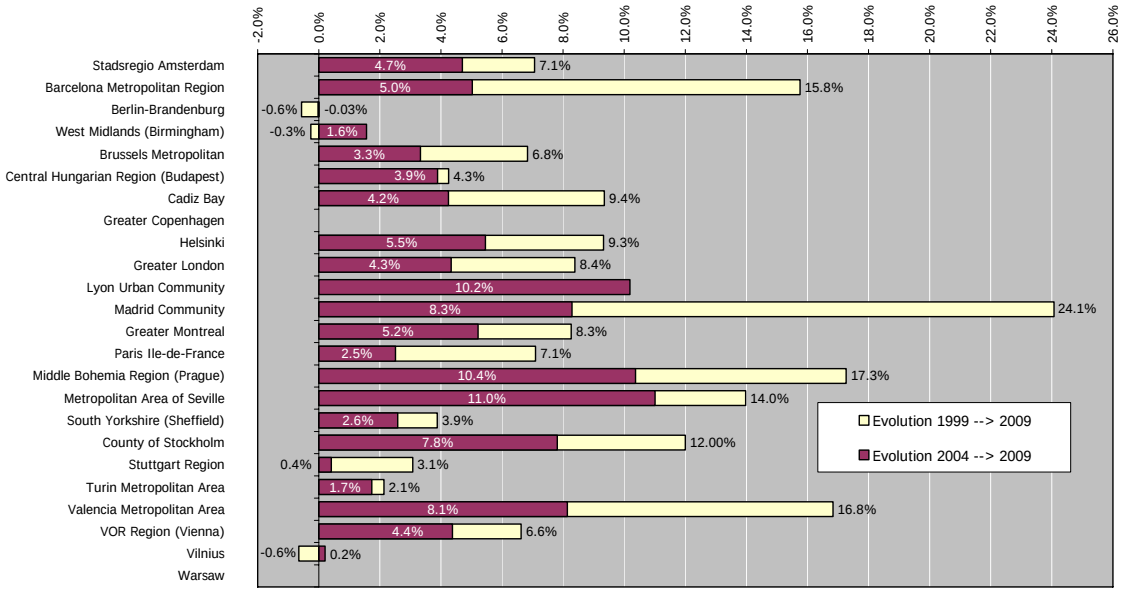
Therefore, it is more relevant to look at the net density, inhabitants in urbanised surface, which reach very high rates in metropolitan areas having a tradition of collective housing such as Spanish cities (Cadiz Bay, Barcelona, Madrid) and also Greater London, Turin, Lyon and Birmingham where the net density is over 6,000 inhabitants/km^2 (or 60 inhabitants/ha).

1.1.3. Evolution of population in metropolitan areas

During the period 1999-2009, the great majority of the PTA areas have had a population increase, with an average ratio considering all metropolitan areas of 8.3% (3.6% on the first 5-year period and close to 5% on the second 5-year period) (Graph 4).

Several of these metropolitan areas have seen an increase over 10% in the last 10 years for the whole period. This is the case of Madrid Community, Middle Bohemia Region (Prague), Valencia Metropolitan Area, Barcelona Metropolitan Region, Metropolitan Area of Seville and County of Stockholm. In almost all of them the growth in the period 2004-2009 has been very significant, over 8% for that period, mainly due to the immigration these areas are experiencing.

Graph 4. Population evolution 1999-2009 and 2004-2009 in metropolitan areas

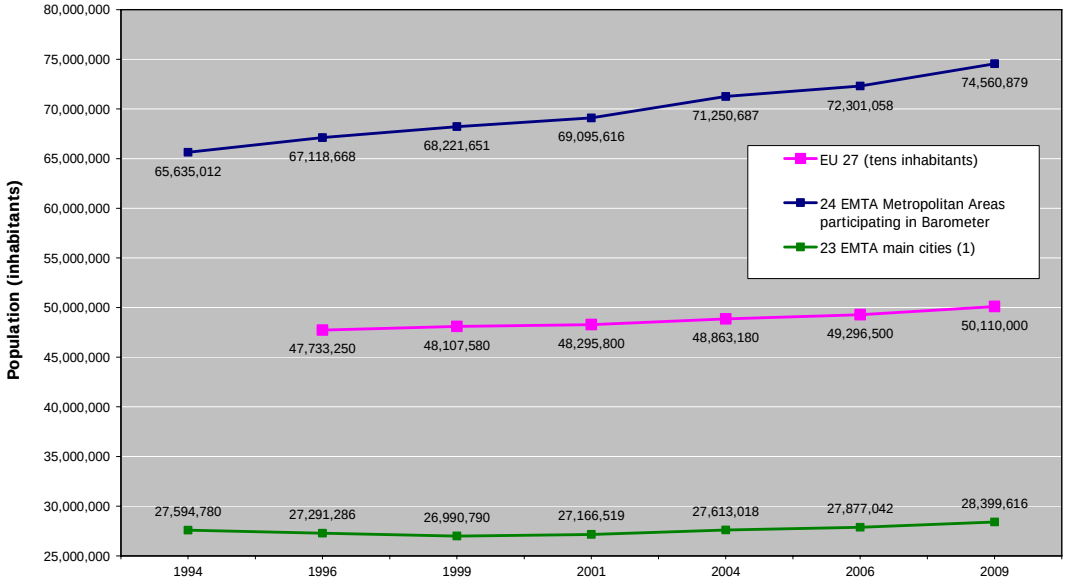


The metropolitan areas with lower level of population growth in the 10-year period are Vilnius, Berlin-Brandenburg and West Midlands (Birmingham), with a decrease in population of 0.6% and 0.3%.

However, due to the slight increase on the last 5-year period we can say the population of these areas remains quite stable.

This general tendency of significant increase of population reflects the situation in Europe during the period 1999-2009, with 4.2% population increase for the EU-27 (Graph 5). However, it is worth noticing that the population in main cities is rather steady in the same period, showing that such growth of population happened outside the main cities, in the metropolitan region.

Graph 5. Population evolution 1999-2009



(1) Greater London is not included in the list of main cities because its boundaries coincides with the metropolitan area

1.2. Main city characteristics

Table 2. Basic socio-economic data of main cities

	Population (inhabitants)	Main city surface (km^2)	Density (total surface) (Inhab / km^2)	Urbanised surface (km^2)	Number of jobs	Unemployment rate (%)	Annual GDP per capita (€)
Amsterdam	767,723	219	3,506	136	522,440	5.6%	27,600
Barcelona	1,619,000	101	16,109	82	1,022,000	9.9%	
Berlin	3,442,675	892	3,860	626	1,667,900	13.5%	26,265
Birmingham	1,016,800	268	3,794	153	528,000	11.6%	21,834
Brussels	1,048,491	162	6,472	142	686,500	21.0%	
Budapest	1,721,556	525	3,279	258	999,671	6.2%	21,661
Cadiz	126,766	14	8,927	8			
Copenhagen	624,926	180	3,472	180	535,795	3.8%	
Helsinki	583,350	215	2,713	133	388,053	8.4%	
London	7,753,600	1,579	4,910	1,042	4,753,800	9.1%	
Lyon	472,331	50	9,447	5	287,180	10.9%	
Madrid	3,273,049	604	5,419	308	1,775,525	12.5%	38,603
Montreal	1,854,442	500	3,709		1,145,585	11.1%	38,462
Paris	2,220,114	105	21,144	105		9.3%	75,439
Prague	1,249,026	496	2,518	283	1,047,800	3.5%	30,463
Seville	704,198	141	4,994				
Sheffield	547,000	368	1,486	119	240,300	4.4%	15,425
Stockholm	829,417	187	4,435		568,447		
Stuttgart	601,357	207	2,905	106	346,908	6.4%	57,372
Turin	909,538	130	6,996	85		9.6%	
Valencia	814,208	137	5,943	58			
Vienna	1,698,957	415	4,094		798,160	7.5%	43,300
Vilnius	560,192	401	1,397	140	398,020	10.8%	
Warsaw	1,714,500	517	3,316			2.9%	24,714
TOTAL	**36,153,216**	**8,413**					

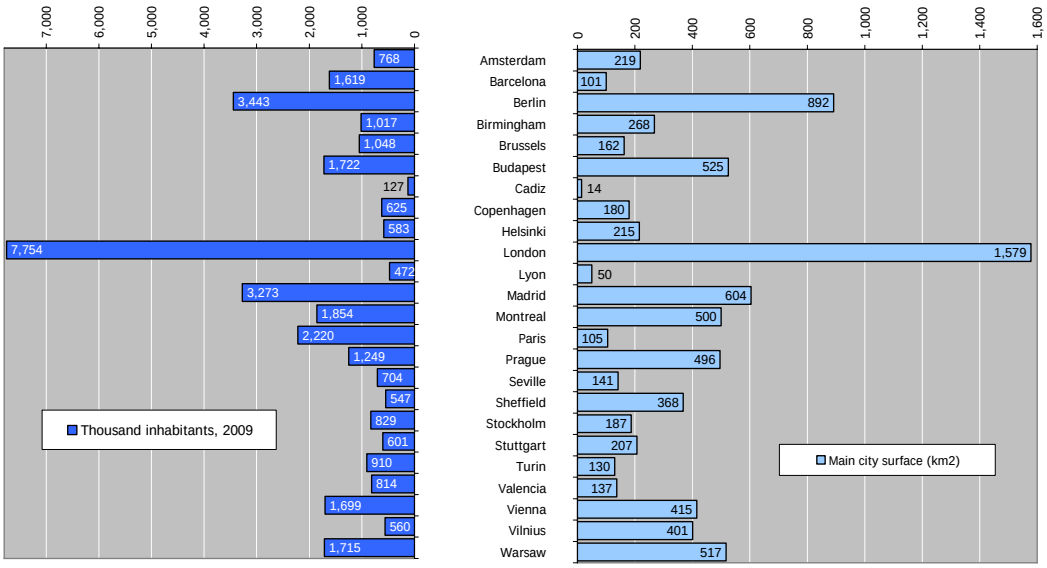
NOTE: Greater London entries in the series of main city figures and graphs are the same as those for the metropolitan area because the whole administrative metropolitan region of Greater London is the same as the main city.

The main cities gather altogether a population of 36,153,216 inhabitants on a surface area of 8,413 km^2, that is to say 48.5% of the population of the total metropolitan areas, 74,560,879 inhabitants, are living only on 6.5% of the total surface area of the 24 metropolitan areas surveyed.

The cities of London, Berlin and Madrid are the most populated (7,753,600, 3,442,675 and 3,273,049 inhabitants respectively), and Cadiz the least (126,766 inhabitants). The differences on the surface area are also noticeable, London (1,579 km^2) is more than 100 times bigger than Cadiz (14 km^2) or 30 times than Lyon (50 km^2).

The main city concentrates 70% of the jobs in metropolitan area, with an average of 62 jobs per hundred inhabitants, varying from 44 jobs/100 inhabitants in Sheffield to 86 jobs/100 inhabitants in Copenhagen. With regards to the economic figure, the average annual GDP per capita in the cities is 35,095 €, 21% higher than the ratio in the whole PTA area.

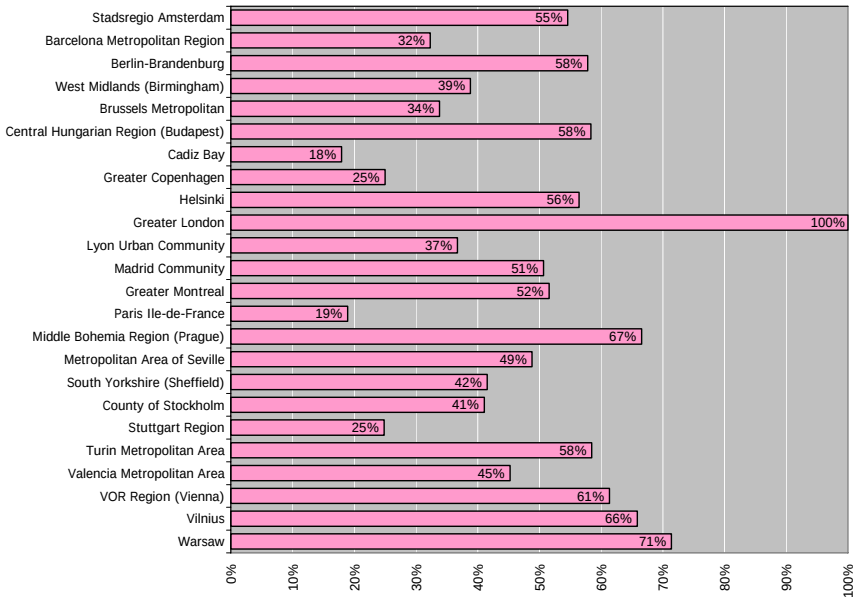
Graph 6. Main cities population and surface



The main city gathers on average 48% of the population of the metropolitan area, with great differences showing the diverse administrative frameworks and structures of the metropolitan areas (Graph 7). This indicator has decreased slightly compared with the last edition in 2006 (46%), after an increasing tendency in the previous 5-year period, showing the change in the metropolitan areas structure, where the city centres are becoming more populated again after a period of leaving the centres to live in the suburbs.

Almost all the cities host over a third of the total population in the PTA area. Cities like Amsterdam, Helsinki, Sheffield or Warsaw concentrate high percentage of the population due to the great surface area of the city compare to the whole metropolitan area. Madrid, Turin, Seville and Vienna host over a half of the population of the metropolitan area because they are very dense metropolis. Again Greater London appears with 100% in the graph because the metropolitan area falls under the administrative limits of the greater city surface.

Graph 7. Population main city / population whole PTA area



Contrary to these cities, Cadiz, Copenhagen, Paris and Stuttgart have the lowest ratios (between 18% and 25%) due to a limited and completely developed city area without surface to expand. This shows a range of different urbanisation processes with cases with an historical central city which loses weight in population due to the growth in suburban cities (like Paris) or others like Stuttgart where there are several population competing centres in the territory.

1.2.1. Urbanised area in main cities

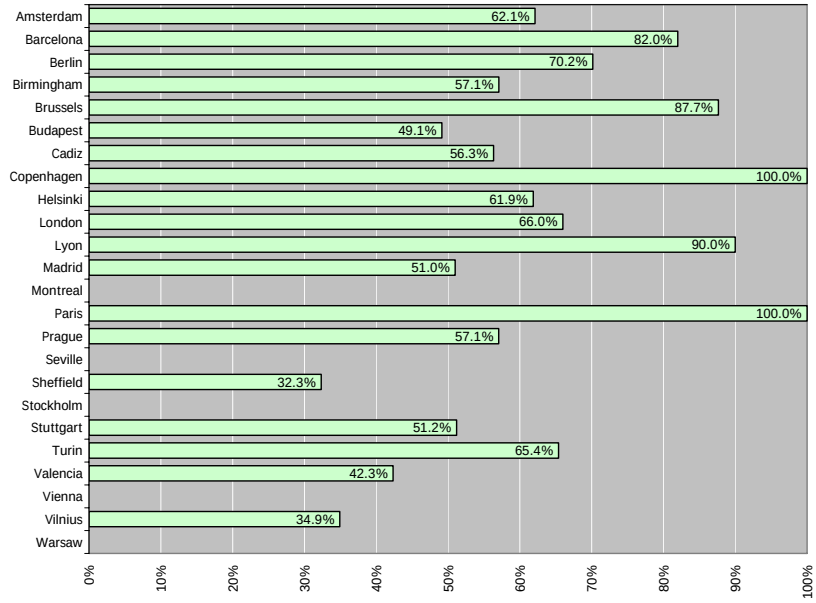
The urbanised area in main cities cover most of the surface, understood as the built surface including land uses such as:

- Built-up areas (residential, commercial, business, services, activities centres, etc.)
- Parks, gardens and sports fields
- Industrial zones, warehouses, waste storage areas
- Transport infrastructures (streets, roads and motorways, railway tracks, airports)

It does not include water bodies such as the sea, lakes, rivers and waterways; nor farmland; nor woods, meadows and other natural zones (flood plains, rocky points, etc.), or large recreational zones (ski area, etc.)

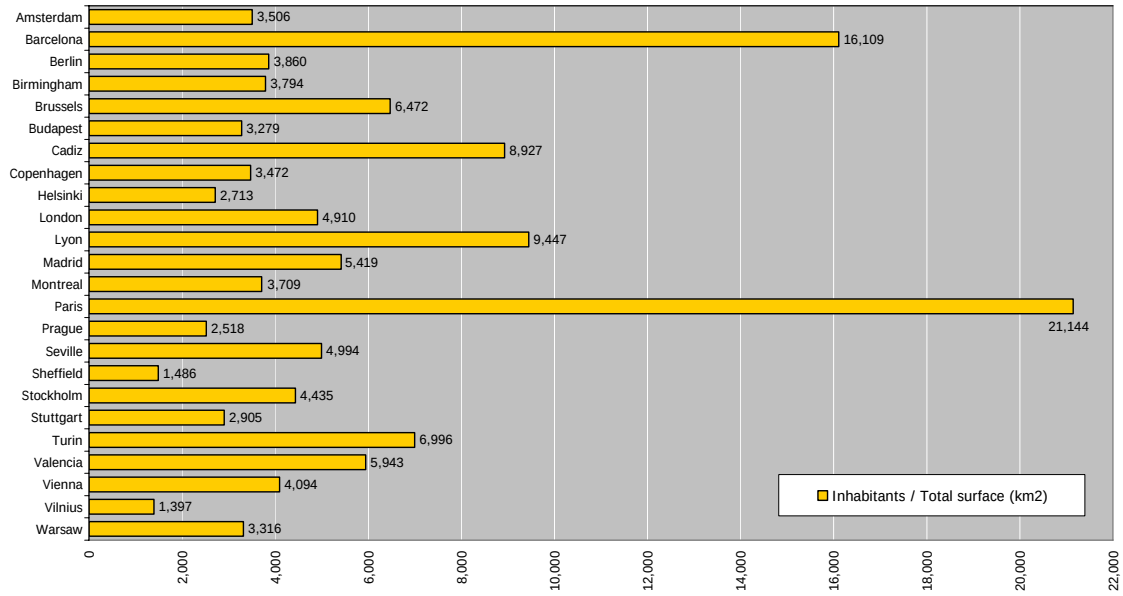
In cities like Copenhagen and Paris the surface area is 100% built up. High ratios are also those of Lyon (90%), Brussels (87.7%) and Barcelona (82.0%), where the built-up areas cover more than 80% of the total main city surface. On average, 64% of the city surface is already urbanised, while the same ratio in the whole metropolitan area is 25%.

Graph 8. Urbanised surface on main city / main city surface



1.2.2. Density of population in main cities

Graph 9. Population gross density in main cities (inhabitants / km^2)



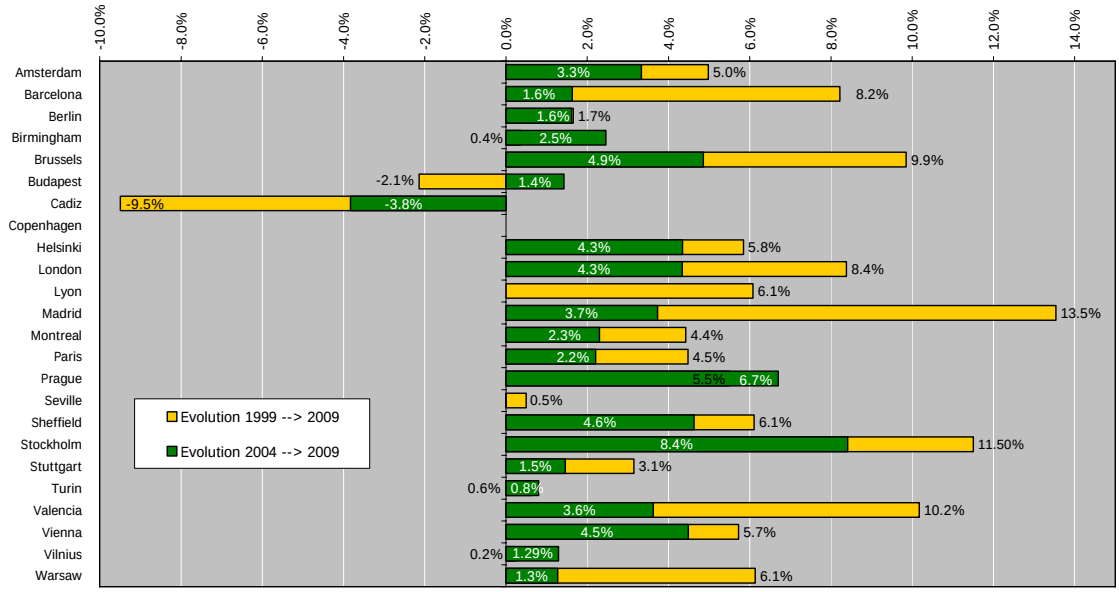
Those cities with high percentage of urbanised areas have higher gross densities than those with lower percentages. These are the cases of Paris (21,144 inhabitants/km^2) and Barcelona (16,109 inhabitants/km^2), and at a second level Cadiz, Lyon, Turin and Brussels (6,000-9,500 inhabitants/km^2). Nevertheless, London, which has a large percentage of urbanised area, has a much lower gross density, due to the housing typology and urban development.

1.2.3. Evolution of population in main cities

During the period 1999-2009, most of the main cities have seen their population increase, with an average ratio of 4.6% for all the cities for the whole period. This growth is appreciably smaller than the metropolitan area's growth, where it is 8.3%, showing that the important population change is taking place in the surroundings of the cities. This fact puts a strain on suburban rail and bus services.

The greatest population increase in the period 1999-2009 occurred in Barcelona, Brussels, London, Madrid, Stockholm and Valencia (over 8%) and less intensively in Lyon, Sheffield and Warsaw (6.1%) (Graph 10). However, in several cities the population remains almost stable in that same period, such as Berlin, Birmingham, Seville, Turin, and Vilnius. In the last 5-year period, the highest increases are in Prague (6.7%) and Stockholm (8.4%).

Graph 10. Population evolution 1999-2009 and 2004-2009 in main cities



Cadiz has almost a complete urbanised surface, thus the scarcity of the housing motivates the rise of their prices, intensified also because it is the capital of the province and a touristic destination. All these circumstances lead to young people moving towards the metropolitan area and a significant population decrease showed in the graph.

2. Mobility

This section gathers data related to mobility such as the main features of the trips in the metropolitan areas, car ownership and modal split (Table 3) obtained from surveys carried out between 2004 and 2009.

Table 3. General Mobility parameters in metropolitan areas

	Trips per person per day	Motorised trips		Home to work & school trips/ total trips	Car ownership rate	Households with no cars
		Average duration (min)	Average distance (km)	(%)	(Vh/1,000 inh)	
Stadsregio Amsterdam	2.61	29	18	26.0%	473	35%
Barcelona Metropolitan Region	3.70	34	12	37.1%	419	17%
Berlin-Brandenburg	3.30	34	18	28.0%	406	33%
West Midlands (Birmingham)	2.71	23	13	25.8%	539	24%
Brussels Metropolitan	2.40			52.0%	450	
Central Hungarian Region (Budapest)	2.96	29	na	46.6%	340	na
Cadiz Bay	2.01	19	na	42.7%	433	28%
Greater Copenhagen					367	54%
Helsinki	3.10	24	9	32.4%	382	38%
Greater London	2.42	58	22	25.1%	(1) 580	42%
Lyon Urban Community	3.40	20	16	32.0%	460	
Madrid Community	2.60	29	13	56.4%	529	33%
Greater Montreal	2.06			27.2%	598	20%
Paris Ile-de-France	3.40			35.8%	431	32%
Middle Bohemia Region (Prague)					547	
Metropolitan Area of Seville	2.37	13		33.6%	472	
South Yorkshire (Sheffield)	2.79		11	25.0%	413	33%
County of Stockholm	3.07	28	16	38.0%	393	
Stuttgart Region				31.6%	528	
Turin Metropolitan Area	2.27	18		37.9%	620	11%
Valencia Metropolitan Area		25		45.7%	477	
VOR Region (Vienna)					471	
Vilnius	3.00			87.0%	547	
Warsaw	1.80	39			(2) 535	

(1) Compared to previous Barometer editions, Greater London shows a significant increase in motorization rate due to a different method of calculation

(2) The figure refers to main city only

2.1. Main characteristics of the trips in metropolitan areas

The number of daily trips varies significantly across the metropolitan areas; this is due partially to the method followed to calculate the figure. In some metropolitan areas, walking trips of less than five minutes are not considered in the calculation, also, in other cases trips under a certain length are not considered either. Despite this, the number of trips per person per day ranges between 1.8 (Warsaw) and 3.7 (Barcelona) with an average of 2.7 trips.

The duration of motorised trips is comprised between 13 and 39 minutes, giving a total average of 28 min. London, being a special case, has an average of 58 minutes and 22 km distance, due to the fact that the extension of the region and the type of urban development promotes longer trips generally speaking. The average length of the trips in the metropolitan areas surveyed is 15 km, inducing an average speed of 32 km/h. On the basis of 3 trips per day, this means that the majority of the population spends between one

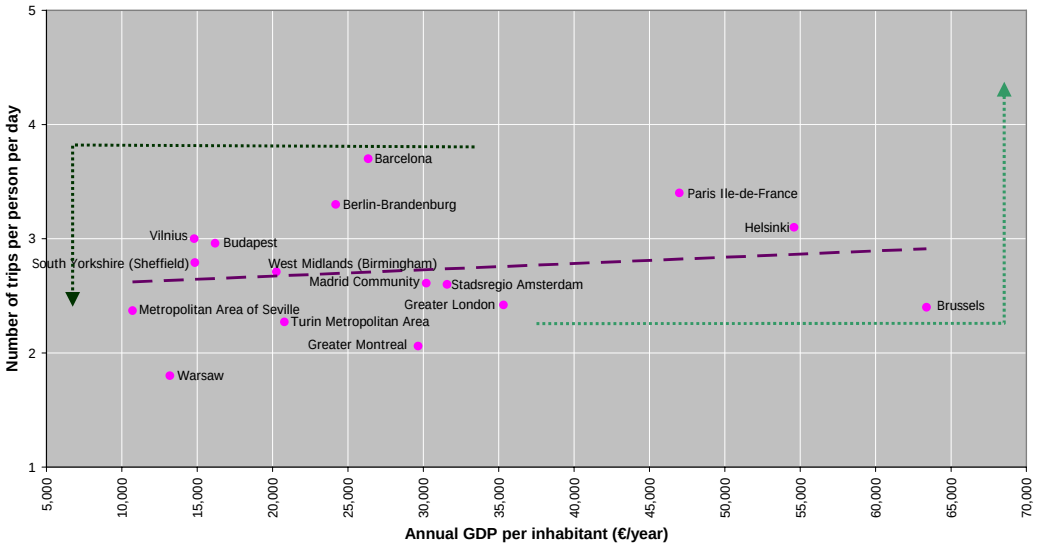
and one and a half hours travelling everyday within metropolitan areas. Therefore it is important to promote safe and comfortable transport systems to make this long period of time as pleasant as possible.

Interestingly there is no clear relationship between the size of the metropolitan area and the length of the trips. As an example, in large areas such as Berlin-Brandenburg, Madrid Community or Stockholm County, the average trip is quite similar (between 13 and 18 km) to other medium sized metropolises such as Stadsregio Amsterdam (18 km) or Lyon Urban Community (16 km).

Regarding obliged mobility (trips to work or to school), it still appears as the main purpose adding 38% of the total trips as an average. It is a figure to take into account since this mobility has a very high concentration on peak hours. Compared to previous year's figures, there are more European metropolitan areas having less than a third of commuting trips, what shows that the mobility patterns are changing, and other trips purposes different to work and studies are becoming more important. These metropolitan areas are Stadsregio Amsterdam (26%), Berlin-Brandenburg (28%), West Midlands (Birmingham) (26%), Greater London (25%), Greater Montreal (27%) and South Yorkshire (Sheffield) (25%).

Graph 11 does not show a clear trend between GDP per inhabitant and year vs the number of trips per person per day. However, we can observe two groups in the dispersion: the metropolitan areas with less GDP per inhabitant (under 35,000 €/inhabitant-year) make as maximum 3 trips per day (except Berlin and Barcelona), and the metropolitan areas with higher GDP (over 35,000 €/inhabitant-year) make 2.5-3.5 trips per day.

Graph 11. Link between annual GDP/inhab-year and number of trips per person and day

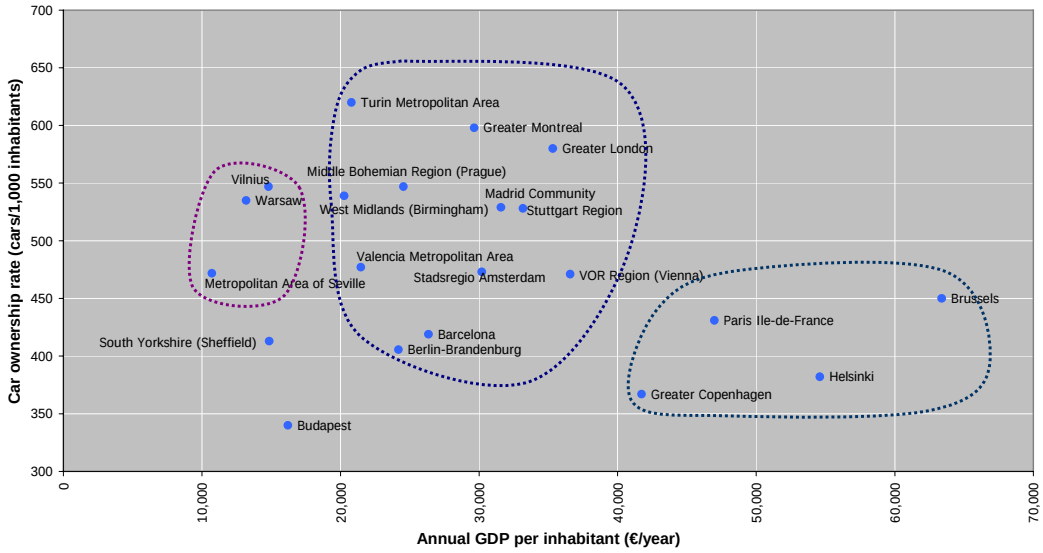


2.2. Car Ownership

In these metropolitan areas car ownership rate is on average 475 cars/1,000 inhabitants ranging from the lowest levels of 340 cars in Budapest to the highest levels of 620 cars in Turin or 598 cars/1,000 inhabitants in Greater Montreal (Table 3). However, the car ownership ratios in main cities are significantly lower, between 10 to 40% lower than in metropolitan areas, except in Birmingham, Budapest, Seville, Turin and Vilnius, where the motorisation rate is the same or slightly higher.

In Graph 12 it seems that car ownership rate in metropolitan areas tends to relate to annual GDP per inhabitant thus acting as a socio-economic indicator. We can observe different groups of metropolitan areas with very diverse motorisation ratios. Between 20,000 and 35,000 €/inhabitant-year the car ownership in some Spanish, English, Italian and German regions are over 400 cars/1,000 inhabitants. On the other hand, the more wealthy metropolitan areas have the car ownership under 450 cars/1,000 inhabitants, showing that the higher GDP per inhabitant, the lower car ownership ratio, while Warsaw, Vilnius and Seville have higher motorisation ratios (over 450 cars/1,000 inhabitants).

Graph 12. Car ownership rate (cars/1,000 inhabitants) vs annual GDP/inhabitant



Nevertheless, the trend for the average motorisation rate throughout these years that the Barometer report has been produced (2000-2009), is in general constantly increasing: 397, 429, 457, 448, 458 and 475 cars/1,000 inhabitants. However, the percentage of households with no cars is a significant 38% in main cities as average, and 31% in whole metropolitan area (of those that have provided data). Thus, the public transport authorities have growing responsibilities in the metropolitan areas to offer an attractive public transport to promote the modal shift and contribute to a less car dependant society.

2.3. Modal split

We can say generally that the modal split in the metropolitan areas surveyed is 32% of non motorised trips (mainly walking), 20% are trips made on public transport (PT) and 49% are trips using private vehicles. These shares have remained quite stable since the year 2000, in round numbers 30% non motorised, 20% public transport and 50% private car. This fact highlights the wide participation of the private vehicle in our mobility, and the need for a change in these patterns. However, besides these general figures, clear differences in mobility behaviours of each of the metropolitan areas appear in Table 4 below, showing data obtained from last mobility surveys carried out between 2004 and 2009.

Table 4. Modal split in whole metropolitan areas

	GENERAL MOBILITY				PUBLIC TRANSPORT MOBILITY			
	Modal share NON MOTORISED TRIPS (%)	Modal share of cycling (%)	Modal share of walking (%)	Modal share MOTORISED TRIPS (%)	Modal share of PT in whole region (%)	Modal share of PT main city ↔ main city trips (%)	Modal share of PT suburbs ↔ main city trips (%)	Modal share of PT suburbs ↔ suburbs trips (%)
Stadsregio Amsterdam	58.0%	33.0%	25.0%	42.0%	8.0%	10.0%	20.0%	1.0%
Barcelona Metropolitan Region	45.3%	1.0%	44.3%	54.7%	19.6%	32.2%	48.0%	7.9%
Berlin-Brandenburg	39.0%	12.0%	27.0%	61.0%	16.0%	21.0%	12.0%	9.0%
West Midlands (Birmingham)	22.7%	2.0%	20.7%	77.3%	8.6%			
Brussels Metropolitan (1)	13.6%	0.8%	12.8%	86.4%		26.5%		
Central Hungarian Region (Budapest)	32.0%	5.9%	26.1%	68.0%	35.0%	46.8%	40.6%	20.4%
Cadiz Bay	36.6%	0.2%	36.4%	63.4%	9.8%			
Greater Copenhagen	27.0%			73.0%	15.0%	25.0%	16.0%	12.0%
Helsinki	34.0%	7.1%	26.9%	66.0%	27.2%	33.5%	36.8%	12.6%
Greater London	21.6%	1.7%	19.9%	78.4%	41.7%			
Lyon Urban Community	34.2%	1.7%	32.5%	65.8%	15.3%		7.0%	27.0%
Madrid Community	31.2%	0.1%	31.1%	68.8%	31.6%	40.1%	46.1%	23.0%
Greater Montreal	12.7%	1.4%	11.3%	87.3%	17.0%	26.4%	23.7%	3.1%
Paris Ile-de-France	34.2%	2.2%	32.0%	65.8%	20.5%	33.9%		
Middle Bohemia Region (Prague) (1)	24.0%	1.0%	23.0%	76.0%		43.0%		
Metropolitan Area of Seville	32.4%	1.9%	30.5%	67.6%	13.8%	19.3%	8.1%	7.7%
South Yorkshire (Sheffield)	23.0%		23.0%	77.0%	10.0%			
County of Stockholm	34.0%			66.0%	24.0%	32.5%	63.0%	
Stuttgart Region	30.2%	7.3%	22.9%	69.8%	14.1%	24.2%		
Turin Metropolitan Area	30.2%	2.0%	28.2%	69.8%	18.7%	23.5%	22.1%	4.8%
Valencia Metropolitan Area	37.9%	1.1%	36.8%	62.1%	13.3%	20.6%		
VOR Region (Vienna)	28.0%	6.0%	22.0%	72.0%	22.0%	35.0%	10.0%	
Vilnius (1)	27.0%	10.0%	17.0%	73.0%		34.0%		
Warsaw	32.5%	4.8%	27.7%	67.5%	30.2%	54.6%		

(1) Figures for main city, not available figures for PTA

In 15 of the metropolitan areas the non motorised mobility stands over 30%. The metropolitan areas with higher share of non motorised trips are Amsterdam, Barcelona, Berlin-Brandenburg, Valencia and Cadiz, all of them with a share over 35%, mainly due to the walking trips. Only in 3 cases (Stadsregio Amsterdam, Berlin-Brandenburg and Vilnius) the cycling trips account with more than 10% of the total mobility. Stadsregio Amsterdam also has an outstanding participation of non motorised modes, up to the point where the non motorised mobility is higher than the motorised mobility (58% vs 42%).

On the other side, Montreal and Brussels are the 2 metropolitan areas with a modal share for non motorised trips lower than 20%. Again the methodology for accounting walking trips can have an

influence on these results, since we look to the fact that Montreal has a low global rate for trips/person (2.04) and Brussels is around 2.4.

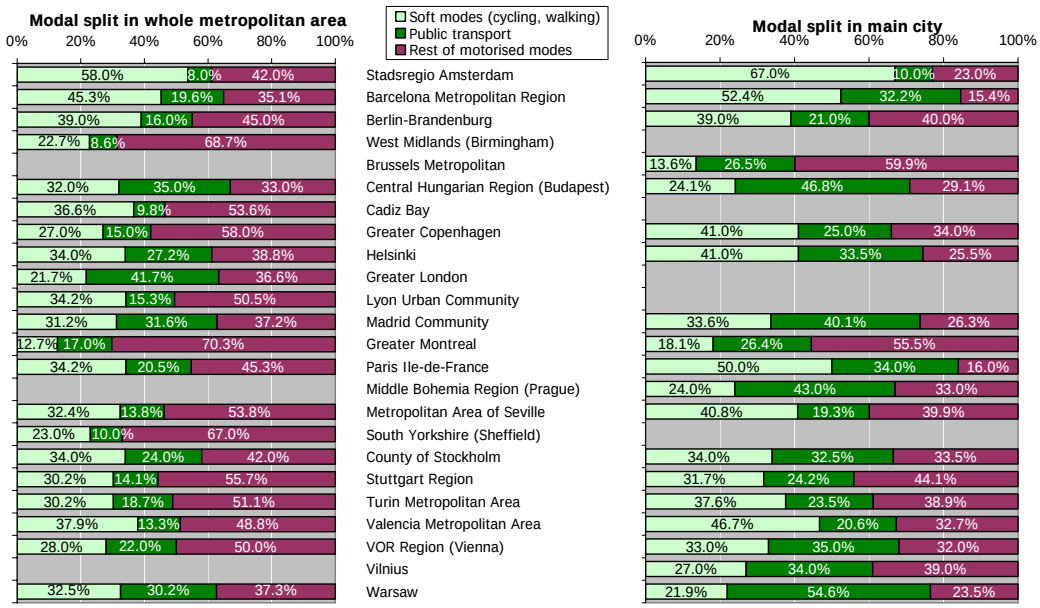
2.3.1. Modal split in whole metropolitan area and main city

The modal split has been divided into three groups: soft modes (which include walking and cycling), public transport and rest of motorised modes (which refer to private car, motorcycle and other motorised modes) with the aim of having a general view of the mobility, not only a motorised one.

Greater London is the metropolitan area where the public transport accounts for the highest percentage in the total mobility (41.7%), followed by Budapest (35%), Madrid Community (31.6%) and Warsaw (30.2%) (Graph 13). But looking to the sum of soft modes and public transport, what we could call "sustainable mobility", Budapest has the highest ratio (67%) followed by Amsterdam (66%) and Barcelona (64.9%). Four other metropolitan areas have over 60% of share in this type of mobility (Greater London, Madrid, Warsaw and Helsinki).

The share of the rest of motorised modes, referred mainly to private car, varies between 33% (Budapest) and 70.3% (Greater Montreal). In 10 cases the private car share accounts with more than half of the mobility (over 50%), what shows a clear predominance of such type of mobility in our metropolitan areas.

Graph 13. Modal split in metropolitan areas and main cities



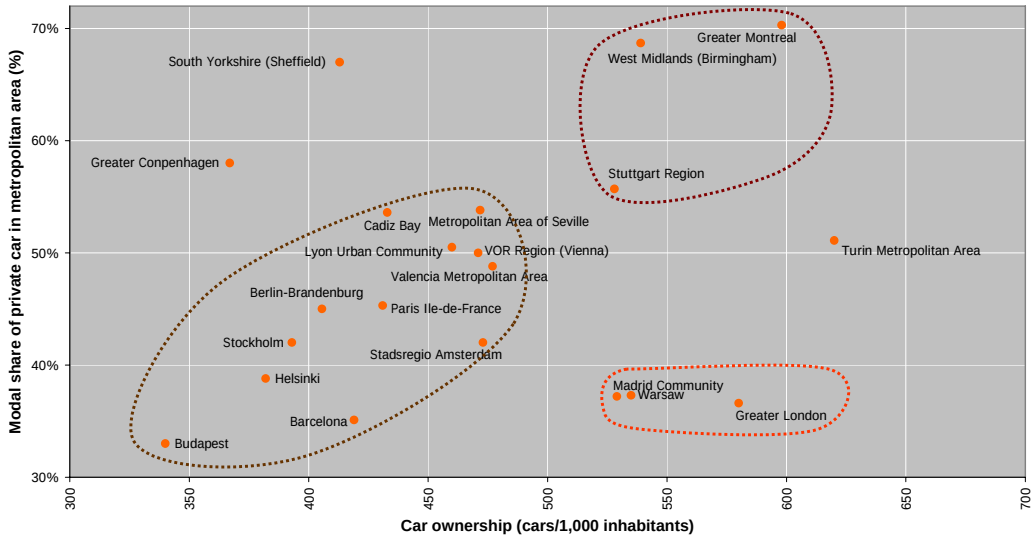
The ratios "in main city" (Graph 13 right part) are quite balanced, on average 36% for non motorised modes, 31% for public transport and 34% for rest of motorised modes. Reminding the shares in whole metropolitan areas (32%-20%-48%), shows that the difference lies on the public transport use vs the

private car, because of the denser transport networks in city centres compared to suburbs and the implementation of parking policies in those areas.

The cities with the highest ratios for soft modes are Amsterdam (67%), Barcelona (52.4%) and Paris (50.0%). The highest use of public transport is in Warsaw (54.6%), Budapest (46.8%), Prague (43%) and Madrid (40.1%).

Graph 14 shows the car ownership rate vs the private car use in the metropolitan areas. There is no casual relationship to be established because of heterogeneous and diffused figures, although there is reason to expect that higher levels of car ownership rate bring higher levels of private car modal share.

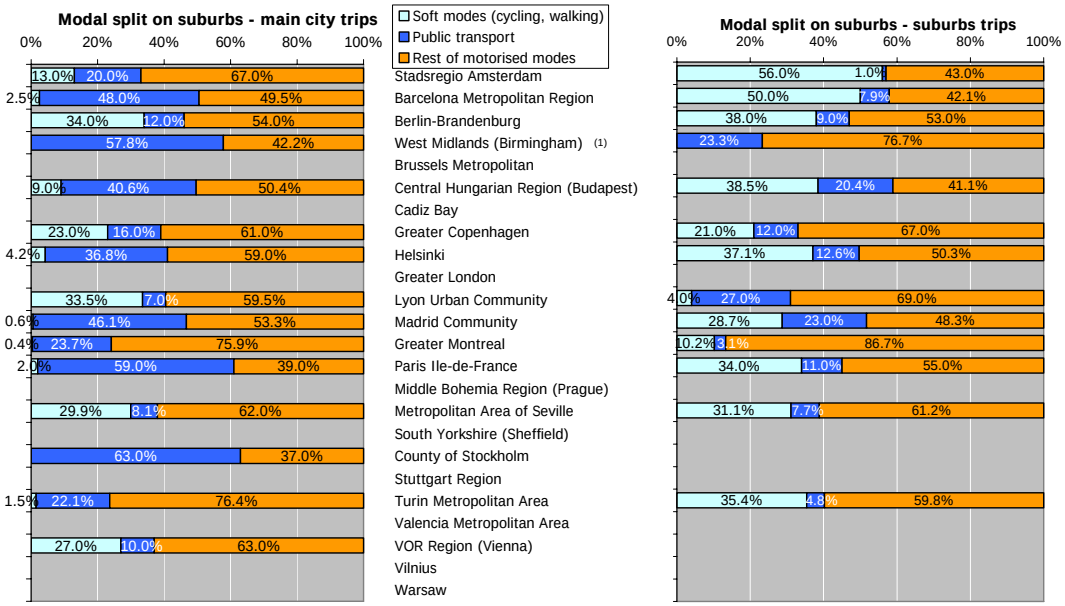
Graph 14. Modal share of private car in metropolitan areas vs car ownership rate



2.3.2. Modal split in metropolitan area in radial and transversal trips

Looking more into details of trips according to their nature (Graph 15) helps understanding the leading role of the private vehicle. The radial trips between metropolitan ring and the main city, are done in majority by other motorised modes (meaning private car basically) reaching up to 76.4% in Valencia and 75.9% in Greater Montreal. However, there are noticeable exceptions where the public transport share is quite close to private car share in Barcelona (48.0%-49.5%), Madrid (46.1%-53.3%) and Budapest (40.6%-50.4%), and other remarkable cases in which the modal split is favourable to PT (Stockholm 63% vs 37% or West Midlands 57,8% vs 42,2%).

Graph 15. Modal split in metropolitan areas in radial and transversal trips



(1) Figures For West Midlands (Birmingham) refer only to motorised trips

Figures for trips from suburbs to suburbs (including the internal trips in the municipalities out of the main city) show an absolute predominance of the private vehicle, but in few cases the soft modes (walking and bicycle) prevail over the private car. These are the cases of Stadsregio Amsterdam (56%) and Barcelona Metropolitan Region (50%), but they hold very low public transport use ratio (1 and 7.9% respectively). It is interesting to highlight the fact that in many other cases the walking mode accounts for more than a third of the total mobility share (in the metropolitan areas of Budapest, Berlin, Helsinki, Turin and Seville, all between 31 and 38%), but again lower public transport use. This is because the size of urban areas around the main city, usually small and medium size municipalities, make the internal mobility easily done on foot, and not easy to provide a frequent public transport service. However, in some cases the public transport share is over 20% as in Lyon (27%), Madrid (23%) and Budapest (20.4%).

3. Description of the Public Transport System

3.1. Public transport networks

3.1.1. Bus

The metropolitan areas surveyed have very dense bus networks. Paris Ile-de-France, Berlin-Brandenbug and West Midlands (Birmingham) are the metropolises with the greatest number of bus lines (both urban and suburban lines) with 1,449, 963 and 900 lines respectively (Table 5). Also Madrid, Barcelona, Greater London, Greater Copenhagen and Helsinki have more than 600 lines as whole network.

Table 5. Characteristics of urban and suburban bus supply in metropolitan areas

	Number of lines	Lines length (km)	Number of Stops - Network	Number of vehicles	Veh - km (mill / year)	Number of operators	
						Public	Priv
Amsterdam	137	4,032.0	3,325	744	(1) 18.2	1	2
Barcelona	692	28,705.0	20,744	2,318	124.9	1	42
Berlin-Brandenburg	963	29,991.1	12,517	3,231	177.2	1	29
West Midlands (Birmingham)	900	(2) 7,524.0	12,500	2,200	132.9		58
Brussels Metropolitan	103	683.8	(1) 2,263	743	(1) 6.1	3	
Central Hungarian Region (Budapest)	501	6,065.0	6,354	2,285	136.4	6	
Cadiz Bay	52	(2) 306.0	1,179	159	7.0		6
Greater Copenhagen	633		17,058	1,325	109.0		22
Helsinki	601	12,361.0	5,839	1,377	88.3		17
Greater London	678	(2) 3,730.0	18,956	8,500	478.0		14
Lyon Urban Community (1)	117	(2) 2,412.0	4,512		36.5		
Madrid Community	693	25,916.0	13,938	4,216	296.5	3	31
Greater Montreal	584	21,295.0		2,957	116.2	14	
Paris Ile-de-France	1,449	24,660.0	28,000	8,781	310.0	2	73
Middle Bohemia Region (Prague)	332	4,648.0	2,280	1,900	88.0	1	16
Metropolitan Area of Seville	111	2,718.0		592	29.8	1	10
South Yorkshire (Sheffield)	377	33,676.0	8,693		67.6		46
County of Stockholm	500	10,539.0	(1) 334	2,016			4
Stuttgart Region	360	3,769.0	3,408	1,377	54.1	1	40
Turin Metropolitan Area	125	7,640.9	4,113	1,361	54.6	1	9
Valencia Metropolitan Area	108	3,909.9	2,281	588	28.4	1	8
VOR Region (Vienna)	287	12,761.0		(1) 500	55.6	1	11
Vilnius (1)	115	808.0	1,283	295	18.7	1	13
Warsaw	250	3,239.5	4,339	(1) 1,780	114.1	8	

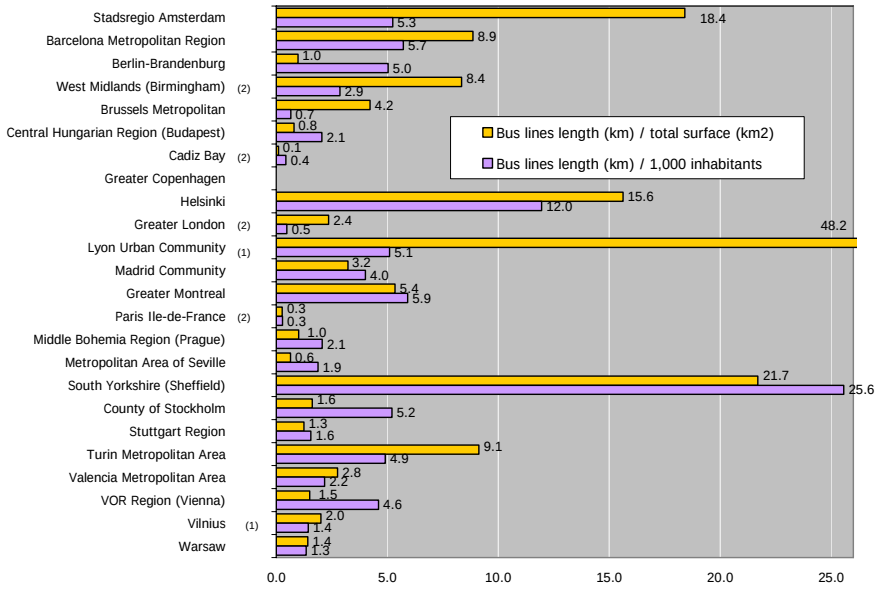
(1) Only urban bus figures (2) Network length

The average length of an urban bus route is 17.2 km, while an interurban bus line has 37 km. This length is lower than the average length in other modes due to the “feeder” role the buses can play in connection with rail modes.

One single company operates an average of 30 routes and this figure is even higher if we take into account that in the main city (where there is a high density of routes) usually there is no more than one company operating the urban lines. This is the case for example of Birmingham (over 500 lines), Budapest (258 urban bus lines), Madrid (215 lines), Warsaw (206) and Berlin (185) where one single operator runs around 200 bus lines.

Regarding the density of lines per km^2 of surface considering all bus network (urban and suburban) (Graph 16), we see figures vary between 0.1 and 9 km/km^2, but South Yorkshire Sheffield (21.7 km of bus lines/km^2 surface), Stadsregio Amsterdam (18.4 km of bus lines/km^2 surface) and Helsinki (15.6 km of bus lines/km^2 surface) appear with more than 15 km of bus lines per km^2 of surface, probably as a consequence of a small metropolitan area (less than 1,500 km^2) and the provision of small rail network. Lyon Urban Community figure (48.2 km /km^2) represents the urban bus network density, and so it is considerably higher.

Graph 16. Bus lines density in metropolitan areas



(1) Urban bus figures

(2) Km of network instead of km of lines

If we compare the figures mentioned above with the density in terms of bus lines length per 1,000 inhabitants, we note that the higher ratios (between 4 and 6 km/1,000 inhabitants) correspond to high populated areas (Barcelona, Berlin, Madrid and Montreal metropolitan areas), excluding Helsinki, Sheffield and Lyon for the same reasons as above. Bus provision in the surveyed areas must be also in connection with the existing networks of metro, tramway and other PT modes, since a lower number of bus lines or km can be compensated by a higher offer in railway modes.

Also, we have obtained that each bus runs between 40,000-60,000 km per year as average.

3.1.2. Tramway/Light rail/Trolleybus

As in previous editions of Barometer every metropolitan area operates or implements medium capacity systems highlighting the tendency of the public transport networks to include trams, light rails or trolleybuses as modern, safe and clean modes of transport standing between buses and metro systems. Of the surveyed cities, only two could not provide data (Greater Copenhagen and Greater Montreal). Stuttgart Region operates and underground light rail.

As we see in Table 6 Vienna Region has the longest tram network (1,033 km and 29 lines), then Prague (538 km and 33 lines), Berlin-Brandenburg (494 km of lines and 44 lines), Warsaw (386 km), Vilnius (237 km of trolleybus lines) and Budapest (231 km). All these cities in fact never removed the trams from their streets.

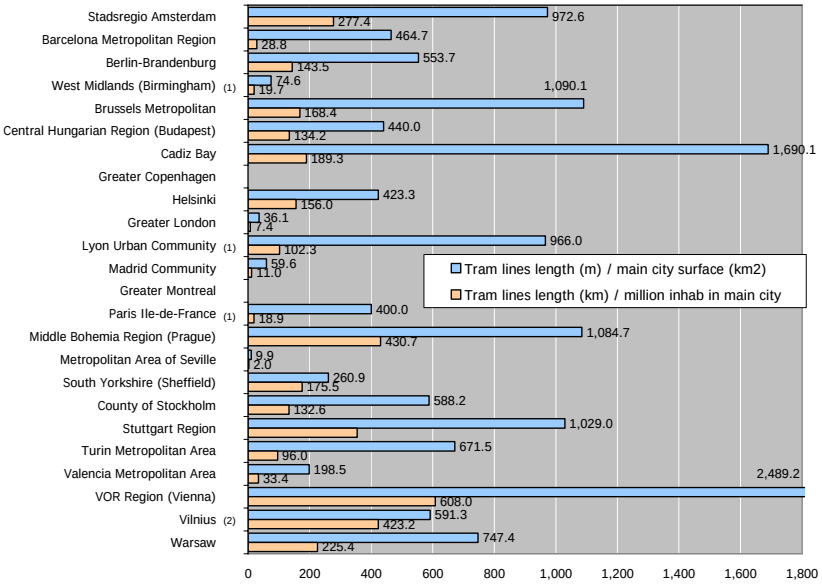
Table 6. Characteristics of tram supply

	Number of lines	Lines length (km)	Number of Stations - network	Number of trains	Train - km (million / year)	Number of operators	
						Pub	Priv
Stadsregio Amsterdam	16	213.0		216	11.6	1	
Barcelona Metropolitan Region	6	46.7	56	37	2.6		1
Berlin-Brandenburg	44	493.9	610	534	30.9	8	
West Midlands (Birmingham)	1	(2) 20.0	23	16	1.7		1
Brussels Metropolitan	15	176.6	(1) 2,263	332	11.7	1	
Central Hungarian Region (Budapest)	28	231.0	671	604	28.5	1	
Cadiz Bay	1	24.0	15				
Greater Copenhagen							
Helsinki	12	91.0	259	132	5.5	1	
Greater London	2	57.0	72	118	7.0		2
Lyon Urban Community	4	(2) 48.3	81		3.9		
Madrid Community	4	36.0	52	44	18.9		3
Greater Montreal							
Paris Ile-de-France	4	42.0	70	61	4.5	2	
Middle Bohemia Region (Prague)	33	538.0	620	(4) 954	29.3	1	
Metropolitan Area of Seville	1	1.4	4	5	0.1	1	
South Yorkshire (Sheffield)	3	96.0	92	25			1
County of Stockholm	8	110.0	97	184			2
Stuttgart Region	16	213	200	164	15.8	1	
Turin Metropolitan Area	8	87.3	381	234	5.9	1	
Valencia Metropolitan Area	2	27.2	42	44	1.6	1	
VOR Region (Vienna)	29	1,033.0		775	34.2		2
Vilnius (3)	20	237.1	232	223	13.7	1	
Warsaw	26	386.4	563	436	21.7	1	

(1) Includes urban bus stops (2) Network length (3) Trolleybus (4) Carriages

To obtain densities we consider the main city surface and population because usually trams and light rails serve urban contexts (Graph 17) (next section with metro figures will be also considered as urban context using main city figures for densities).

Graph 17. Tramway lines density in main city



(1) Tram network length instead of lines length

(2) In Vilnius is trolleybus

The densest cities in relation to the tram network (Graph 17) are Vienna, Brussels, Prague, Stuttgart, Lyon and Amsterdam, with around 1,000 m of tram lines/km^2 in main city or more. The figure in Cadiz is referred to the train-tram, and so is especially high due to the metropolitan context of the line. The average distance between stations varies between 230 m (Turin) and 1.7 km (Cadiz), with an average of 750 m, and the number of trains is around 1 or 2 trains per km of line. The tram vehicles seem to run less km per year than buses, with several cities under 40,000 km/year.

3.1.3. Metro

Out of the 24 cities surveyed, only Birmingham, Sheffield, Stuttgart (which underground system is considered more as light rail than a metro) and Vilnius haven't got a metro system (Table 7) and in Copenhagen there is a metro but there is no information available. The most developed networks in relation with number of lines are in Paris (16 lines), Madrid (13 lines) and London (11 lines), but regarding the lines length the most populated cities come first, as London (408 km), then Madrid (279 km) and Paris (217 km). Between 100 and 200 km of network length are Berlin-Brandenburg (152 km), Valencia (149 km), Barcelona (117 km) and Stockholm (108 km).

Table 7. Characteristics of metro supply

	Number of lines	Lines length (km)	Number of stations - network	Number of carriages	Carriages - km (million / year)	Number of operators	
						Pub	Priv
Stadsregio Amsterdam	4	63.0	52	106	18.2	1	
Barcelona Metropolitan Region	10	117.2	154	681	85.6	2	
Berlin-Brandenburg	10	152.1	173	1,264	118.4	1	
West Midlands (Birmingham)							
Brussels Metropolitan	4	55.7	59	292	(2) 5.1	1	
Central Hungarian Region (Budapest)	3	35.0	78	391	30.4	1	
Cadiz Bay (3)	1	16.0	5				
Greater Copenhagen							
Helsinki	2	32.0	17	(2) 54	14.2	1	
Greater London	11	408.0	269	(2) 521	(2) 70.6	1	
Lyon Urban Community	4	(1) 30.4	43		(2) 6.1		
Madrid Community	12+1	278.7	232	2,281	198.2	1	1
Greater Montreal	4	66.1	68	756	76.1	1	
Paris Ile-de-France	16	217.0	300	3,511	(2) 47.9	1	
Middle Bohemia Region (Prague)	3	59.1	57	610	10.6	1	
Metropolitan Area of Seville	1	18.0	22	(2) 17	(2) 1.7	1	
South Yorkshire (Sheffield)							
County of Stockholm	7	108.0	100	513			1
Stuttgart Region							
Turin Metropolitan Area	1	9.6	14	58	8.6	1	
Valencia Metropolitan Area	3	149.4	91	(2) 69	(2) 5.0	1	
VOR Region (Vienna)	5	95.0		824	71.0		1
Vilnius							
Warsaw	1	23.1	21	240	25.4	1	

(1) Network length

(2) Trains or train-km, as composition of carriages

(3) Refers to an underground section of the commuter train

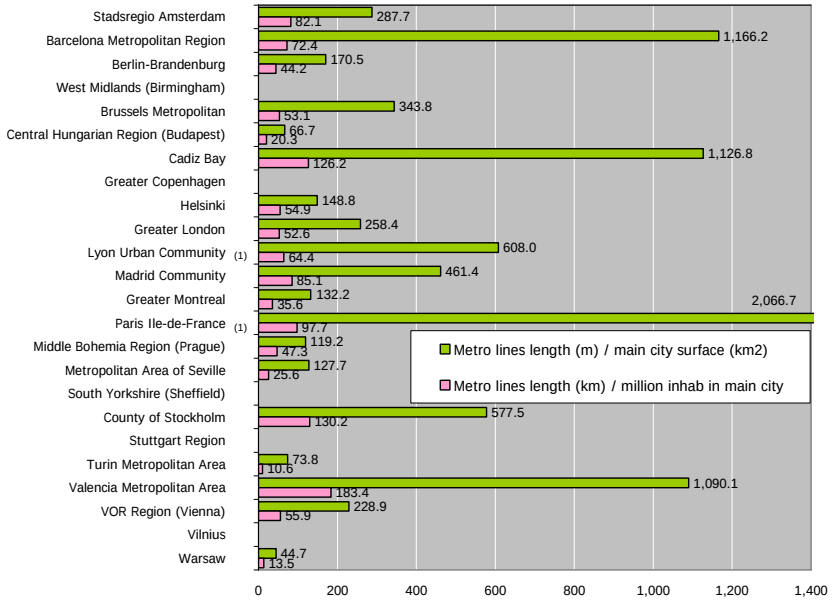
The average length of a metro line is between 8 km (Lyon) and 21 km (Madrid), except in Valencia (50 km) and London (37 km), thus serving a metropolitan area larger than the sole core urban centre. The

average distance between stations is 1.2 km. However, stations are more distant in Helsinki (2 km) or Valencia (1.7 km), while they are closer in Budapest (0.45 km) or Lyon (0.7 km).

Usually one single company operates the whole metro network. Madrid and Barcelona have two operating companies. In Madrid, the second company operates a short section of the network as a concession, while in Barcelona the second company operates the suburban part of the system, which is actually an old train route upgraded to a metro system.

In terms of density (Graph 18), it is more indicative the density expressed in m of metro lines per km^2 of main city surface because the metro systems are usually inside the boundaries of the main city, where there is a high density of population. The highest densities are in Paris (2,067 m of metro lines/km2 of main city surface) and Barcelona (1,166 m/km^2) due to the compactness of these cities, followed by Valencia and Cadiz (over 1,000 m/km^2). These two last cities are the densest on the base of km of metro lines / inhabitants in main city.

Graph 18. Metro lines density in main city



(1) Metro network length instead of lines length

3.1.4. Suburban railway

All the metropolitan areas surveyed have a suburban rail system serving metropolitan and regional purposes but not all of them have such mode of transport under power of the public transport authority or there is no information available (Copenhagen, London, Lyon, Vilnius). The number of lines varies from just 1 to 3 lines (Warsaw, Cadiz, Stockholm) to 55 in Berlin-Brandenburg (of which 15 are S-Bahn railway lines) or 38 in VOR Region (Vienna) (Table 8). In the case of Greater London the National Rail system is operated by 12 different Train Operating Company franchises, who serve a network of approximate 788 km.

The average length of a line is 43 km, but again there are significant differences depending on the territory and administrative frameworks, from Berlin, Madrid and Stockholm (67 km/line) to Stadsregio Amsterdam (5 km). The distance between stations is around 4.8 km on average, varying from 6.5 km in Seville to 1.0 km in Brussels.

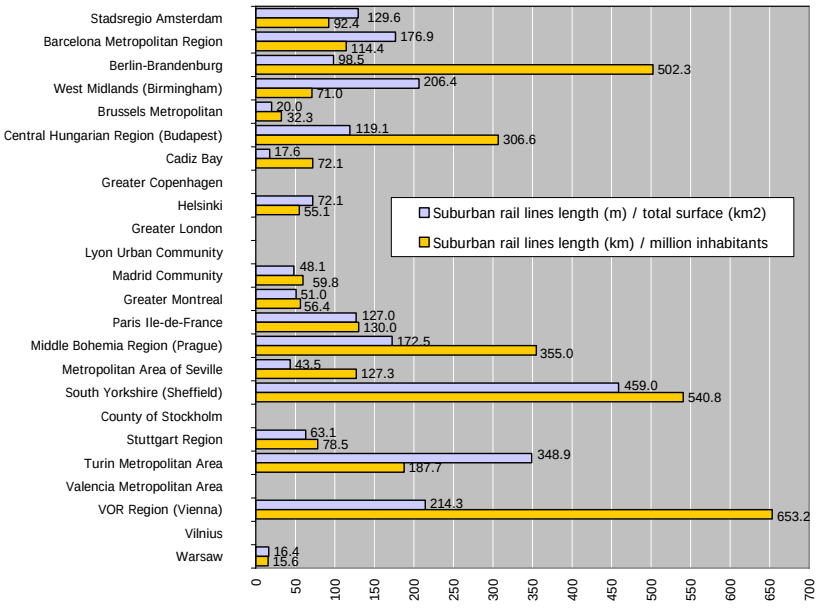
Table 8. Characteristics of suburban railway supply

	Number of lines	Network length (km)	Number of Stations - network	Number of trains	Train - km (million / year)	Number of operators	
						Pub	Priv
Stadsregio Amsterdam	26	130.0	24			1	
Barcelona Metropolitan Region	14	573.0	107	(1) 983	(1) 121.5	2	
Berlin-Brandenburg	55	2,990.6	496	1,165	68.9	2	4
West Midlands (Birmingham)	8	186.0	71	89	5.3		5
Brussels Metropolitan	6	100.0	100	100		1	
Central Hungarian Region (Budapest)	20	904.9	269	986	35.2	2	
Cadiz Bay	2	51.0	12			1	
Greater Copenhagen							
Helsinki	16	57.0	34	(1) 256	5.5	1	
Greater London		788.0					12
Lyon Urban Community							
Madrid Community	8	386.4	100	(1) 1,146	(1) 138.7	1	
Greater Montreal	5	202.9	52	213	9.0	1	
Paris Ile-de-France	13	1,525.0	448	(1) 4,852	69.1	2	
Middle Bohemia Region (Prague)	18	666.0	224	200	13.2	1	1
Metropolitan Area of Seville		183.6	28			1	
South Yorkshire (Sheffield)	10	712.4	32				18
County of Stockholm	3	200.0	50	215			1
Stuttgart Region	6	190.0	75	146	9.0	1	
Turin Metropolitan Area	6	292.0	76	39	3.5	2	
Valencia Metropolitan Area	6					1	
VOR Region (Vienna)	38	1,808.7					2
Vilnius							
Warsaw	1	37.4	15	11	1.3	1	

(1) Carriages and carriages-km, referring to the single units that compose a train

South Yorkshire (Sheffield) has the highest density of network (459 m of suburban rail lines/km^2), followed by Turin (348.9 m/km^2) (Graph 19).

Graph 19. Suburban railway lines density in metropolitan area



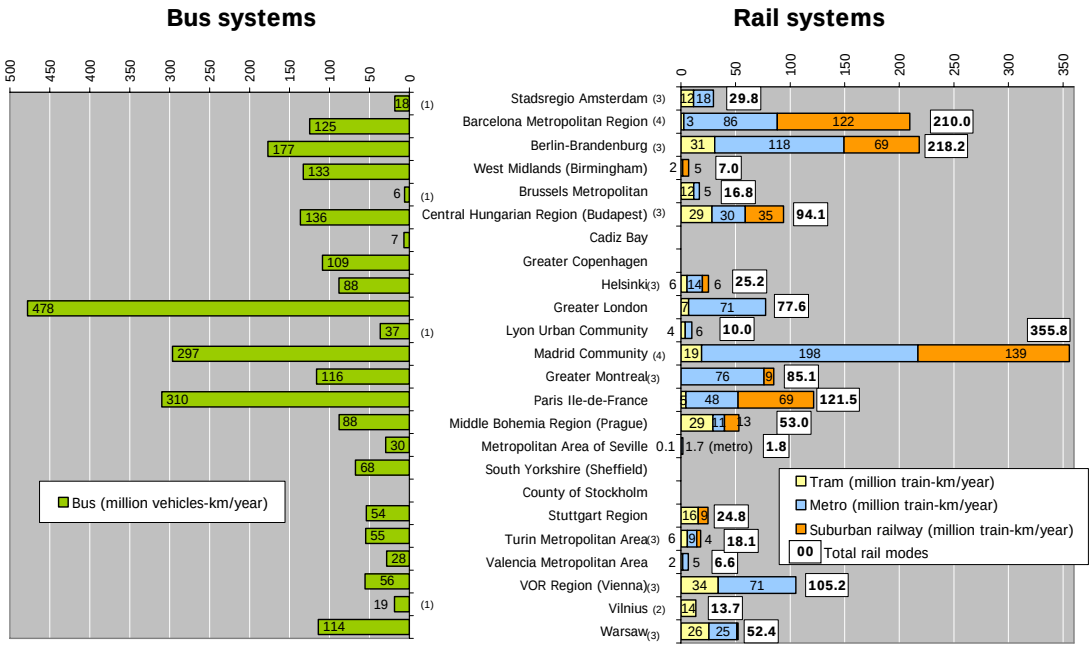
In relation with the population in the metropolitan area, the greatest densities are those in Vienna (653.2 km/million inhabitants), Sheffield (540.8) and Berlin-Brandenburg (502.3).

Please, note that the units used in bus systems densities (Graph 16) are “km of lines/km2” and “km of lines/1,000 inhabitants” while on rail modes (tram, metro, and suburban rail) are “m of lines/km2” and “km of lines/million inhabitants” (Graphs 17, 18 and 19). This difference is made to avoid the representation of decimal and centesimal figures, which are more difficult to understand and compare.

3.2. Public transport supply

The greatest supply (in vehicles-km/year) on bus systems is offered in Greater London, Paris Ile-de-France, Madrid and Berlin-Brandenburg, which is not surprising since these are the biggest and most populated areas (Graph 20). Please note that in many cases railway figures are missing (Greater London, Amsterdam, Brussels, Vienna, etc) independently of the status of integration of such mode in the PTA, which make the total figures not comparable.

Graph 20. Public transport supply in million vehicle-km (or train-km) / year



(1) Figures just for urban bus, do not include suburban bus

(2) In Vilnius the tram figure is trolleybus

(3) Metro figures are expressed in carriage-km instead of train-km

(4) Metro and suburban railway figures are expressed in carriage-km instead of train-km

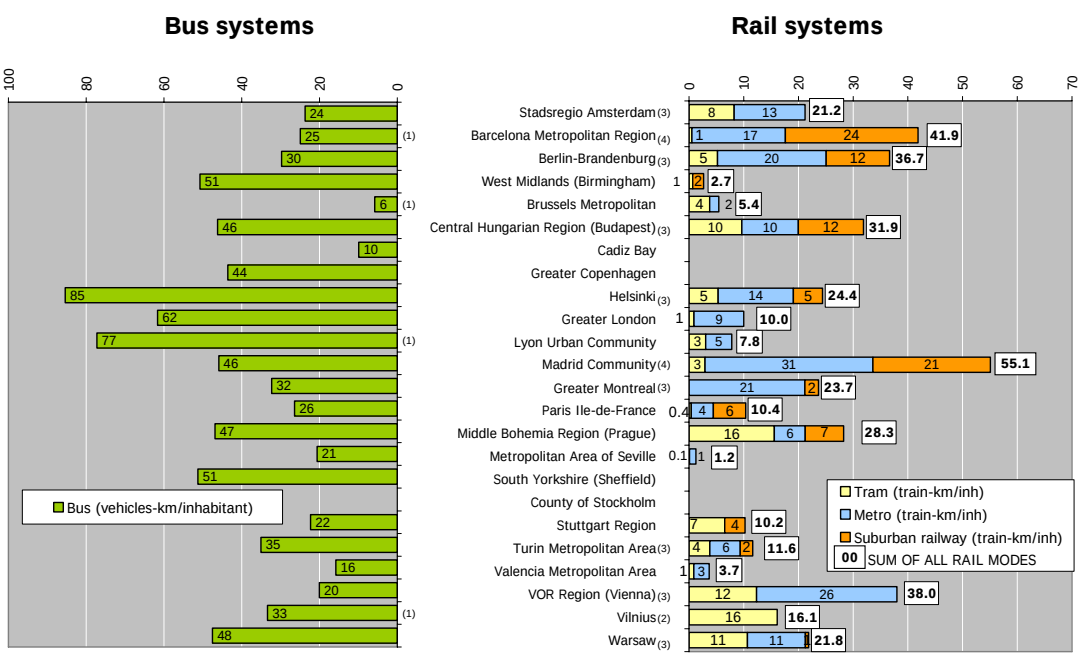
The bus is the mode that provides the largest figures to such an extent that the number of vehicles-km provided by bus almost double the sum of all rail modes, even more if we bear in mind that we are comparing vehicle-km with carriages-km in most of the cases. Note that we speak about trains as composition of carriages, and carriages are the single units that form a train.

The statement above also has to be looked at carefully because there is lack of figures or small rail supply in some cities (integration is not fully achieved). Still it gives a picture of public transport supply in European metropolitan areas.

To be able to compare between the cities surveyed in terms of density and by modes we can look at Graph 21, where we see the largest bus supply are in Helsinki (85 veh-km/inhabitant), Lyon (77 veh-km/inhabitant, considering only urban bus), Greater London (62 veh-km/inhabitant), South Yorkshire

(Sheffield) and West Midlands (Birmingham) (51). On tram supply, the head are the trolleybus in Vilnius (16.1 train-km/inhabitant) and Prague (15.6). On metro supply the highest densities are Madrid (31 carriage-km/inhabitant) and Vienna (26) (note that metro figures are mainly given in carriages-km). And on suburban railway the highest supply is given in Budapest and Berlin-Brandenburg (12 train-km/inhabitant), since Barcelona (24 carriage-km/inhabitant) and Madrid (21 carriage-km/inhabitant) give carriage-km instead of train-km.

Graph 21. Public transport supply in vehicle-km (or train-km) / inhabitant / year



(1) Figures just for urban bus, do not include suburban bus

(2) In Vilnius the tram figure is trolleybus

(3) Metro figures are expressed in carriage-km/inhabitant instead of train-km/inhabitant

(4) Metro and suburban railway figures are expressed in carriage-km/inhabitant instead of train-km/inhabitant

3.3. Public transport demand

If we analyse the demand looking at the number of journeys on each mode, we will note that buses transport 8,545 million journeys/year and all the rail modes together 11,206 million journeys/year as sum in the metropolitan areas surveyed. If we compare the demand by the number of passengers-km, the result is even more favourable to the rail modes, highlighting the different use of the modes depending on their functionality and the length of the trip. Out of the total demand (127,215 million passengers-km/year) on the European metropolitan areas surveyed, one quarter is made on bus (26%), another quarter is made on metro (25%), and almost two quarters are made on suburban railway (46%). The remaining 3% corresponds to tram (see Table 9 and Graph 22). These ratios keep the share of last Barometer editions.

Table 9. Public transport demand

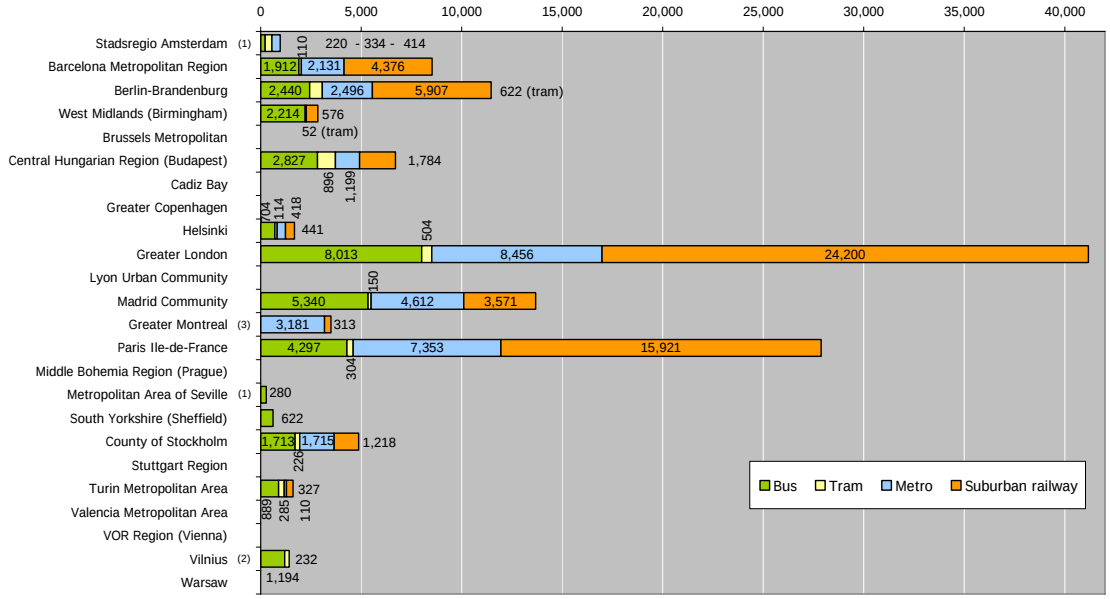
	Bus		Tram		Metro		Suburban Railway	
	Journeys / year (million)	Passenger - km (million)	Journeys / year (million)	Passenger - km (million)	Journeys / year (million)	Passenger - km (million)	Journeys / year (million)	Passenger - km (million)
Stadsregio Amsterdam	(1) 55	(1) 220	114	334	95	414		
Barcelona Metropolitan Region	339	1,912	24	110	398	2,131	154	4,376
Berlin-Brandenburg	475	2,440	209	622	509	2,496	425	5,907
West Midlands (Birmingham)	320	2,214	5	52			40	576
Brussels Metropolitan	91		76		133		70	
C. Hungarian Region (Budapest)	667	2,827	325	896	287	1,199	105	1,784
Cadiz Bay	17							
Greater Copenhagen	203							
Helsinki	158	704	55	114	57	418	42	441
Greater London	2,257	8,013	96	504	1,065	8,456	854	24,200
Lyon Urban Community								
Madrid Community	672	5,340	17	150	653	4,612	184	3,571
Greater Montreal	221				235	(3) 3,181	15	313
Paris Ile-de-France	1,297	4,297	93	304	1,479	7,353	1,125	15,921
Middle Bohemia Region (Prague)	156		154		259		18	
Metropolitan Area of Seville	94	(1) 280						
South Yorkshire (Sheffield)	171	622	15				8	
County of Stockholm	277	1,713	34	226	307	1,715	69	1,218
Stuttgart Region								
Turin Metropolitan Area	175	889		285		110	14	327
Valencia Metropolitan Area	103		6		61			
VOR Region (Vienna)	167		196		510		81	
Vilnius	(1) 177	1,194	(2) 112	(2) 232				
Warsaw	453		200		198		28	
TOTAL	**8,545**		**1,729**		**6,245**		**3,231**	

(1) Just urban bus figures (2) Trolleybus instead of tram (3) Includes pass-km of urban bus

By dividing passenger-km by journeys, we can get an idea of the distance travelled on each mode of transport. The longest trip obviously is made on suburban railway, around 19 km as average distance. Metro systems average trip is 6.5 km long, very similar to those made on bus and tram, which are 5 km, what shows the urban environment where these modes usually operate.

Looking at Graph 22 we observe that the highest demand on passenger-km come from the most populated metropolitan areas: Greater London, Paris Ile-de-France, Madrid, Berlin-Brandenburg, Barcelona and Budapest, all of them over 5,000 million passenger-km per year. Thus it is more interesting to analyse the figures by ratios related with population, for example journeys/inhabitant (Graph 23).

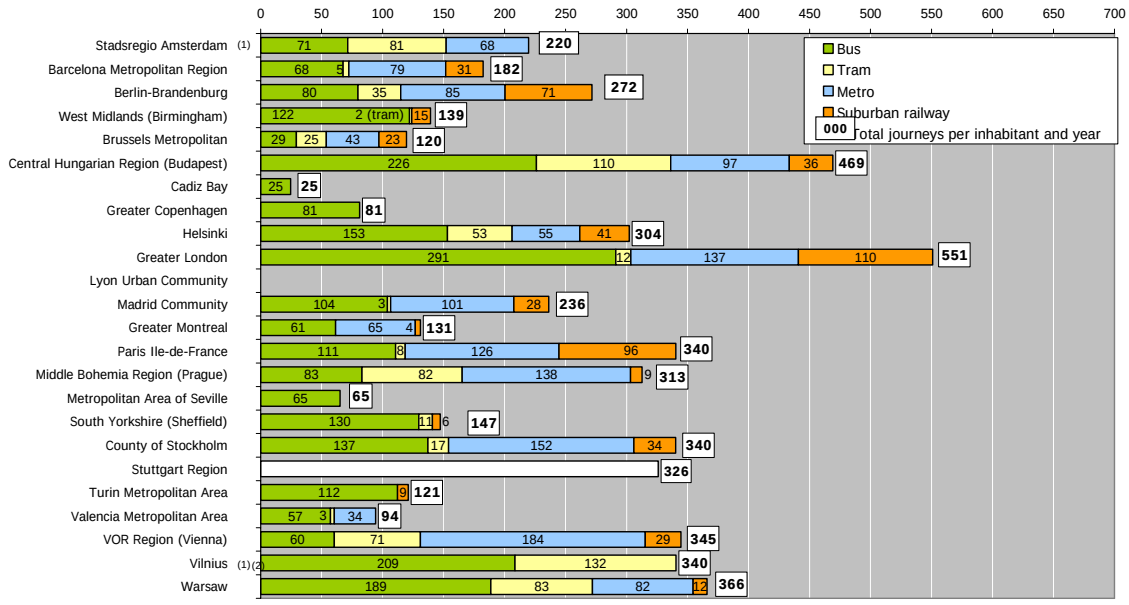
Graph 22. Public transport demand in million passenger-km/year



(1) Just urban bus figures (2) Trolleybus instead of tram (3) Includes pass-km of urban bus

Graph 23 allows us to compare the metropolitan areas notwithstanding their size. On average, the population travels 240 journeys/inhabitant-year on public transport, what is significantly higher than the last Barometer edition figure, 232 journeys/inhabitant-year, but we must make a further analysis later to check the coherency of such figure. This means that every person does at least one journey on public transport every labour day.

Graph 23. Public transport demand in journeys per inhabitant and year



(1) Just urban bus figures (2) Trolleybus instead of tram

Half of the journeys are made on bus, highlighting the importance of this network in metropolitan areas, as a complement to the rail modes. On the other hand, bigger metropolitan areas have higher rail demand. Several cities have more than 350 journeys on PT/inhabitant-year such as Greater London (551 journeys/inhabitant-year), Budapest (469) and Warsaw (366).

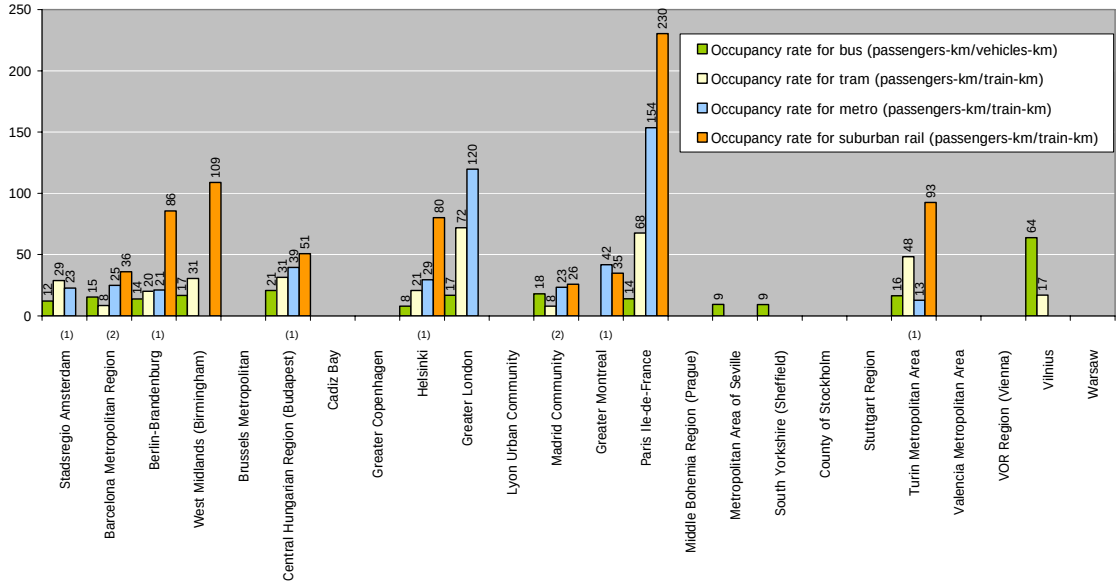
3.3.1. Occupancy rate of public transport modes

Shown in Graph 24, the occupancy rate by vehicle for the different public transport modes expressed as passengers-km/vehicles-km or train-km on rail modes. In general terms, we observe quite low occupancy ratios for all modes, what makes a challenge in all cities, to increase occupancy rate, therefore, the efficiency.

As we could expect, suburban railway and metro systems have the highest occupancy ratios (83 and 49 passengers/train on average respectively) because of the bigger capacity of the rolling stock. The tram average occupancy is 32 passengers and buses have a ratio of 18 passengers per vehicle.

Regarding the heavy rail occupancy, the highest ratios are Paris and Birmingham (230 and 109 passengers-km/train-km). On metro, Paris and London have remarkable figures because they express occupancy in trains while the rest of cities express occupancy on each carriage. It is noticeable the occupancy rate in trams in London (72 passengers-km/train-km), and on buses, in Vilnius (64).

Graph 24. Occupancy rate by modes



(1) Metro figures are expressed in carriage-km instead of train-km

(2) Metro and suburban railway figures are expressed in carriage-km instead of train-km

3.4. Evolution of public transport supply and demand

In Table 10 and 11 we have gathered information of supply and demand from this present edition of the Barometer (2009) and two last ones (2006 and 2004). We have not taken into consideration previous data (2002 and 2000) because we would have obtained less consistent figures due to different participation of metropolitan areas throughout all these years. In addition, many metropolitan areas' cells appear empty trying to take into account only homogeneous data.

We can observe that the demand in the period 2004-2009 (Table 10) has increased in all modes but at different levels: bus supply have increased by 7.5%, the tramway by 5.5% and metro by 6% while suburban railway increase by 29.3%. However, the more significant increases have occurred in the last period (2006-2009).

Table 10. Evolution of public transport supply

SUPPLY	Bus			Tram			Metro			Suburban railway		
	veh-km / year (million)			train-km / year (million)			train-km / year (million)			train-km / year (million)		
	2004	2006	2009	2004	2006	2009	2004	2006	2009	2004	2006	2009
Stadsregio Amsterdam												
Barcelona Metropolitan Region	101	108	125	1	3	3	79	69	86	64	97	122
Berlin-Brandenburg	172	172	177	34	27	31				71	70	69
West Midlands (Birmingham)	136	133	133	2	2	2				4	5	5
Brussels Region				11	12	12	18	5	5			
Central Hungarian Region (Budapest)												
Cadiz Bay												
Greater Copenhagen												
Helsinki	89	83	88	5	5	6	13	13	14	5	5	6
Greater London	470	458	478	2	3	7	65	66	71			
Lyon Urban Community												
Madrid Community	247	263	297							105	108	139
Greater Montreal												
Paris Ile-de-France	272	285	310	3	3	4	44	44	48	68	66	69
Middle Bohemia Region (Prague)	79	88	88	24	25	29	9	10	11	8	9	13
Metropolitan Area of Seville	39	26	30									
South Yorkshire (Sheffield)												
County of Stockholm												
Stuttgart Region	51	52	54	13	14	16				9	9	9
Turin Metropolitan Area	52	53	55	7	8	6				4	4	4
Valencia Metropolitan Area	30	31	28	1	1	2	5	6	5			
VOR Region (Vienna)	30	29	56	39	37	34	60	63	71			
Vilnius	33	19	19									
Warsaw												
	1,802	1,799	1,937	143	138	151	292	275	310	336	372	435
		2004-2009	7.5%		2004-2009	5.5%		2004-2009	6.0%		2004-2009	29.3%
		2004-2006	-0.1%		2004-2006	-3.1%		2004-2006	-6.1%		2004-2006	10.7%
		2006-2009	7.6%		2006-2009	8.9%		2006-2009	12.9%		2006-2009	16.8%

In Table 11 we observe the demand has increased homogeneously in all modes (between 12 and 13%). Part of this increase might be explained by the increase of population (5% in average in the same period).

Table 11. Evolution of public transport demand

DEMAND	Bus			Tram			Metro			Suburban railway			Total journeys in PT per inhabitant			
	Journeys / year (million)			Journeys / year (million)			Journeys / year (million)			Journeys / year (million)						
	2004	2006	2009	2004	2006	2009	2004	2006	2009	2004	2006	2009	2004	2006	2009	*2004-2009*
Stadsregio Amsterdam													183	341	220	*20.1%*
Barcelona Metropolitan Region	327	340	339	8	17	24	386	397	398	147	157	154	182	188	182	*0.3%*
Berlin-Brandenburg	na	450	475										199	177	272	*36.5%*
West Midlands (Birmingham)	315	310	320	5	5	5				29	33	40	135	134	139	*2.8%*
Brussels Region	77	86	91	66	71	76	106	123	133	66	68	70	106	116	120	*13.1%*
Central Hungarian Region (Budapest)	707	812	667	357	391	325	299	293	287	102	103	105	496	500	469	*-5.4%*
Cadiz Bay																
Greater Copenhagen																
Helsinki	162	150	158	56	53	55	55	57	57	38	41	42	314	302	304	*-3.3%*
Greater London	1,803	1,816	2,257	19	76	96	976	971	1,065	700	503	854	473	448	551	*16.4%*
Lyon Urban Community																
Madrid Community	750	758	672				618	660	653	196	204	184	262	270	236	*-10.0%*
Greater Montreal	206	212	221				218	220	235	14	15	15	119	124	128	*7.6%*
Paris Ile-de-France	1,225	1,229	1,297	44	50	93	1,336	1,406	1,479	1,008	1,096	1,125	329	327	341	*3.5%*
Middle Bohemia Region (Prague)	106	135	156	98	120	154	138	183	259	26	12	18	217	265	313	
Metropolitan Area of Seville	102	99	94										90	84	65	*-27.5%*
South Yorkshire (Sheffield)	120	115	171	13	14	15				6	6	8	109	105	147	*34.9%*
County of Stockholm	253	267	277	29	32	34	278	297	307	62	64	69	327	344	340	*3.9%*
Stuttgart Region																
Turin Metropolitan Area	165	166	175							14	14	14	117	118	121	*3.3%*
Valencia Metropolitan Area	116	119	103	5	5	6	52	60	61				110	106	94	*-14.6%*
VOR Region (Vienna)	162	118	167	205	205	196	420	450	510				371	343	345	*-7.1%*
Vilnius	277	169	177										501	476	340	*-32.0%*
Warsaw	495	452	453	225	249	200	116	88	198				348	368	366	*5.0%*
	7,369	7,804	8,270	1,130	1,287	1,278	4,997	5,203	5,641	2,408	2,317	2,698	249	257	255	
		2004-2009	12.2%		2004-2009	13.1%		2004-2009	12.9%		2004-2009	12.0%		2004-2009	2.1%	
		2004-2006	5.9%		2004-2006	13.8%		2004-2006	4.1%		2004-2006	-3.8%		2004-2006	2.9%	
		2006-2009	6.0%		2006-2009	-0.6%		2006-2009	8.4%		2006-2009	16.5%		2006-2009	-0.8%	

Regarding journeys in public transport per inhabitant and year, we see there are very different situations of very significant increase (Berlin, Sheffield, Amsterdam, London and Brussels over 10%), of slight increase or stabilization (Montreal, Warsaw, Sheffield, Stockholm, Paris, Turin, Birmingham and Barcelona between 0.3% and 7.6%), and others where the decrease in demand is noticeable (Vilnius, Seville). The average use of public transport per inhabitant in the period 2004-2006 showed an increase of close to 3%, while the tendency afterwards have shifted to a decrease of 1% in the period 2006-2009. This decrease in demand (and probably its reflect in supply) is likely to become more noticeable in the last years (from 2009 until today) where the economic situation has worsened.

3.5. Quality of public transport supply

Public transport authorities and operators have regarded an improvement of the quality of services provided as one decisive way to improve the attractiveness of public transport systems over the past years. Quality of service includes very different features, and Tables 12 and 13 refer to some basic ones.

3.5.1. Bus quality indicators

Generally speaking, the commercial speed for urban bus lines is less than 20 km/h (close to 18 km/h on average), while on suburban lines commercial speed is clearly much higher (28 km/h).

It is noticeable that 80% of the urban bus fleets are predominantly low floor.

The average age of the fleet is 8 years old; the cities with older fleets in previous Barometer editions have decreased their average age of vehicles showing the big effort made to renew their fleets (Budapest, Turin, and Warsaw). Barcelona, Madrid and Seville do not exceed 6 years old.

Table 12. Supply quality indicators for bus and tram or light rail

	Bus (urban)				Tram			
	Commercial speed (urban/suburb) (km / h)	Amplitude of service (hours)	Low floor buses (%)	Average age of vehicles (years)	Comercial speed (km / h)	Amplitude of service (hours)	Station accesible for PRM (%)	Average age of vehicles (years)
Stadsregio Amsterdam	21.5 / 28	19.0	100%	8.0	16.7	19.0	8%	12.5
Barcelona Metropolitan Region	11.7 / 26.1	17.0	100%	5.8	18.3	19.0	100%	5.0
Berlin-Brandenburg	19.5	21.0		na	19.1	24.0		
West Midlands (Birmingham)	20.0	18.0	88%	7.7	35.0	19.0	100%	10.0
Brussels Metropolitan	17 / 25	19.5	100%	6.0	16.8	19.5	75%	20.0
C. Hungarian Region (Budapest)	14.8 / 30	24.0	21%	16.7	13.4	22.0	0%	29.6
Cadiz Bay	na / 36.6	19.1	13%	8.2	na	na	na	na
Greater Copenhagen	23 / 35	20.0	95%	6.0				
Helsinki	23 / 32	20.2	99%		15.0	21.0		25.0
Greater London			100%	6.1		20.0	100%	11.0
Lyon Urban Community	18 / na	20.0	67%	8.9	21.3	20.0	100%	4.3
Madrid Community	13.6 / na	24.0	100%	5.6	22.9	19.9	100%	2.5
Greater Montreal	15.5 / 26.6	20.0	76%	8.6				
Paris Ile-de-France	14 / 24	24.0	100%		20.9	22.0	100%	
Middle Bohemia Region (Prague)	25 / 32	24.0	40%	9.0	18.0	24.0		12.0
Metropolitan Area of Seville	13.3 / 24	18.0	100%	5.3	11.3	20.0	100%	2.0
South Yorkshire (Sheffield)		19.5	83%	8.1		19.0	100%	15.0
County of Stockholm		20.0	100%			20.0	20%	
Stuttgart Region					27.3	20.0		
Turin Metropolitan Area	17.9 / 28	20.5	56%	9.0	17.9	20.5		20.7
Valencia Metropolitan Area	11.8 / 22	17.0	96%	8.0	18.0	18.0	100%	10.0
VOR Region (Vienna)	16.8	24.0	100%		15.3		100%	
Vilnius	21.0	21.3	50%	10.0				
Warsaw	21 / 26.8	20.5	76%	7.6	18.6	19.0		23.0

Regarding the fleet composition by type of fuels, the urban bus fleets are the most innovative and varied compared to the suburban bus fleets, where there are some electric, hybrid and ethanol propelled buses. The standard diesel buses are predominant in most of the cities surveyed, except in Madrid, Montreal and

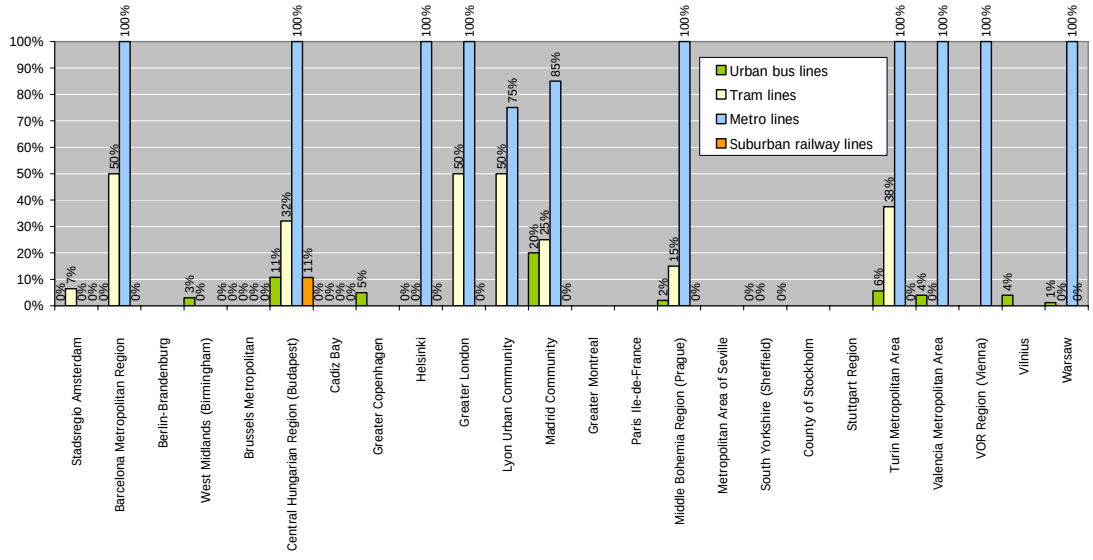
Seville where there is predominance of biodiesel, in Vienna CNG (Compressed Natural Gas), and in Vilnius electric buses. In interurban bus fleets, also the majority of buses are standard diesel, except in Seville, where the predominance is CNG (97%).

Table 13. Composition of the bus fleet by type of fuel

	Bus fleet of main city network								Bus fleet of suburban network			
	No. buses	Diesel (%)	Biodiesel (%)	CNG (%)	Electric (%)	Hybrid (%)	Ethanol (%)	Other (%)	No. buses	Diesel (%)	Biodies (%)	CNG (%)
Stadsregio Amsterdam	267	100							477	100		
Barcelona Metrop. Region	1,006	59	12	29	0	0	0		1,312	100		
Berlin-Brandenburg	1,455	97	0	0	0	1	0	1	1,776	98	0	2
W. Midlands (Birmingham)	2,200 buses // 100% diesel											
Brussels Metropolitan	623	95	0	5								
C. Hung. Reg. (Budapest)	1,537	90	0	0	10	0	0	0	748	100		
Cadiz Bay									111	95	5	
Greater Copenhagen	955	100							370	100		
Helsinki		72	16	12					1377	74	22	4
Greater London	8,500 buses // 99% diesel , 1% hybrid											
Lyon Urban Community		88			12							
Madrid Community	2,092	16.5	62.7	19.6	1.0		0.2		2,124	89.5	10	0.5
Greater Montreal	1,830	0.4	99.6						1,127			
Paris Ile-de-France	8,781 buses // 95% diesel , 2% CNG , 3% hybrid electric											
M. Bohemia Reg. (Prague)	1,400	98		1	1				500	100		
Metrop. A. of Seville	403		62	36	2				189		3	97
South Yorkshire (Sheffield)		100								100		
County of Stockholm												
Stuttgart Region												
Turin Metropolitan Area	1,229	76	0	22	2				132	100		
Valencia Metropolitan Area	480	61	21	18					108	100		
VOR Region (Vienna)	500	20		80								
Vilnius	295	39		15	46							
Warsaw	1,780	100							na	100		

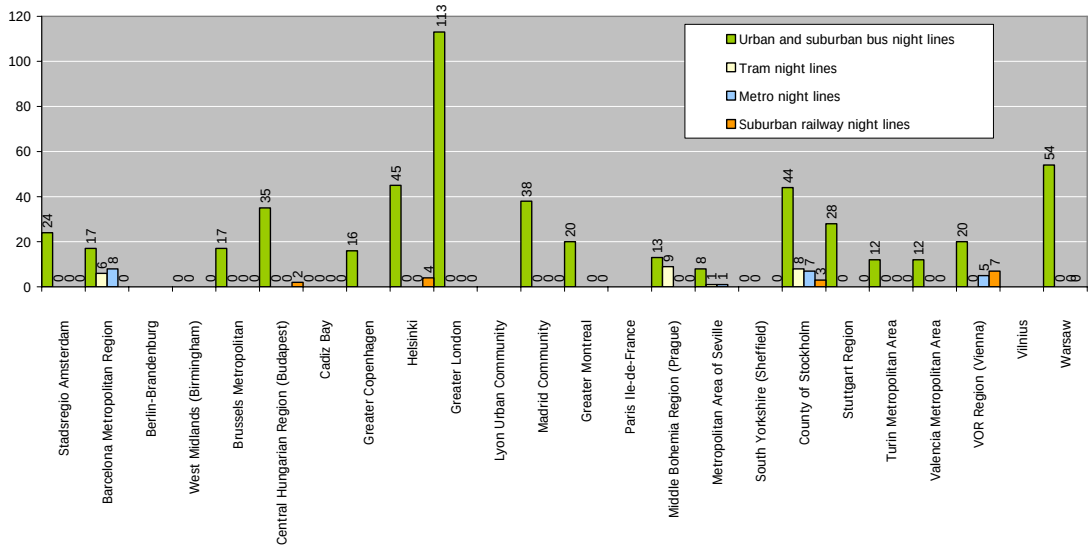
Madrid and Budapest have the highest bus frequency on peak hour, with respectively 20% and 11% of urban lines with less than 5 minutes of frequency on that period (Graph 25). Compared to previous year's figures, the % of lines with such high frequency has been reduced, in some cases up to 50% of reduction.

Graph 25. % of lines with frequency under 5 min on peak hour



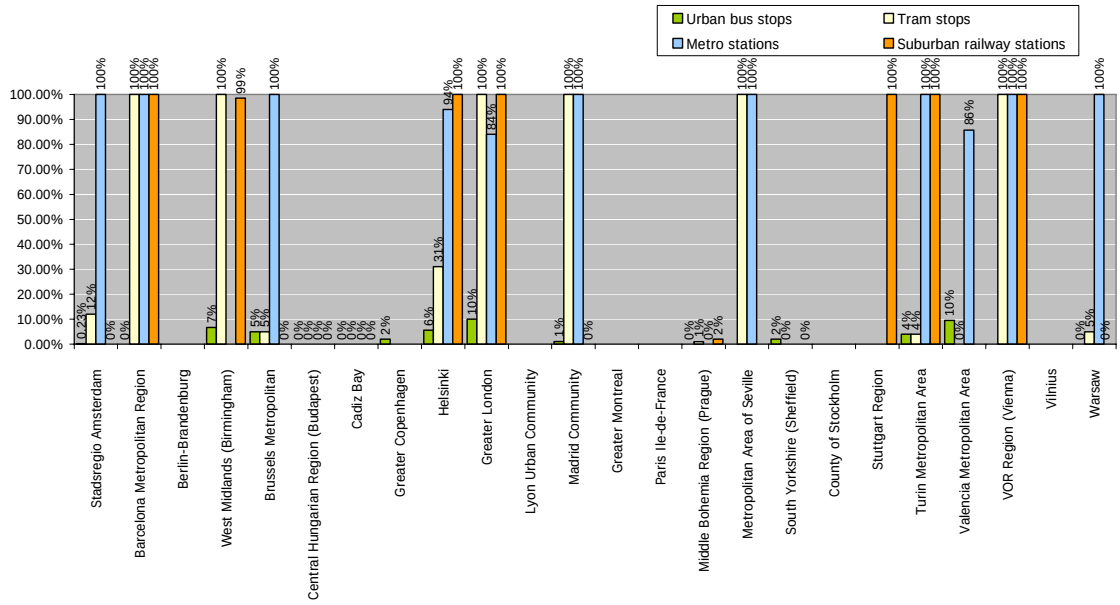
All cities but three have night bus services on a weekend day, and the number varies from 8 lines in Seville to 113 lines in Greater London (Graph 26). It is remarkable that the bus is the mode chosen in most of the cases to cover the public transport night services, due to the low demand and less operational costs, but as noted before, the supply has been also reduced in such services compared to previous data, up to the point that in some cases the bus night lines have been cut out.

Graph 26. Number of night lines on a weekend day



Regarding the bus stops with real time information, we must differentiate among the dynamic information displays (which % is shown in Graph 27) and the SMS or mobile information devices. In the first case, the % of stops equipped with real time information varies between 0.2% (Amsterdam) and 10% (Valencia).

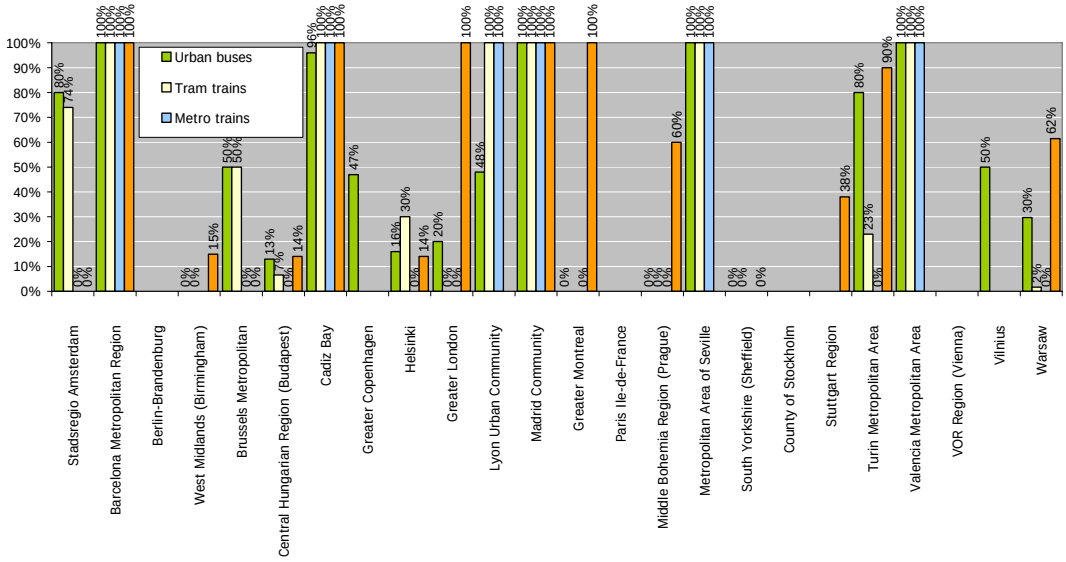
Graph 27. Stops and stations equipped with real time information



The second case (SMS or mobile information tools) usually is 100% coverage of the urban network once is implemented (with exceptions if there are many operators), that is the case in 9 of the 24 cities surveyed (Amsterdam, Barcelona, Birmingham, Brussels, Copenhagen, London, Madrid, Sheffield and Turin). There is also 100% of the urban bus fleet equipped with real time information devices in Amsterdam, London in Madrid.

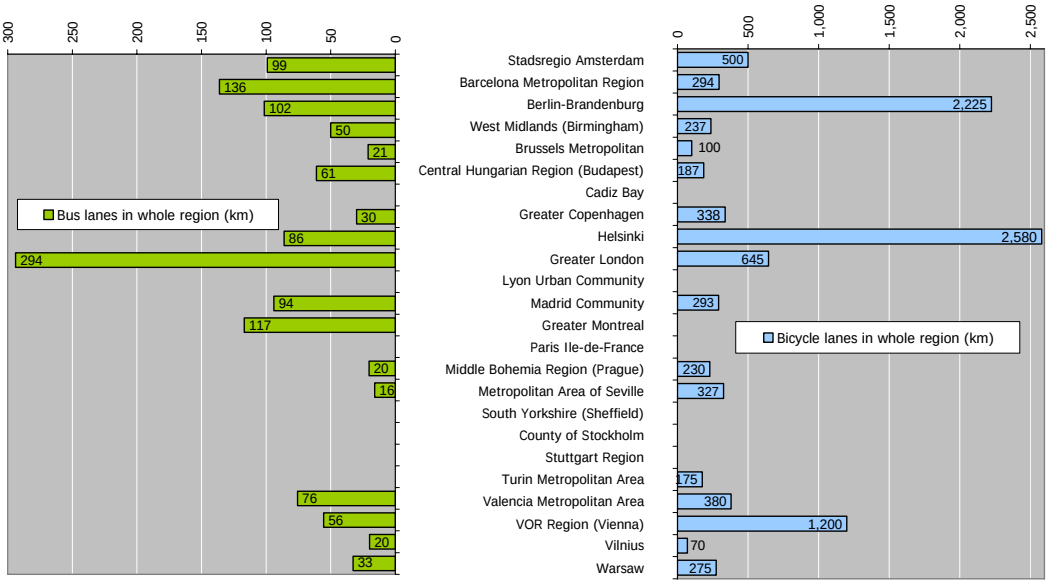
In Graph 28, we can observe that the southern cities have 100% of bus vehicles equipped with air conditioning due to their higher temperatures.

Graph 28. Vehicles equipped with air conditioning



The cities that have provided information sum to more than 1,300 km of dedicated bus lanes in a whole region (77 km on average), varying from 16 km in Seville to over 100 km in Greater London (294 km), Barcelona (136 km), Montreal (117 km) and Berlin (102 km) (Graph 29, left part).

Graph 29. Length of dedicated bus lanes and bicycle lanes in whole region



Compared to last edition of the Barometer, the number of km of dedicated bus lanes have increased considerably, from 55 km to the actual 77 km.

The length of bicycle lanes is much higher, with a minimum of 70 km in Vilnius (just in the city) up to 2,580 km in Helsinki.

3.5.2. Light rail/tram quality indicators

The commercial speed for tram systems does not exceed 20 km/h in all cases but Birmingham (35 km/h), Stuttgart (27.3 km/h on his underground light rail), Madrid (22.9 km/h), Lyon (21.3 km/h) and Paris (20.9 km/h), which count with suburban lines (Table 12). It is worth noticing that the speed of the tram system is not much higher than the speed of the bus system (including interurban buses) especially when they do not benefit from dedicated lanes. On the other hand, trams have other positive aspects such as higher capacity, regularity, reliability image, urban regeneration, etc.

The amplitude of the service is in general between 18 and 22 hours per day except for Prague and Berlin (24 h). The great majority of the systems are 100% accessible for People with Reduced Mobility (PRM), but few cities with old systems keep a big quantity of non-accessible stations. In the cities with newly inaugurated tram systems, the average age is very low compared to other older systems, but in average the vehicles are 13 years old.

The ratio of frequency on peak hour (Graph 25) varies very much depending on the case. In Barcelona, London and Lyon, 50% of the tram lines have a frequency under 5 minutes on peak hour, while in many other cities frequencies are above 5 min at all periods. Turin (38%) and Budapest (32%) also have high frequencies. As it has occurred in bus networks, the % of lines with high frequencies on peak hour has been reduced compared to previous years.

Barcelona, Birmingham, London, Madrid, Seville and Vienna have the whole tram network covered by real time information displays at stops (Graph 27), and Amsterdam, Birmingham, Brussels, Helsinki, London and Turin have 100% tram network coverage by SMS or mobile information tools.

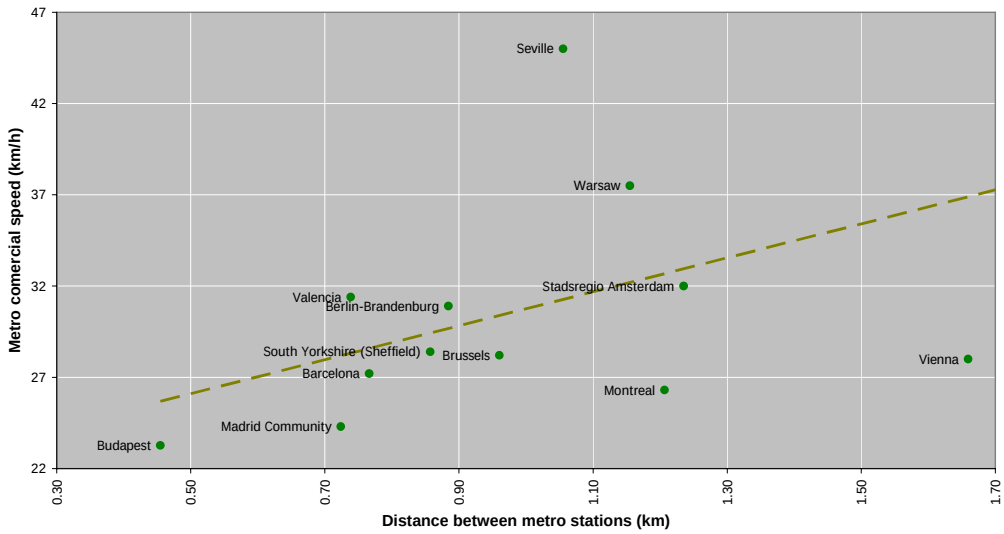
3.5.3. Metro quality indicators

In Table 14, it can be seen that the commercial speed of the metro system is over 30 km/h in many cities, reaching 46 km/h in Helsinki or 45 km/h in Prague. Contrary to this, Budapest, Lyon and Paris have lower speeds (under 25 km/h) due to the short distance between the stations, 450 m and 700 m respectively on average. As an example of how the distance between stations in a metro network influences the commercial speed, see Graph 30. The figure shows clearly that longer distances between metro stations lead to higher speeds; therefore this factor is determinant in the metro network operation. The characteristics of the rolling stock and other features have little influence in the commercial speed.

Table 14. Supply quality indicators for metro and suburban railway

	Metro				Suburban railway			
	Commercial speed (km / h)	Amplitude of service (hours)	Station accesible for PMR (%)	Average age of vehicles (years)	Commercial speed (km / h)	Amplitude of service (hours)	Station accesible for PMR (%)	Average age of vehicles (years)
Stadsregio Amsterdam	32.0	19.0	100%	23.0	78.5	20.5	na	na
Barcelona Metropolitan Region	27.2	19.0	85%	8.7	52.7	18.0	na	11.5
Berlin-Brandenburg	30.9	21.0			39.2	21.0		
West Midlands (Birmingham)					38.0	18.0	80%	14.0
Brussels Metropolitan	28.2	19.5	20%	15.0	60.0	18.0	0%	29.0
C. Hungarian Region (Budapest)	23.3	18.6	14%	30.4	34.6	21.5	10%	19.4
Cadiz Bay	na	na	na	na	60.0	na	100%	na
Greater Copenhagen								
Helsinki	46.0	18.0	100%	24.5	56.0	20.8	98%	26.6
Greater London		19.0	23%	28.0		19.5	26%	1.0
Lyon Urban Community	24.3	20.0	99%	28.8				
Madrid Community	26.3	19.5	63%	12.2	na	19.6	na	na
Greater Montreal	37.6	20.0	9%	37.4	43.6	19.0	6%	25.0
Paris Ile-de-France	24.5	21.2	3%		44.4	20.3	24%	
Middle Bohemia Region (Prague)	45.0	19.0	56%	4.0	44.0	19.0	20%	25.0
Metropolitan Area of Seville	28.4	17.0	100%	1.0		17.5		
South Yorkshire (Sheffield)						19.5		
County of Stockholm		20.0	90%			20.0	70%	
Stuttgart Region					50.0	20.0	50%	12.0
Turin Metropolitan Area	31.4	18.0	100%	3.0	47.5	19.0	64%	22.5
Valencia Metropolitan Area	28.0	18.0	98%	11.0				
VOR Region (Vienna)	31.6	24.0	100%	23.0			100%	18.0
Vilnius								
Warsaw	37.5	21.0	100%	10.0	24.4	19.0	33%	15.9

Graph 30. Link between metro stations separation and commercial speed



Coming back to Table 14, the amplitude of the metro services is very high; the majority of the cities are between 18 and 20 hours, reaching 21 h in Berlin, Paris and Warsaw, and 24 h in Vienna.

The metro networks that are 100% accessible to PRM are the cases of Amsterdam, Helsinki, Turin, Seville, Vienna and Warsaw (Lyon and Valencia 99 and 98%), while in the oldest systems such as Paris the

percentage come down to 3%. Regarding the average age of the rolling stock there are big differences in the figures between the oldest systems (Montreal and Budapest, over 30.0 years) and the newest in Seville and Turin (3 and 1 year old) which is the period into operation of the metro system in those cities.

Metro is the mode with highest frequencies on peak hour (Graph 25). Out of 14 cities providing data, 9 cases have all the metro lines with a frequency less than 5 minutes on peak hour. However, the supply for night services (Graph 26) is scarce in metro systems, only Barcelona, Seville, Stockholm and Vienna operate metro on weekend nights.

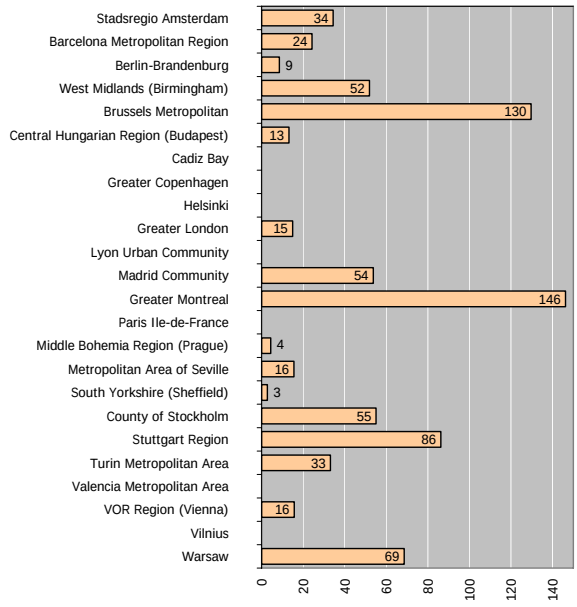
With regard to real time information at stations (Graph 27), also in most of the cases 80-100% of the stations-network have real information, except Budapest, Cadiz and Prague.

3.5.4. Suburban railway quality indicators

The majority of the suburban railway networks have commercial speed above 40 km/h, up to 78.5 km/h in Stadsregio Amsterdam, becoming the fastest public transport mode with a speed of 48 km/h on average (Table 14). The amplitude of the service is similar to the rest of the modes, between 17.5 h and 21.5 h, and any case with 24 h services, contrary to what previous years information showed. The accessibility to the stations for PRM is low, but efforts are made to make it more accessible (Birmingham, Cadiz, Helsinki, Vienna) with 100% or close to it of accessible stations. The average age of the vehicles is comprised between 1 year (Greater Stuttgart) and 29 years (Brussels).

Only few lines in Budapest have frequencies under 5 minutes on rush hour (11% of the lines) (Graph 25). VOR Region (Vienna) has 7 suburban rail lines offering night services on weekends, 4 in Helsinki, 3 in Stockholm and 2 in Budapest (Graph 26). The coverage with real time information on stations is quite high, as we have seen in the other rail modes (Graph 27).

Graph 31. Number of Park and Ride places per km of suburban train network

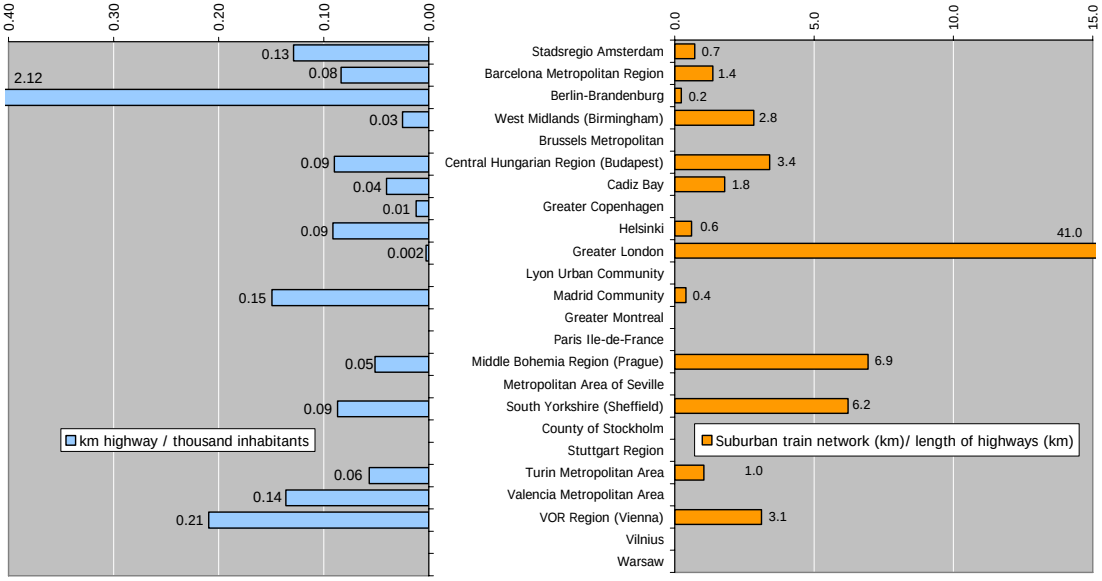


An important element of a suburban train system is the Park and Ride facility. They are usually linked to train stations, but as in the case of Birmingham, they can also be related to bus and metro stations. In Montreal (Graph 31), there are more 146 parking spaces per km of suburban rail network, 130 in Brussels, 86 in Stuttgart and 69 in Warsaw. This policy leads the people to use public transport for radial trips from suburbs to city centre.

To have an idea about the policies developed by different metropolitan areas we can look at Graph 32 and 33. In Graph 32 (left part) we can see the road density by km of highway per thousand inhabitants, and we observe that Berlin, Vienna, Madrid, Valencia and Amsterdam have the highest densities. Comparing the left part of the graph with the right part, the cases of Madrid, Amsterdam and Helsinki show a predominance in road densities compared to train densities (low ratios in right part). Berlin-Brandeburg has such a high ratio in highway density that train density appears low, which is not completely true because we have to keep in mind the very wide area is referred. Vienna, Sheffield and Budapest show high road densities and high train network densities. (Note: there might be different interpretation of the meaning of a “highway” what makes comparisons difficult).

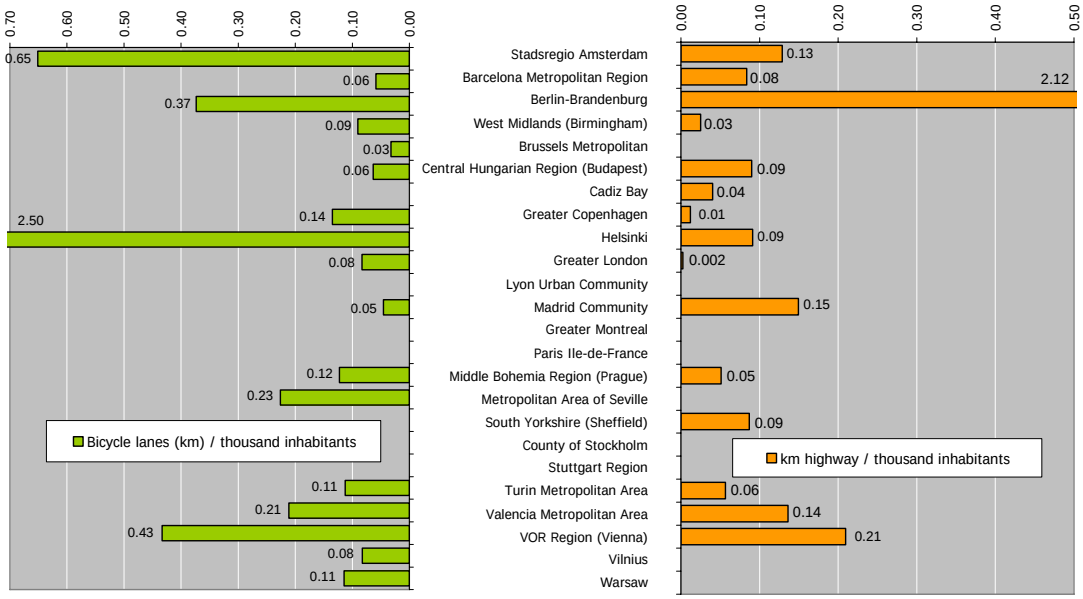
Greater London and Prague have developed more the suburban rail network than on highways (respectively, 41 and 7 times more length on train network than on highways), but Greater London figure is a special case: due to the urban and dense context of the area, which accounts with less space and conditions to construct highways. Out of the 13 metropolitan areas with data available, 9 have greater suburban rail network than highways network.

Graph 32. Suburban train network length (km) / highways length (km)



Graph 33 shows indicators to compare length of bicycle lanes with highways length. It is remarkable the high ratio of bicycle lanes in Helsinki, Stadsregio Amsterdam, Vienna and Berlin, and highways length in Berlin, as we have seen before in other graphs. In general terms we can say that metropolitan areas are making a big effort on bicycle infrastructures, or at least are looking for a balance between car infrastructures and soft modes.

Graph 33. Bicycle and highways length



4. Fares and Financial Aspects

4.1. Fares in main city and whole region

Most of the cities have besides the single ticket, many other different type of tickets, such as a multiple trip ticket and season integrated passes, as well as discounts for students and elderly people (Tables 15 and 16).

Table 15. Fares in main city for all modes

	Single ticket (€)	Multiple trips coupon (€)	Trip with multiple trip coupon (€)	Monthly pass (€)	Yearly pass (€)	Student monthly pass (€)	Elderly people monthly pass (€)
Amsterdam	0.97	7.30		40.00	400.00	26.40	26.40
Barcelona	1.35	7.95	0.80	47.90		(1) 112.00	(2) 3.30
Berlin	2.10	8.00	2.00	72.00	670.00	26.00	45.00
Birmingham	1.69			82.33	868.48	41.16	free out of peak
Brussels	1.70	12.30	1.23	49.50	495.00	(3) 200.00	
Budapest	1.11	9.97	1.00	34.70	394.98	13.66	13.66
Cadiz	1.00			35.00			
Copenhagen	2.82	17.47	1.75	43.01	473.11	43.01	49.06
Helsinki	2.50			41.20	453.30	15.80	41.20
London							
Lyon							
Madrid	1.00	7.40	0.74	46.00	506.00	29.50	10.90
Montreal	2.00	9.26	1.54	49.82	548.02	26.91	26.91
Paris	1.60			56.60	574.60	(3) 287.70	
Prague	0.72			22.00	190.00	5.20	10.00
Seville	1.00		0.70	28.00			
Sheffield	1.08			85.16			
Stockholm	2.82	2.12	1.06	64.96	685.42	39.54	(3) 411.44
Stuttgart	1.95	3.60	0.90	52.30	523.00	37.80	39.70
Turin	1.00	13.50	0.90	32.00	290.00	18.00	18.00
Valencia	1.40	6.50	0.65	37.40		28.05	9.00
Vienna	1.80	14.40	1.80	49.50	449.00	(3) 79.60	(3) 224.00
Vilnius	0.58			31.85		6.37	6.37
Warsaw	0.70			19.50		9.75	

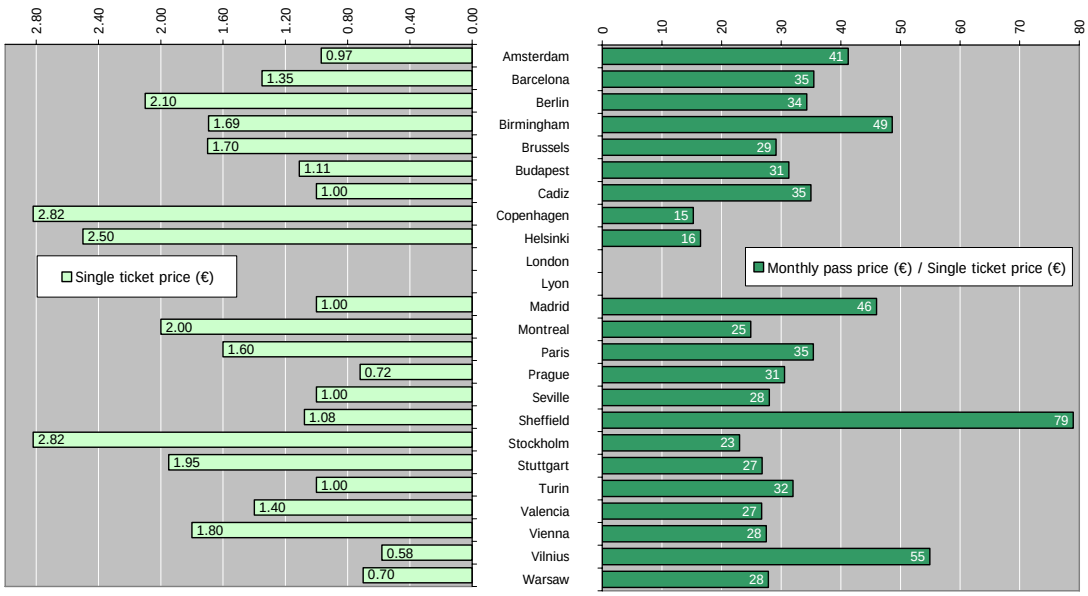
(1) Pass valid for 3 months (2) Pass valid for ten trips (3) Pass valid for one year

The price for a single ticket in the main city varies from 0.58 € in Vilnius to 2.82 € in Copenhagen or Stockholm, but most of them are between 1.00 and 2.00 €.

The price of a monthly pass goes from 19.50 € in Warsaw to 85.16 € in Sheffield, but this value does not consider the differences in economy and size between the cities, so we will better see later few ratios in order to compare them.

Comparing these figures with last Barometer edition, we can observe there is a general increase on both prices (single ticket and monthly pass) of around 13% as average, varying between 6 and 20%. There are cases with very small increase or no increase in one or another type of ticket (Berlin, Birmingham, Helsinki, Madrid). Others show a decrease on prices by 10-15% (Stockholm, Montreal, Sheffield or Seville) usually on the single ticket, but this might be due to the exchange rate used.

Graph 34. Ratios in main city



What is worth noticing is the ratio of the monthly pass in relation to the single ticket (Graph 34). In a lot fair number of cities it stands around 30, which means that the user who buys an integrated monthly ticket is paying the same as one single ticket per day (30 days per month). In one extreme, we find Sheffield, Vilnius and Birmingham with high ratios (79, 55 and 49), meaning that the single ticket is very cheap compared to the monthly pass (in the case of Birmingham because the single ticket is bus only). In the other extreme we find Copenhagen, Helsinki and Stockholm with ratio around 20, cities where the saving on the integrated monthly ticket is very important compared with the single ticket.

The price of a yearly pass is 10 times the price of a monthly pass, which is a ratio very homogeneous in all the cities surveyed, varying between 8.6 in Prague and 11.4 in Budapest.

The student pass is on average around 48% cheaper than the adult pass of the same category (monthly, yearly) and almost every city has this type of pass. The student pass in Prague, Vienna and Vilnius have a significant discount, over 75% compared with the standard pass. In the case of elderly people tickets, there is a wide range of discounts. In few cities it is completely free at least during off peak hours (Birmingham) or has a symbolic low price under 15 € for a monthly pass (Vilnius, Valencia, Prague, Madrid and Budapest). Others have the same discount as students (Amsterdam, Montreal, and Turin).

In Table 16 fares for the whole metropolitan area are given, that is the most external ring or the outer zone in the fare areas division. The price of a single ticket for the whole region varies from 1.05 € in Warsaw to 19.00 € in Berlin-Brandeburg, but that is obviously much related with the size of the metropolitan area. The widest metropolitan areas have the highest single ticket price (Berlin-Brandenburg, Paris Ile-de-France, Greater Copenhagen and Vienna Region) what shows that the price of the suburban trips (longer trips) are clearly defined by the distance covered, what does not happen for the main city price.

Same kind of passes and level of discounts than in main cities are applied to the whole region fares, but in some cities are not available for trips outside the main city.

Table 16. Fares for the outer ring of the metropolitan area for all modes

	Single ticket (€)	Multiple trips coupon (€)	Monthly pass (€)	Yearly pass (€)	Student monthly pass (€)	Elderly people monthly pass (€)
Stadsregio Amsterdam				976.50	64.45	64.45
Barcelona Metropolitan Region	5.70	33.90	136.00		(1) 308.00	
Berlin-Brandenburg	19.00		176.30	1,710.10	129.40	45.00
West Midlands (Birmingham)	1.91		93.62	998.19	46.81	free out of peak
Brussels Metropolitan	2.00					
Central Hungarian Region (Budapest)	6.76		258.77	2,587.67	25.88	25.88
Cadiz Bay	5.95		78.00			
Greater Copenhagen	12.70	54.44	158.60	1,744.60	91.13	64.52
Helsinki	4.00		84.40	928.60	37.10	84.40
Greater London	4.74		206.18	2,147.52	103.09	free
Lyon Urban Community	1.60	13.30	48.60	462.00	25.00	8.40
Madrid Community	4.25	29.75	83.50	918.50	52.10	10.90
Greater Montreal	6.91	16.73	158.55	1,744.07	95.28	95.28
Paris Ile-de-France	10.30		123.60	1,251.10	(3) 708.30	
Middle Bohemia Region (Prague)	2.24		72.00	636.00	25.60	
Metropolitan Area of Seville	3.00					
South Yorkshire (Sheffield)	1.74		95.31	958.72		
County of Stockholm	5.65	4.24	64.96	685.42	(2) 230.67	
Stuttgart Region	6.50	12.10	179.10	1,791.00	131.20	60.00
Turin Metropolitan Area	1.50	21.00	42.00	378.00		
Valencia Metropolitan Area	3.60	18.00	58.00		43.50	
VOR Region (Vienna)	14.40		172.40	1,678.00		
Vilnius						
Warsaw	1.05		29.00		14.50	(3) 10.00

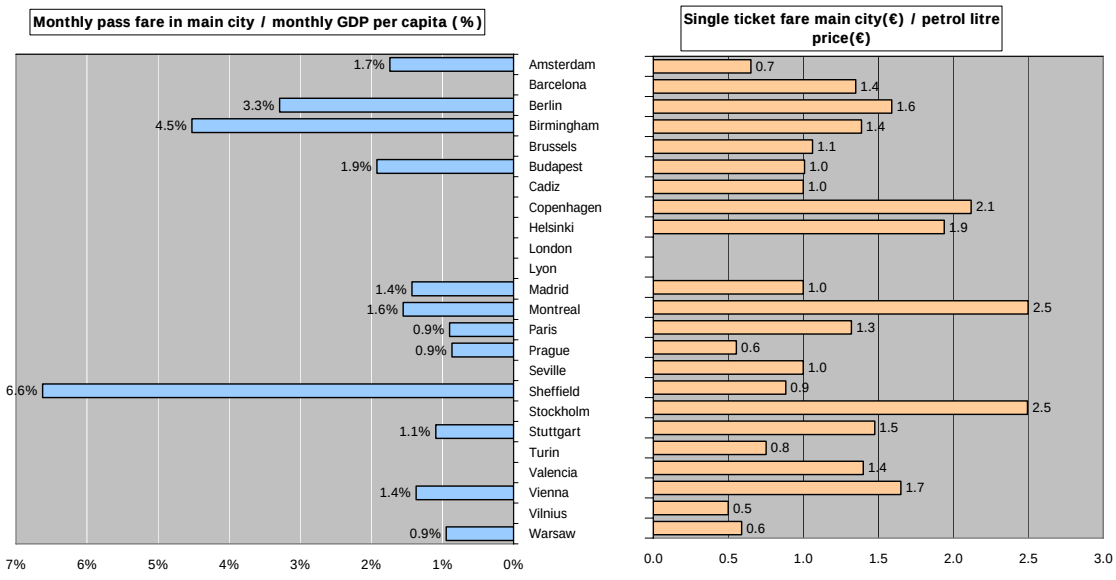
(1) Pass valid for 3 months (2) Pass valid for a semester (3) Pass valid for one year

4.2. Comparison between main city fares ratios

Graph 35 shows two ratios to compare the fares in main city relating them to GDP per capita and petrol litre price. The monthly pass price in main city compared with GDP per capita (annual GDP in main city divided by 12) gives a ratio of 2.2% on average (Graph 35, left part), slightly higher than last edition figure for 2006 (1.8%). Most of the cities are between 1 and 2%, but the highest ratios are in Sheffield (6.6%), Birmingham (4.5%) and Berlin (3.3%), coinciding with the cities with less increase of prices in the period of 2006-2009.

When we compare the single ticket fare in main city with the price of a litre of petrol (unleaded 95) (Graph 35, right part) we observe a wide range of values. The most attractive price is in Vilnius, where a single ticket costs a half of the petrol litre (0.5). This fact is opposite to the use of the private vehicle since the fuel of the car is much more expensive than the public transport ticket. On the other side, Montreal and Stockholm have the highest ratio, 2.5 times more than a litre of petrol. This fact might be explained because of the lower prices in the fuel.

Graph 35. Main city fares ratios



4.3. Financial aspects

Table 17 is very heterogeneous on its content depending on the metropolitan area. A very important indicator on public transport financing is the percentage of the operational expenses that is covered by the revenues collected by fares and the percentage covered by public subsidies. However, the attribution of costs and revenues varies very much in the different metropolitan areas. The yearly operational costs in the table are those provided by each metropolitan area, therefore they might include capital expenditures together with the purely operational expenditures since they are not broken down.

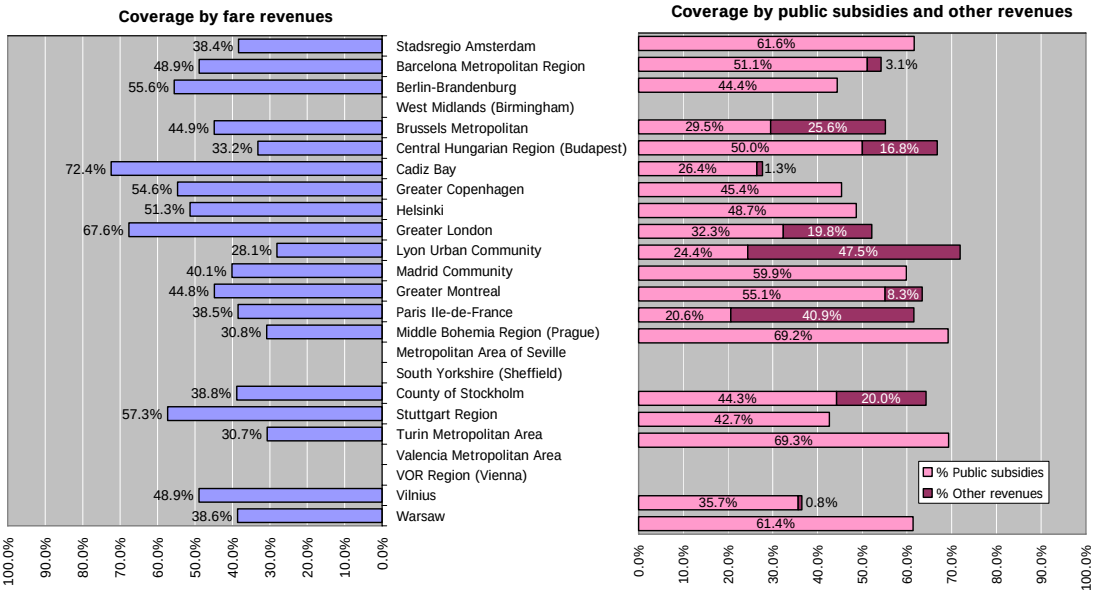
Table 17. Financial aspects

	Yearly operation cost (million € / year)	Revenues from ticket sales (million € / year)	Public subsidies (million € / year)	Other revenues (million € / year)	Modes included				
					Urb bus	Subur bus	Tram	Metro	Railw
Stadsregio Amsterdam	518.0	198.8	319.1	0.0		x		x	
Barcelona Metropolitan Region	1,025.0	500.9	524.1	31.7	x		x	x	x
Berlin-Brandenburg	1,840.6	1,022.6	818.0		x	x	x	x	x
W. Midlands (Birmingham)									
Brussels Metropolitan	457.4	205.3	135.1	117.3	x		x	x	
C. Hungarian Reg. (Budapest)	756.6	251.4	378.3	126.9	x	x	x	x	x
Cadiz Bay	9.5	6.9	2.5	0.1		x			
Greater Copenhagen	640.1	349.7	290.4	0.0	x	x			
Helsinki	444.5	228.1	216.4	0.0	x	x	x	x	x
Greater London	4,986.1	3,372.9	1,612.9	985.6	x	x	x	x	x
Lyon Urban Community	576.3	161.9	140.6	273.8	x	x	x	x	x
Madrid Community	2,155.6	865.3	1,290.3		x	x	x	x	x
Greater Montreal	1,014.3	454.8	558.9	84.4	x	x		x	x
Paris Ile-de-France	7,861.0	3,025.0	1,620.0	3,217.0	x	x	x	x	x
M. Bohemia Region (Prague)	577.7	178.0	399.7		x	x	x	x	x
Metropolitan Area of Seville									
South Yorkshire (Sheffield)									
County of Stockholm	1,309.4	508.7	579.7	261.9	x	x	x	x	x
Stuttgart Region	609.3	349.2	260.1		x	x	x		x
Turin Metropolitan Area	301.0	92.4	208.6		x	x	x	x	x
Valencia Metropolitan Area	235.6	101.7	6.9		x	x	x	x	
VOR Region (Vienna)		503.7			x	x	x	x	x
Vilnius	53.5	26.2	19.1	0.5	x		trolley		
Warsaw	372.4	143.8	228.6		x	x	x	x	x

In Graph 36 we observe that the coverage of operational costs by fare revenues is on average 45.5%, varying the percentage in cities where data are available between 28.1% in Lyon up to 72.4% in Cadiz-Bay.

The other indicator, the coverage by public subsidies is on average 45.9% what means that close to half of the public transport operational costs are covered by public subsidies from national, regional or local authorities depending on the local context, and other half by fares. The balance share between fare revenues and public subsidies is a consequence of the public service obligations entitled to public transports services and the existence of reduced social fares as we have seen in the previous section.

Graph 36. Coverage of operational costs



The rest of the percentages up to 100%, that is 18.4% on average, are other revenues corresponding to "transport tax" (as *Versement du Transport* in French metropolitan areas, 47.5% of the yearly operation cost in Lyon Urban Community and 40.9% in Paris Ile-de-France), publicity, congestion charging, taxi licensing incomes, bus enforcement fines, etc.

We should note that in few cases the figures are not consistent or do not include all modes, due to a lack of financial and rigorous information from different modes and operators and the difficulty to obtain them, even more when each case considers different items for each group of costs and different calculation. For example, British authorities in West-Midlands (Birmingham) or South Yorkshire (Sheffield) do not directly operate public transport services neither collect fares because of their deregulated system, thus they do not have available meaningful figures to allow comparison.

To obtain these ratios evolution over the years since the Barometer was first released (Table 18), we have selected the average figure of both percentages taking into account the cities participating on each edition. We observe there are not big variations, but neither a constant tendency on the evolution. However, in 2000 and 2002 coverage by fares was higher than coverage by subsidies, and from 2004 figures show the contrary. In 2006 and 2008 percentages show a slight tendency of increase in the public subsidies contribution to maintain the financial balance of the public transport system, which has been attenuated in the latest figures.

Table 18. Evolution of operation cost coverage

YEAR	2000	2002	2004	2006	2008	2009
FARES	48.7%	53.6%	47.0%	44.0%	46.9%	45.5%
SUBSIDIES	43.9%	42.6%	49.8%	47.6%	50.8%	(1) 45.9%

(1) The percentage of subsidies has decreased significantly compared to previous years mainly because the French *Versement Transport* was included under the category of "Subsidies", amount that has been shifted to "Other revenues" in this Barometer edition

5. Conclusions

The key facts we draw in this report are the following:

- **The metropolitan areas surveyed show differences in terms of surface area, population and urban density**. The different urban layouts have significant consequences for the coordination of the provision of public transport among the various local authorities concerned. Administrative and legislative organization also contribute to these differences.

- **Main cities gather more than 48% of the population of the metropolitan area** on 6% of its surface. This population percentage has been increased throughout the last years (up 2% compared to 2006), showing a tendency of citizens moving towards city centres to live, after a period of population concentration in the suburbs.

- **The number of trips per person per day (including motorised and non motorised trips) is 2.7 as an average in the metropolitan areas surveyed** (down from 3 in 2006). Each motorised trip represents 28 min time (5 min less than in 2006) and 15 km distance. 38% are commuting trips like home-to-work and home to school, a figure that has decreased edition after edition of this report (40% in 2006 and 45% in 2004), meaning we move more and more for other reasons.

- In average there is one car for every two inhabitants, but the tendency is that **higher GDP´s are related with lower motorisation rates (and often with higher PT provision)**. This is very important for the Public Transport Authorities, which see a growing responsibility in offering a more attractive public transport system to a less car dependant society.

- The high car ownership ratios explain why private car remains the favoured mode of transport (49% of total trips, 2% up from 2006), followed by non-motorised modes (26% walking and 5% cycling) and public transport (20%). There is a trend to a link between car ownership and public transport use, though it is not very strong and there is a large dispersion of data, pointing out that the more cars we own, the less we use public transport. This fact can also be used for parking policies for residents.

- **In main cities the modal share is quite balanced, 34% private car, 36% soft modes (walking and cycling) and 31% public transport**. This underlines the leading role of an efficient safe and fair public transport system in large urban territories and how dense urban areas favour the soft mobility. However when considering the trips outside the main city (radial trips, interurban trips and internal trips in other municipalities) the private car share rises up to 60%. The lower level of public transport provision, but also the characteristics of urban development combined with road infrastructure provision have a determinant impact.

- **Metro systems are expanding** or appearing in almost all the cities surveyed, being successful in dense areas, although there are some differences in occupancy and therefore in efficiency of these systems.

- The number of tramway routes and systems is increasing quite fast in several European metropolitan areas, based on the **new concept of tramways on dedicated platform called light rail system**. They represent an alternative for medium capacity modes.

- Considering public transport demand, **the bus attracts 25% less passengers than all rail modes together** (journeys/year). In general terms, both supply and demand have increased in the period of 2004-2009, but there are few cases of reduction of supply and demand.

- On average, the population does more than **240 journeys per inhabitant a year on public transport**, what shows a clear increasing tendency from the first Barometer editions (230 journeys in 2006 and 210 in 2004).

- The fastest modes are the rail modes, with averages of **commercial speed of 48 km/h for heavy rail, 31 km/h for metro, 19 km/h for tram, and 28 km/h suburban bus services and 17 km/h urban bus**. It is remarkable that tram and urban bus have almost the same speed though the tram usually runs on reserved platform. This might be due to the low levels of traffic light priority provided to the tram.

- **The amplitude of public transport services is quite high, around 20 hours** as average in all modes. The figures in this report show a slight decrease on frequencies and night services compared to previous years. The most accessible mode to people with reduced mobility is the tram; nevertheless, the bus is carrying out a big effort on low floor buses and a less pollutant fleet with the introduction of hybrids, electrics or CNG buses in almost all cities surveyed.

- **New technologies** for real time information are also developed in all cases, with more and more stops providing real time information, but also on board the vehicles or through web or sms services.

- **The single ticket price varies between 0.58 € to 2.82 €** (0.32 € was minimum price in 2006). With the multiple trip coupon (usually 10 trips) one can save around 40%. The price of a monthly pass is on average 30 times the single ticket, but for young and elderly people the pass is 50% cheaper than the normal monthly fare.

- Regarding the financing of the public transport systems, **operational costs are covered 45.5% by fares (vs 44% in 2006) and 45.9% by public subsidies (vs 48% in 2006)**.

Annex I: List of Metropolitan Areas Surveyed

This is a table with the metropolitan areas participants from the first edition of the Barometer until the present edition with the Transport Authority responsible for each of them.

Metropolitan Area	Country	Transport Authority	Web	Barometer Edition (data year)				
				2009	2006	2004	2002	2000
Stadsregio Amsterdam	Netherlands	Stadsregio	www.stadsregioamsterdam.nl	x	x	x		
Athens	Greece	OASA	www.oasa.gr				x	x
Barcelona Metropolitan Region	Spain	ATM	www.atm.cat	x	x	x	x	x
Berlin-Brandenburg	Germany	VBB	www.vbbonline.de	x	x	x	x	
Bilbao	Spain	CTB	www.cotrabi.com			x	x	x
West Midlands (Birmingham)	United Kingdom	Centro	www.centro.org.uk	x	x	x	x	
Brussels Metropolitan	Belgium	MRBC	www.bruxelles.irisnet.be	x	x	x	x	x
Central Hungarian Region (Budapest)	Hungary	BKSZ	www.bksz.hu	x	x			
Cadiz Bay	Spain	CMTBC	www.cmtbc.es	x		x		
Greater Copenhagen	Denmark	MOVIA	www.movia.dk	x	x			
Dublin	Ireland	DTO	www.dto.ie				x	
Frankfurt Rhein-Main	Germany	RMV	www.rmv.de		x	x	x	
Helsinki	Finland	HSL	www.hsl.fi	x	x	x	x	x
Greater London	United Kingdom	TfL	www.tfl.gov.uk	x	x	x	x	x
Lyon Urban Community	France	SYTRAL	www.sytral.fr	x		x		
Madrid Community	Spain	CRTM	www.crtm.es	x	x	x	x	x
Greater Manchester	United Kingdom	GMPTE	www.tfgm.com		x	x	x	x
Milan Community	Italy	ATM	www.comune.milano.it					
Greater Montreal	Canada	AMT	www.amt.qc.ca	x	x			
Oslo Region	Norway	RUTER	www.ruter.no			x		
Paris Ile-de-France	France	STIF	www.stif.info	x	x	x	x	x
Middle Bohemia Region (Prague)	Czech Republic	ROPID	www.ropid.cz	x	x	x	x	x
Metropolitan Area of Seville	Spain	CTAS	www.consorciotransportes-sevilla.com	x	x	x	x	x
South Yorkshire (Sheffield)	United Kingdom	SYPTE	www.sypte.co.uk	x	x	x		
County of Stockholm	Sweden	SL	www.sl.se	x	x	x	x	x
Stuttgart Region	Germany	VRS	www.region-stuttgart.org	x	x	x		
Turin Metropolitan Area	Italy	AMMT	www.mtm.torino.it	x	x	x		
Valencia Metropolitan Area	Spain	aMM	www.avmm.es	x	x	x	x	
VOR Region (Vienna)	Austria	VOR	www.vor.at	x	x	x	x	x
Vilnius	Lithuania	MESP	www.vilniustransport.lt	x	x	x	x	x
Warsaw	Poland	ZTM	www.ztm.waw.pl	x	x		x	
Zurich	Switzerland	ZVV	www.zvv.ch				x	x

In this fifth edition, 24 metropolitan areas have collaborated, which is a great achievement since the first one surveyed 15 cities.

The questionnaire used contains 98 questions. It has represented a strong involvement from the Authorities to collect data and a considerable work for CRTM to consolidate these data.

Annex II: List of Tables and Graphs

List of Tables

List of Graphs