The Good, The Bad and The Ugly: Planning for Reduced Car Dependence in European and Other Global Cities

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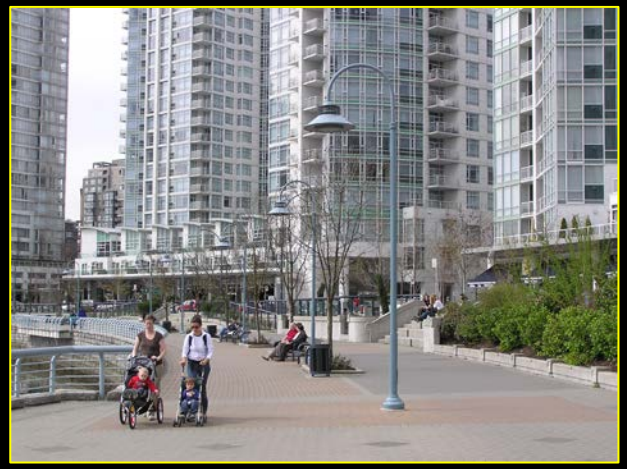


OUTLINE

- An overview of comparative data on cities using selected key variables (American, Canadian, Australian, European and Asian cities).
- Major changes in urban transport in recent years.
  - Peak car use, nationally and in cities
  - Decoupling of GDP from growth in car use
- An insight into the concept of Automobile, Transit and Walking City fabrics and how recognising, respecting and rejuvenating different urban fabrics can lead to better planning and transport outcomes for cities.
- Some brief conclusions and overall policy implications
  - What are some key things that cities should do to become more sustainable in passenger transport?

Urban form factors
- Urban density
- Proportion of jobs in CBD

Economic factors
- Metropolitan gross domestic product per person
- Average user cost of a car trip
- Average user cost of a public transport trip
- Total passenger transport cost as a percentage of GDP
- Ratio of annual investment in public versus private transport

Private transport infrastructure factors
- Length of freeway per person
- Parking spaces per 1000 CBD jobs
- Total cars + motor cycles per person

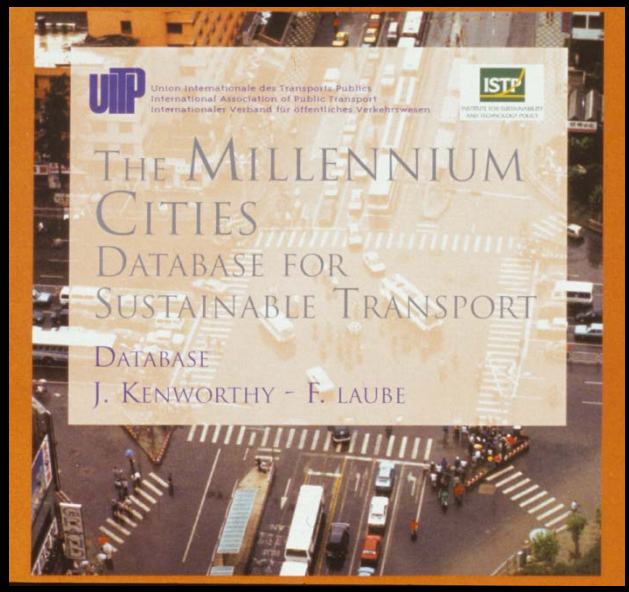
Public transport infrastructure factors
- Total length of reserved public transport route per person
- Total length of reserved public transport route per urban ha
- Ratio of reserved public transport infrastructure versus freeways

Private transport use and performance factors
- Total car+motor cycle+taxi passenger kilometres per person
- Ratio of system average public transport speed versus private transport speed

Public transport service and use and non-motorised mode use factors
- Total public transport seat kilometres of service per person
- Total public transport boardings per person
- Proportion of total motorised passenger kilometres on public transport
- Proportion of total daily trips by public transport
- Proportion of total daily trips by non-motorised modes

Energy and externality factors
- Total private and public transport passenger energy use per person
- Total CO_2 emissions per person from passenger transport (kg)
- Total emissions of CO, HC, NO_x and SO_2 per person (kg)
- Total emissions of CO, HC, NO_x and SO_2 per urban hectare (kg)
- Total transport deaths per 100,000 people
- Total transport deaths per billion passenger kilometres

A small sample of the kind of data that are collected and compared for cities.

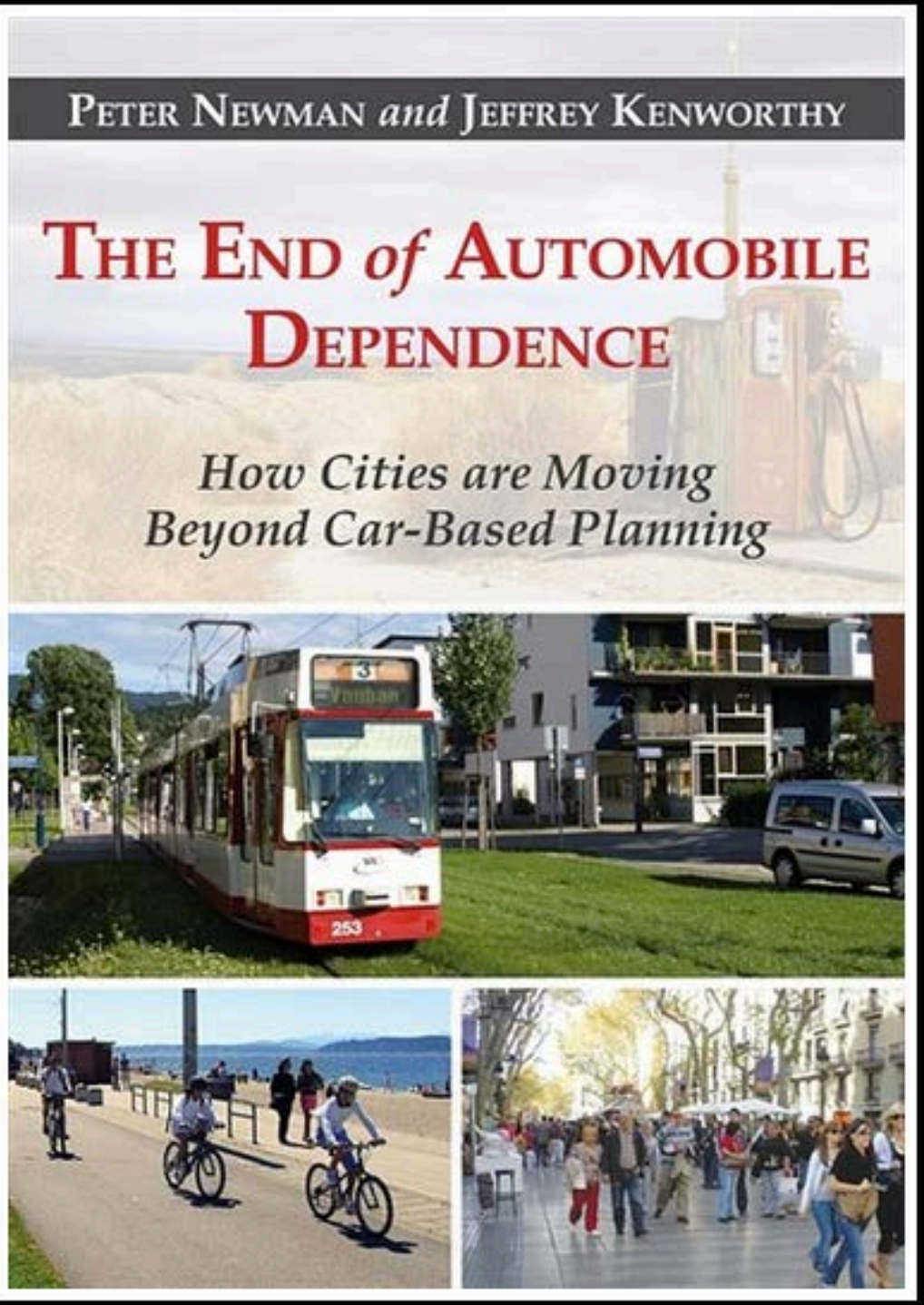


Metropolitan Areas Represented in Trends Data

- **Australian Metropolitan Areas**
  - Perth
  - Melbourne
  - Brisbane
  - Sydney
- **Canadian Metropolitan Areas**
  - Vancouver
  - Calgary
  - Montreal
  - Ottawa
  - Toronto
- **American Metropolitan Areas**
  - Atlanta
  - Chicago
  - Denver
  - Houston
  - Los Angeles
  - New York
  - Phoenix
  - San Diego
  - San Francisco
  - Washington
  - Seattle
  - Portland
  - New Orleans
- **European Metropolitan Areas**
  - Berlin
  - Frankfurt
  - Hamburg
  - Munich
  - Stuttgart
  - Zurich
  - Copenhagen
  - Helsinki
  - Oslo
  - Stockholm
  - London
  - Manchester
  - Graz
  - Bern
  - Prague
  - Düsseldorf
  - Geneva
  - Vienna
  - Madrid
  - Brussels
  - Paris
- **Asian Metropolitan Areas**
  - Hong Kong
  - Singapore

Last three US cities and Paris are not in trends graphs, only detailed city graphs

Total 45 cities



Much of the data shown in this presentation and more are in our book released in August 2015

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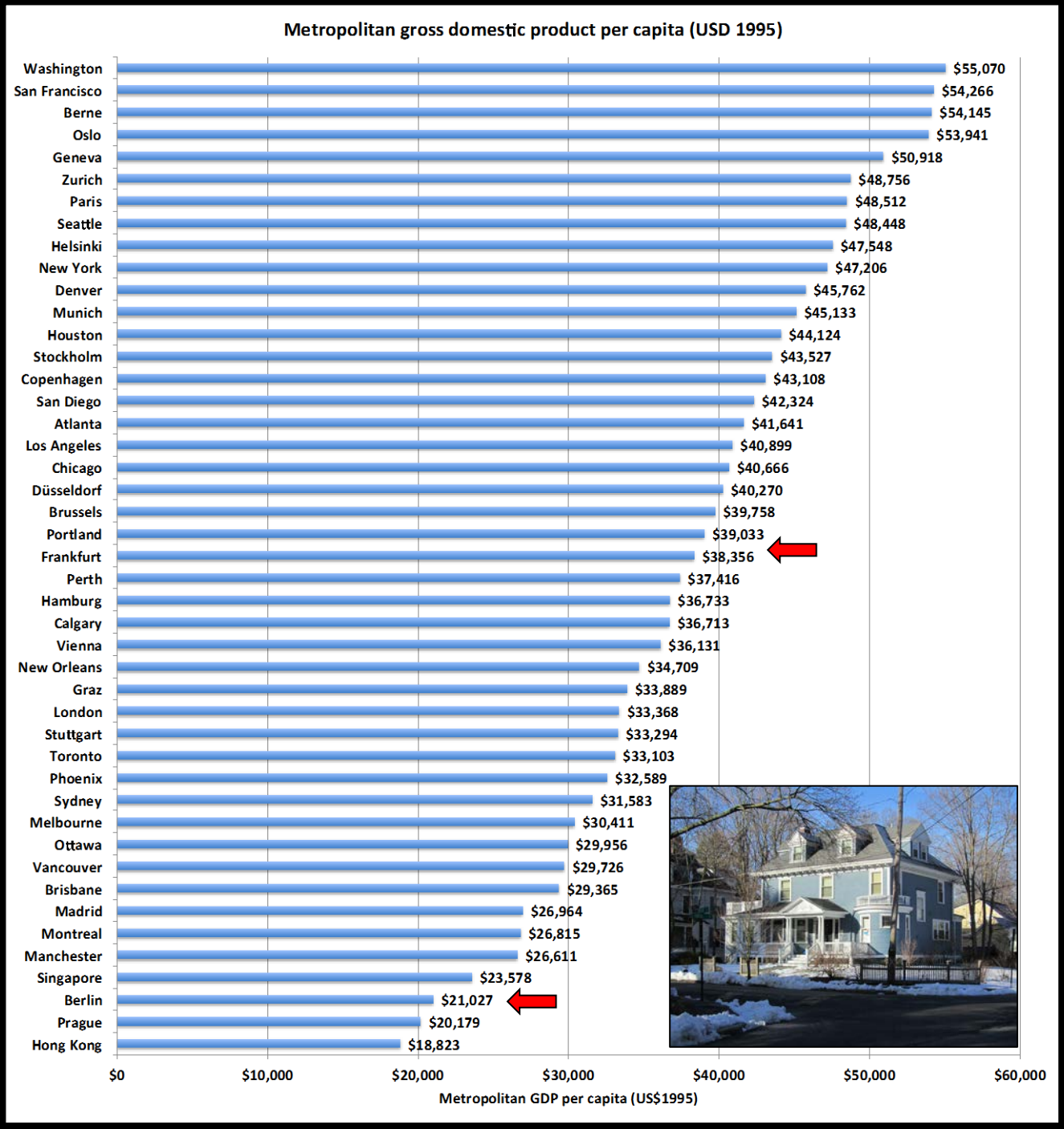
Metro GDP per Capita, 2005

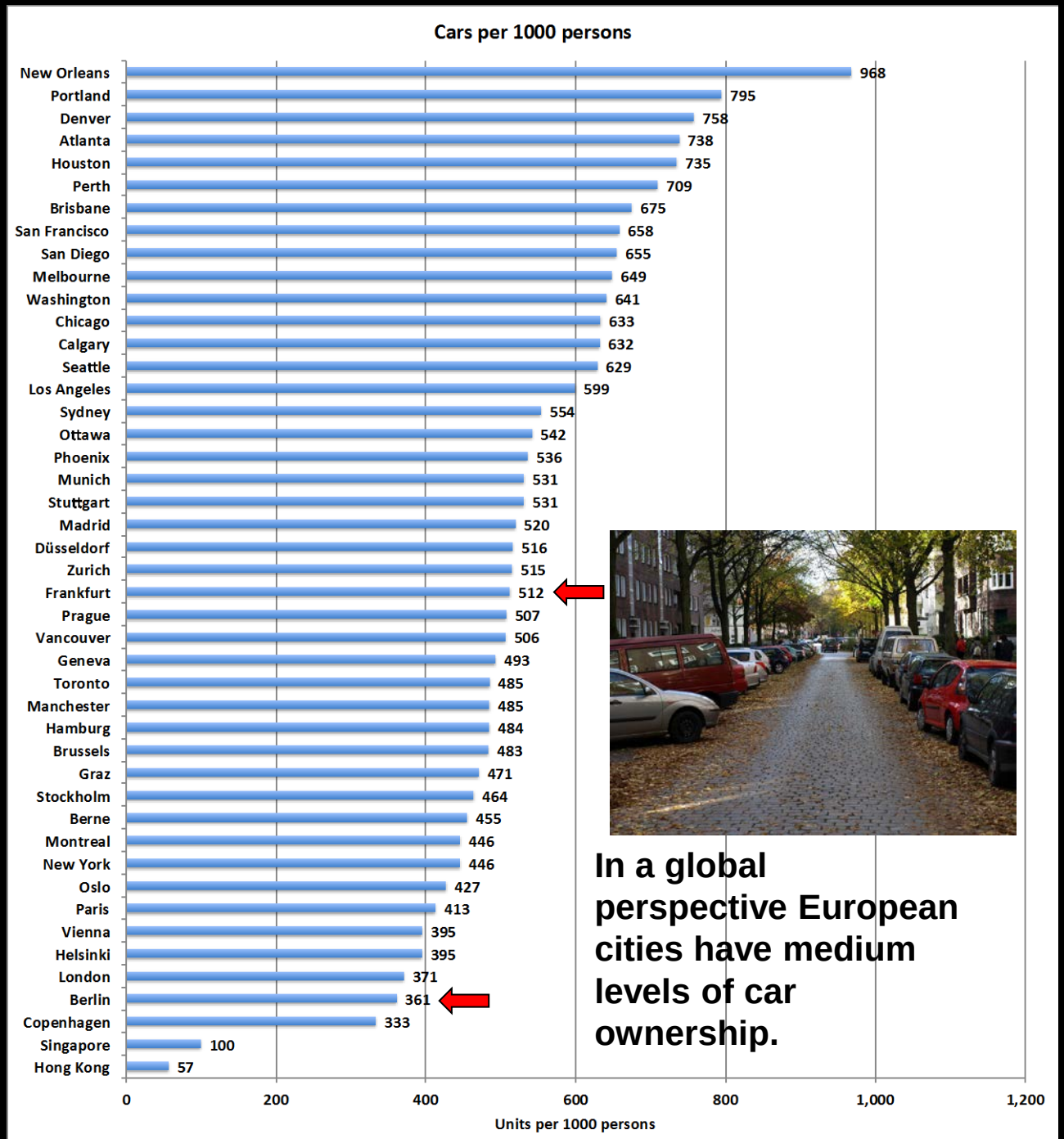


GDP of metro areas is not a major determinant of their sustainability in transport or mobility patterns.

There are many high income cities with quite low car use and many high income cities with high car use.

Many European cities have comparatively high per capita GDP but comparatively low car dependence.

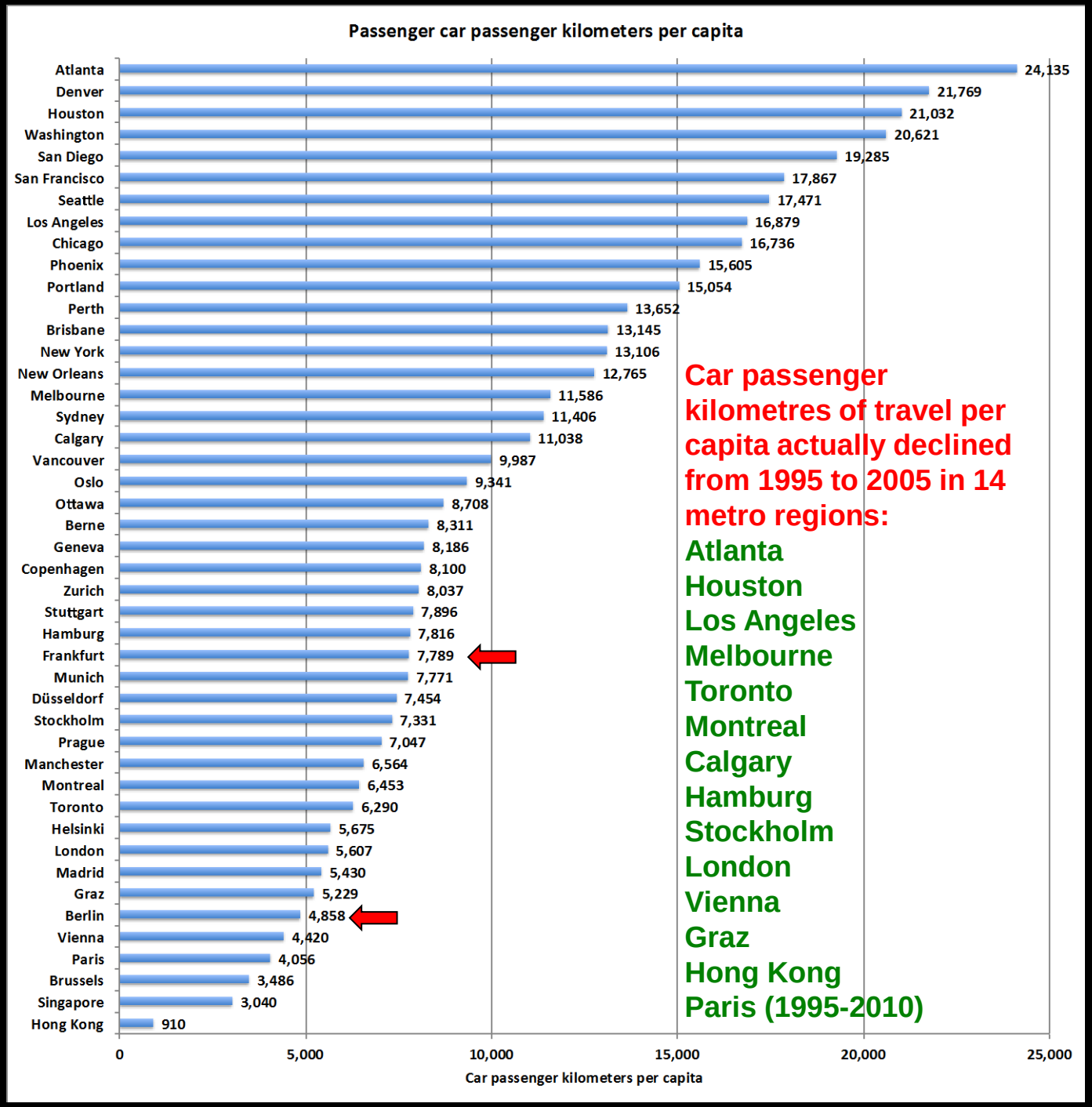
Car Ownership 2005



In a global perspective European cities have medium levels of car ownership.

Car ownership is important, but not as critical as how much cars are used

Car Use 2005

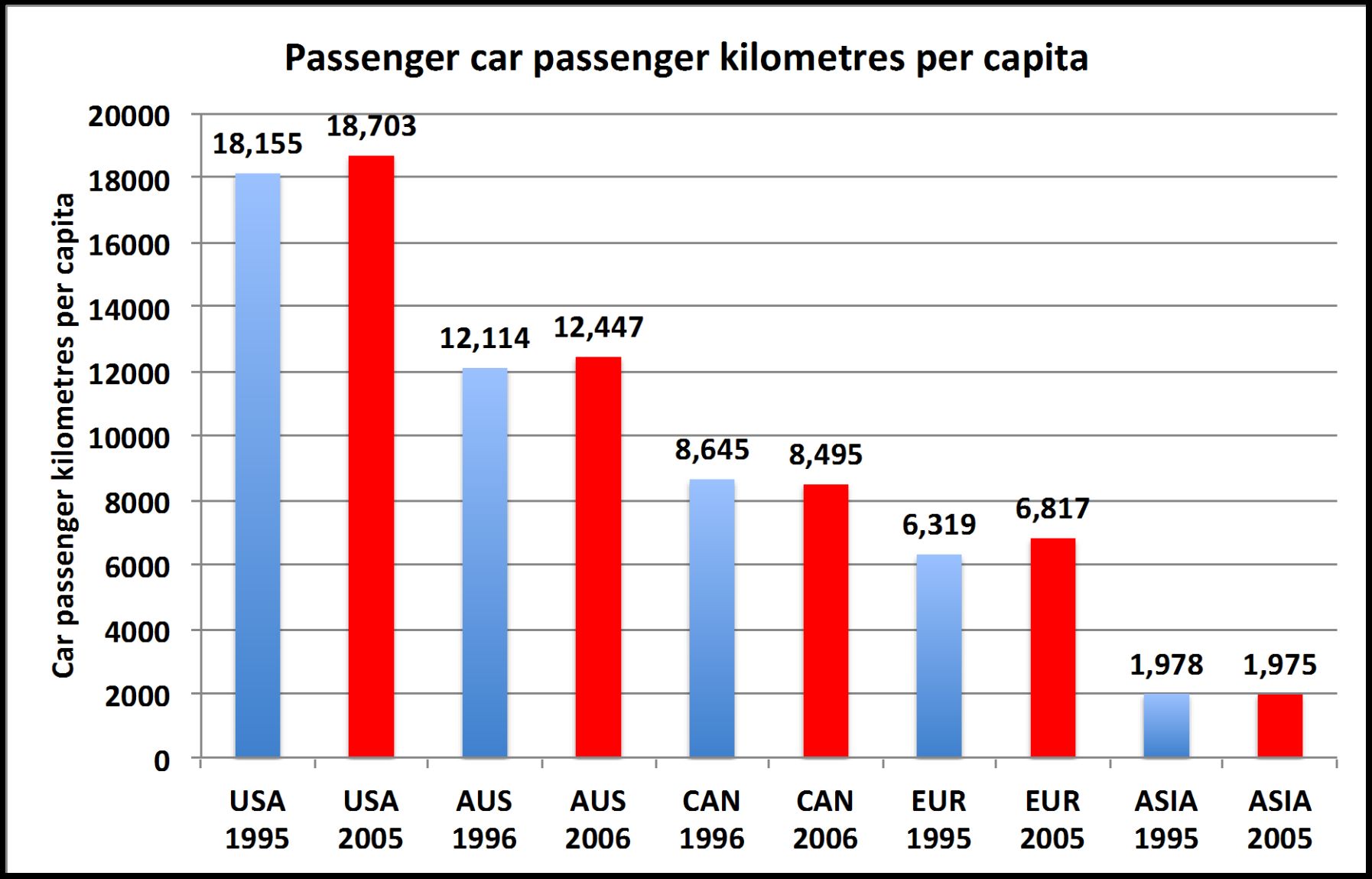


Car passenger kilometres of travel per capita actually declined from 1995 to 2005 in 14 metro regions:

- Atlanta
- Houston
- Los Angeles
- Melbourne
- Toronto
- Montreal
- Calgary
- Hamburg
- Stockholm
- London
- Vienna
- Graz
- Hong Kong
- Paris (1995-2010)

In a moment I want to explore some of the factors that influence the level of automobile dependence in cities, as reflected in these car travel data.

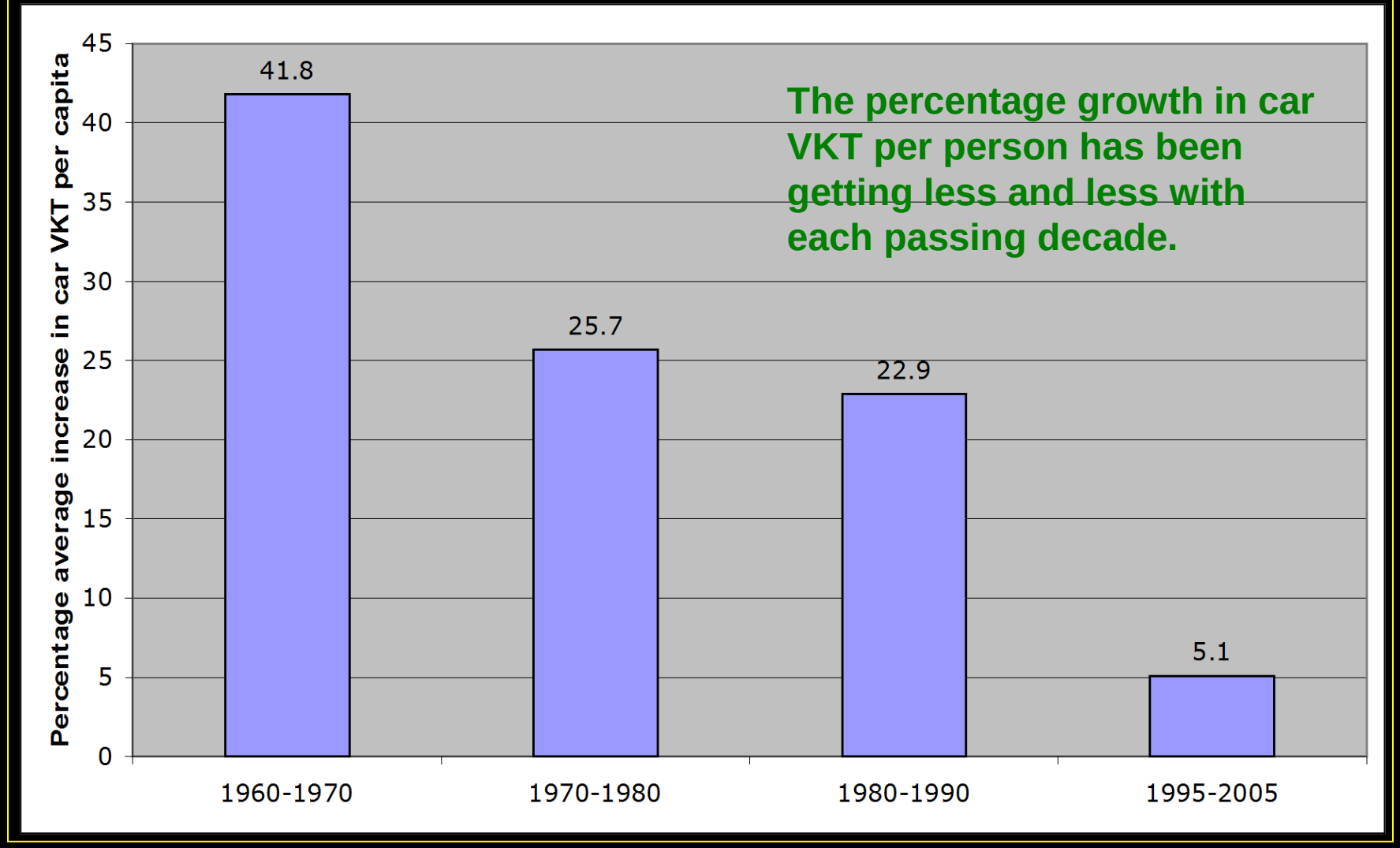
Car Use Trend in 41 Global Cities, 1995-6 to 2005-6



Let's now consider this question of the peaking of car use and its decoupling from GDP. There is now strong evidence that cities in the developed world are peaking in car use.

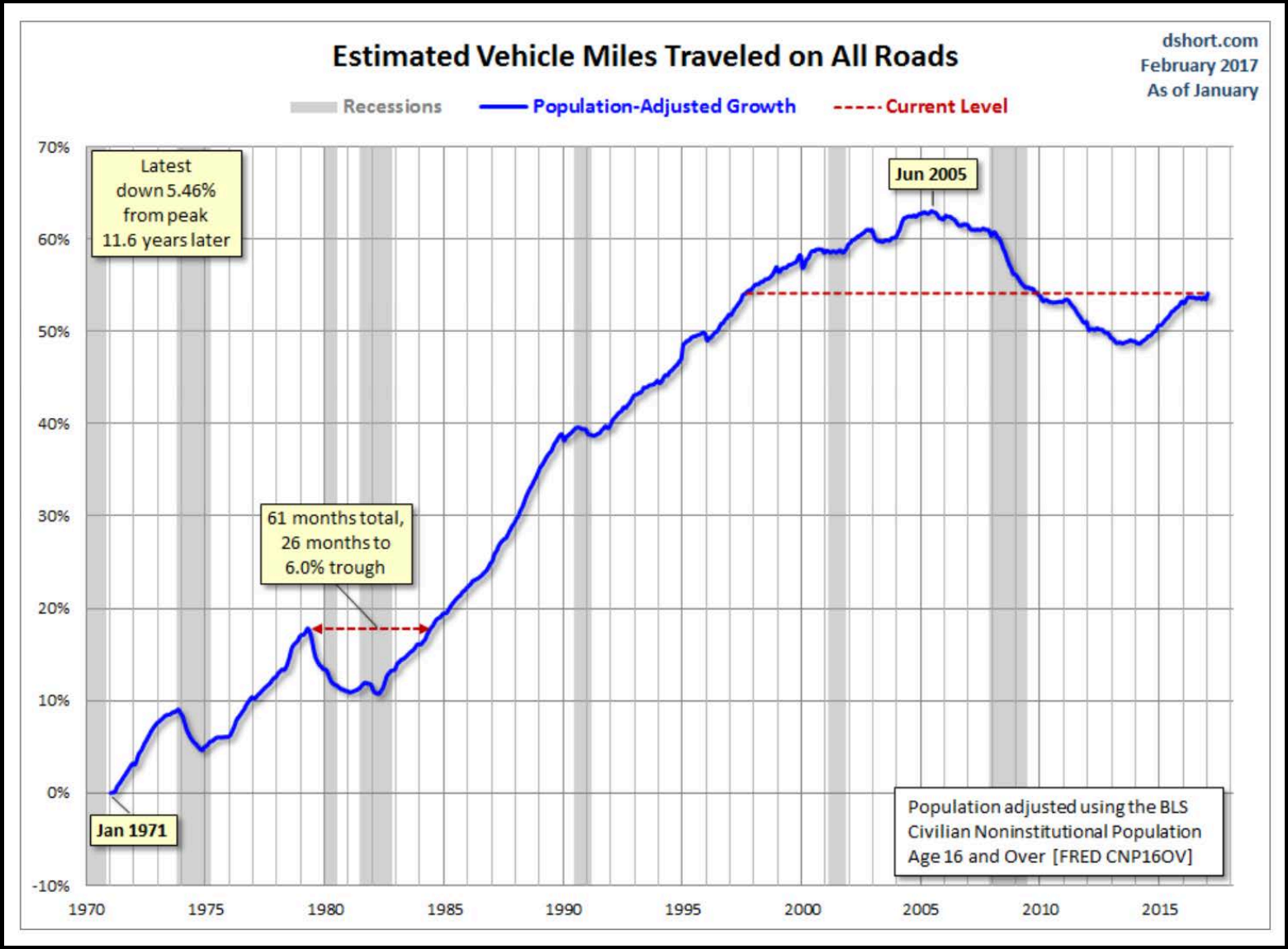
Peaking of car use in wealthier cities has had a long gestation period.

Car Use Trend 1960 to 2005



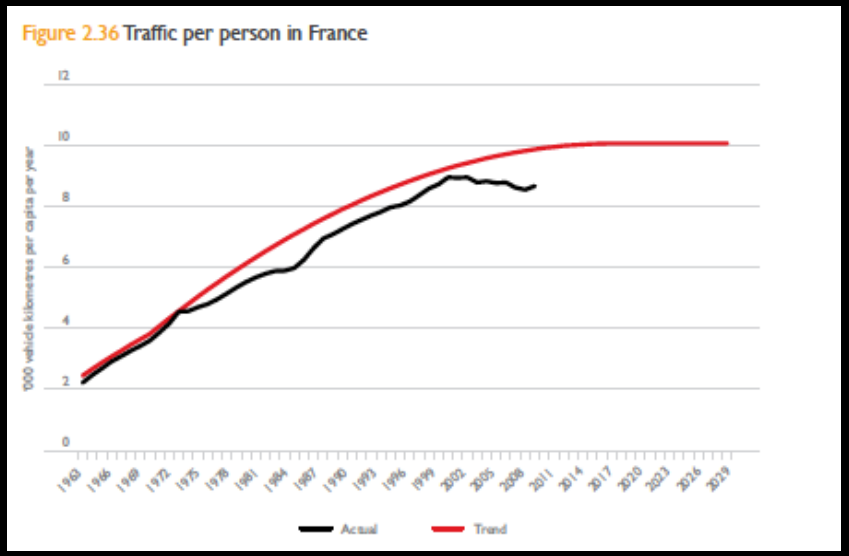
Car use growth trends in developed cities from 1960 to 2005 using Global Cities Database.

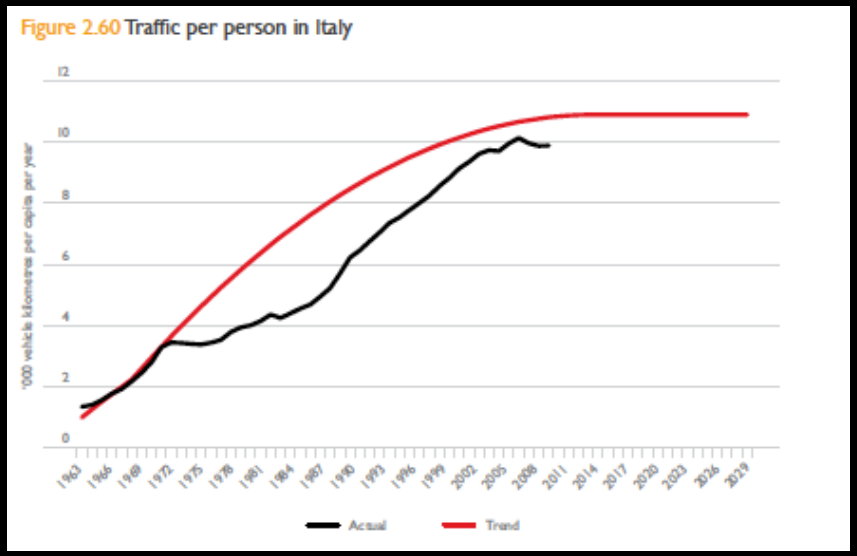
Car Use (VMT) Appears to Have Peaked in the USA as a Whole

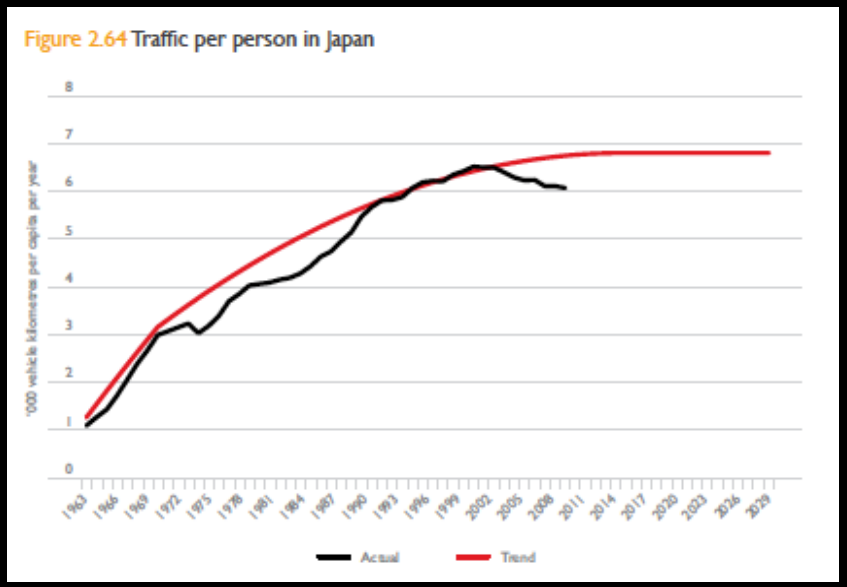


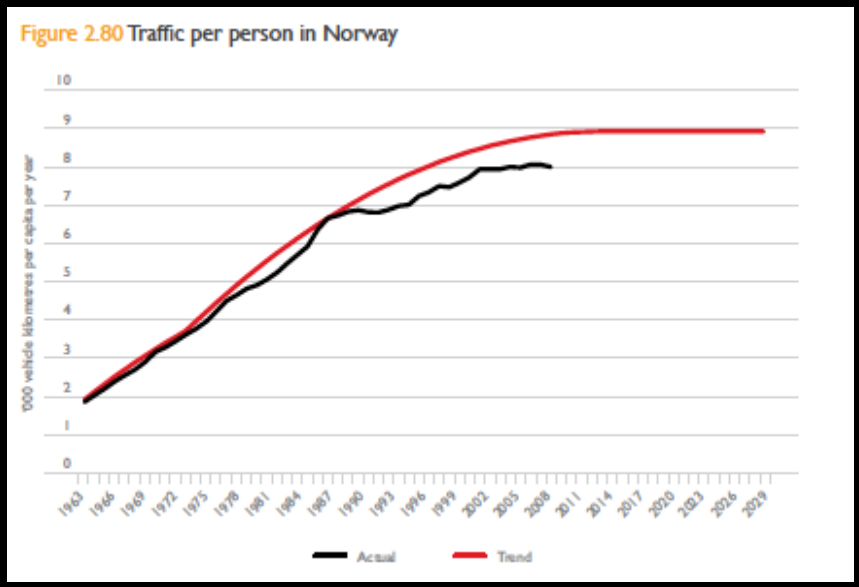
Source: https://www.advisorperspectives.com/dshort/updates/2016/10/17/vehicle-miles-traveled-another-look-at-our-evolving-behavior **retrieved April 1, 2017**

National Peak Travel in Various Countries

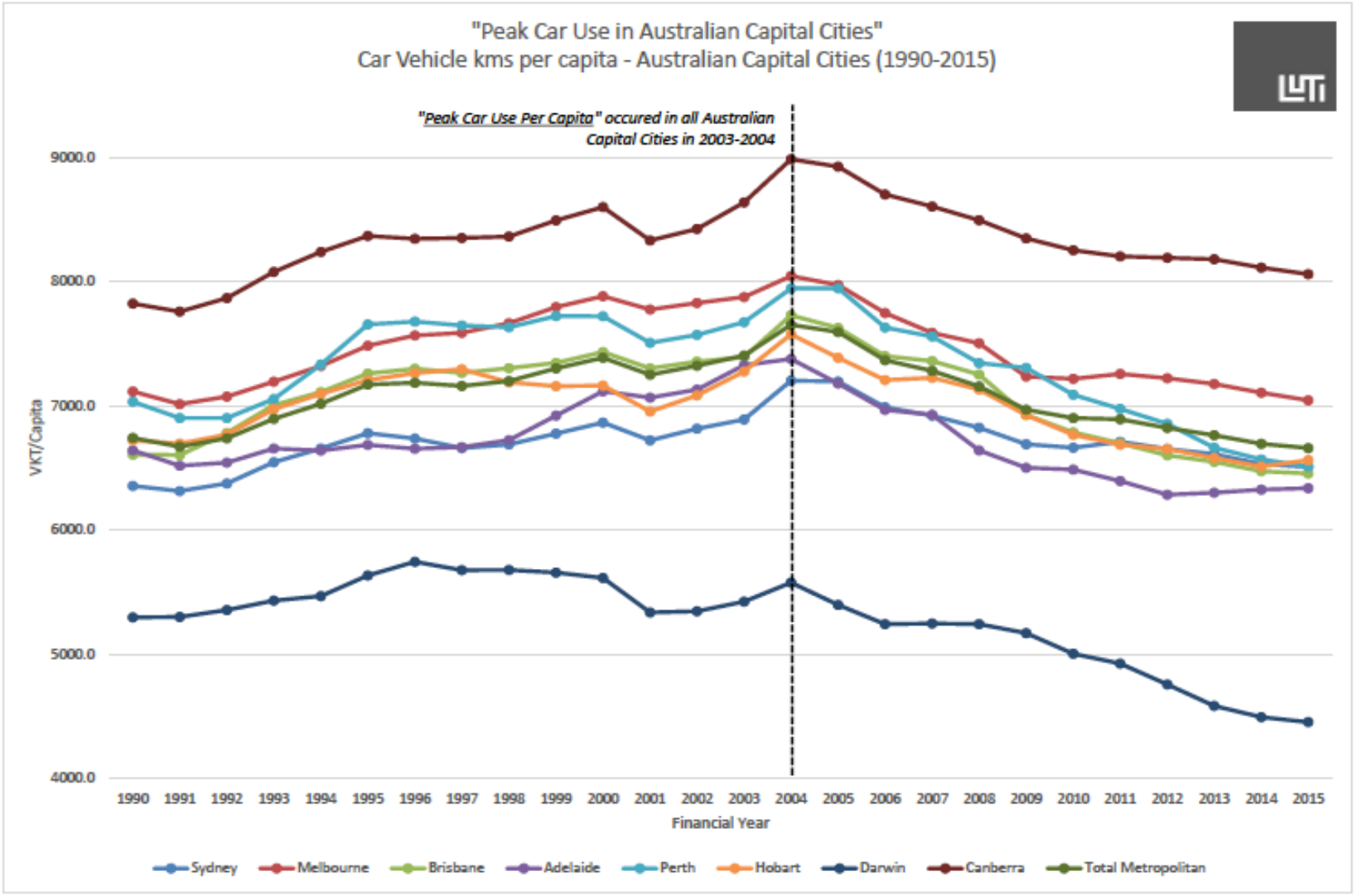






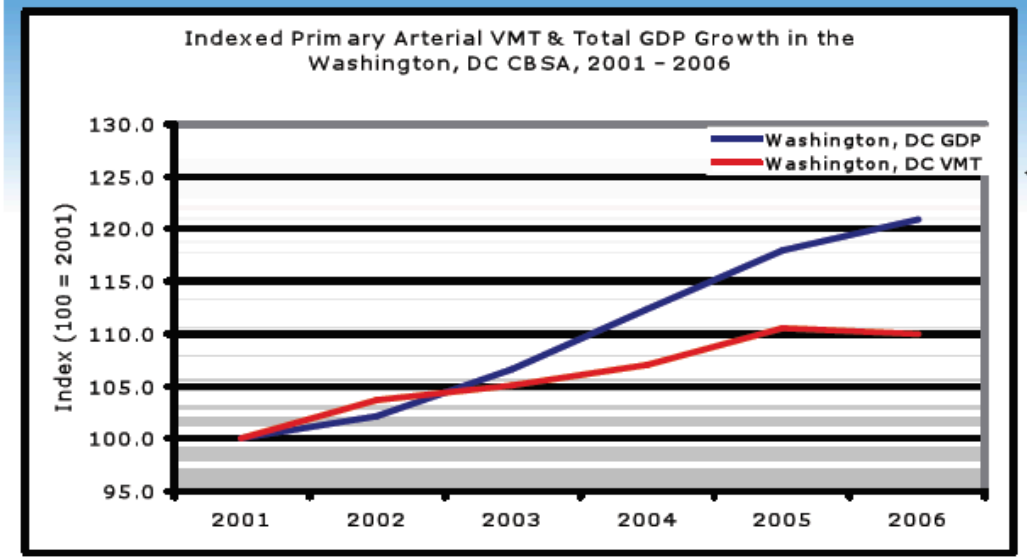


Bureau of Infrastructure, Transport and Regional Economics (2012a) Traffic Growth: Modelling a Global Phenomenon, Report 128, BITRE, Canberra, Australia. https://www.bitre.gov.au/publications/2012/files/report_128.pdf Data are based on all vehicle types.



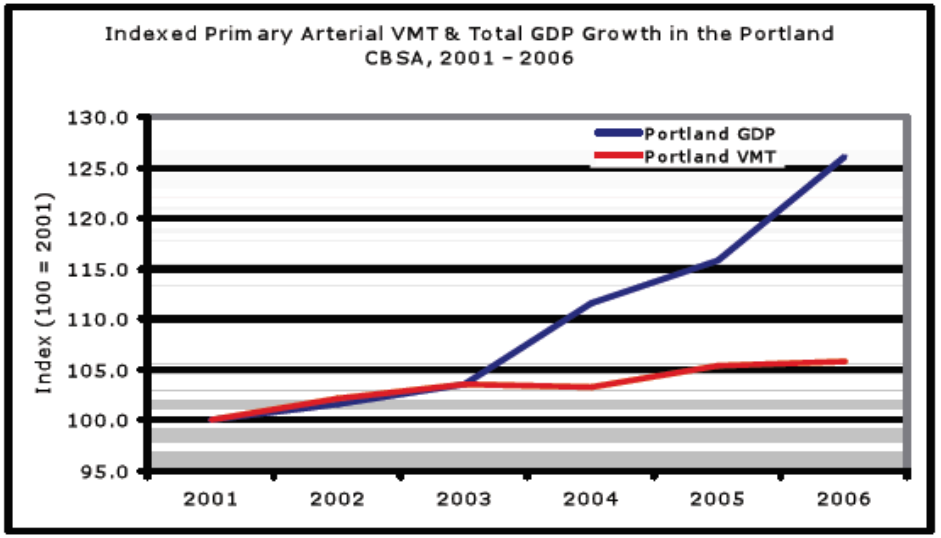
Peak Car Use in Australian Cities: A Sustained Trend.
(graphic created by James McIntosh from BITRE, Canberra data)

Note: Passenger kilometres for Australian cities in this graph are only for the passenger car class of vehicle, whereas our own comparisons also include the light commercial vehicle class because it is used heavily for private passenger travel in Australian cities (as with light duty trucks in US cities).



Washington, DC

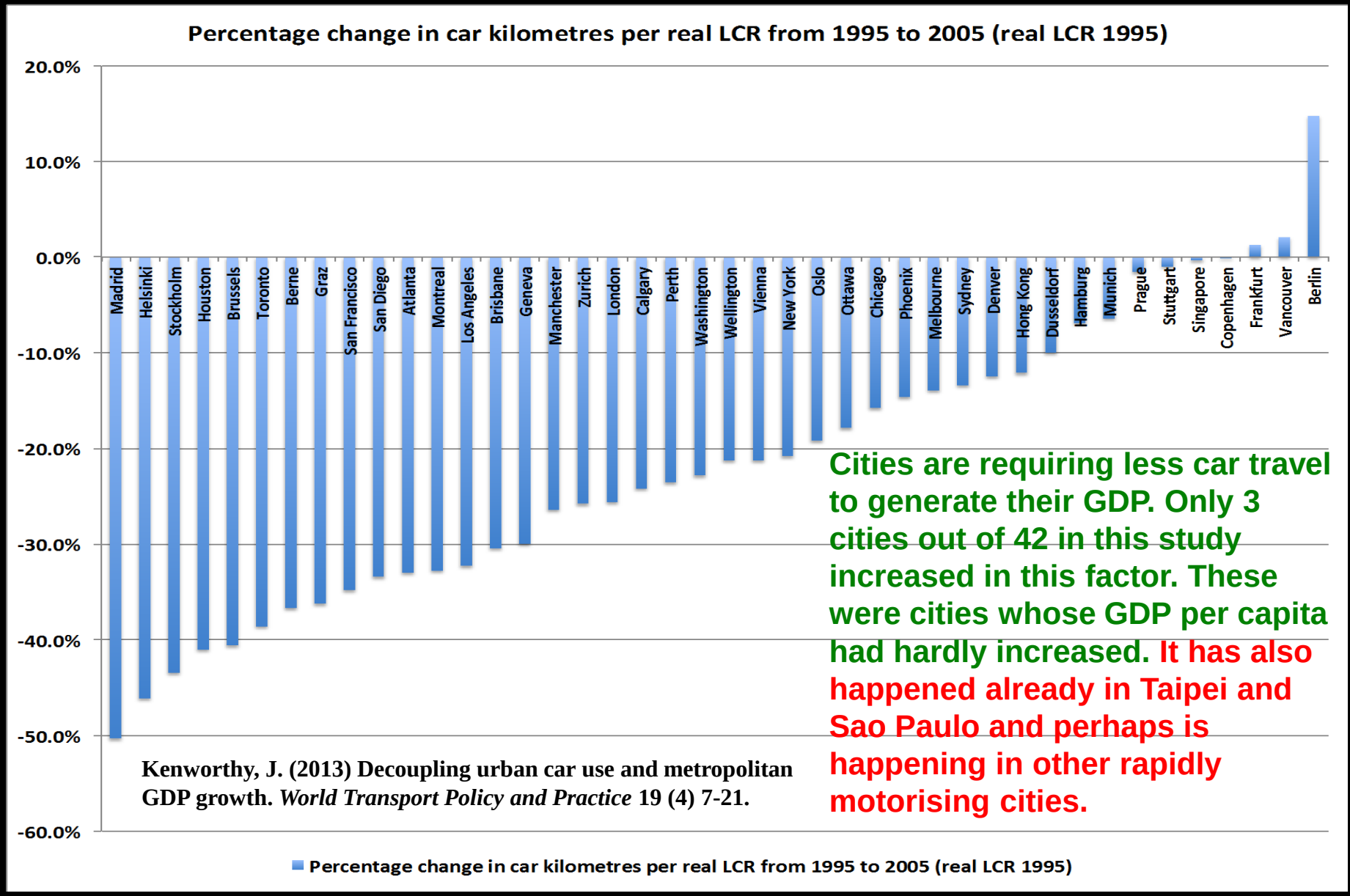
Portland



Decoupling of GDP from driving is very pronounced in some US cities.

Kooshian, C. and Winkelman, S. (2011) Recent trends in the travel intensity of the US economy. Center for Clean Air Policy, Washington DC. (available at: http://www.cts.umn.edu/events/wstlur/symposium/2011/agenda/documents/presentations/2-kooshian.pdf - accessed July 7, 2013)

Urban Car Use Has Decoupled From Metropolitan GDP Growth



Cities are requiring less car travel to generate their GDP. Only 3 cities out of 42 in this study increased in this factor. These were cities whose GDP per capita had hardly increased. It has also happened already in Taipei and Sao Paulo and perhaps is happening in other rapidly motorising cities.

Kenworthy, J. (2013) Decoupling urban car use and metropolitan GDP growth. *World Transport Policy and Practice* 19 (4) 7-21.

Factors behind peak car use in cities from our analysis

• Modelling of trends in car VKT for our global cities database from 1960 to 2000, shows that the changes can be primarily explained by urban density and transit service levels[1].

• Sprawl has reversed in many cities and metropolitan densities are increasing. There is a strong power function linking car use and urban density (shown next)

• Growth of a culture of urbanism: People are moving back into central city and inner city areas in search of a live/work/play urban environment with less car use, not long car commutes from the suburbs in congested traffic.

• Young people are getting fewer driver's licenses and are driving less, preferring to spend money on public transport, mobile devices and more central living (as well as more holiday travel).

• Public transport is growing rapidly in use, particularly in urban rail and one passenger km on public transport replaces multiple car vehicle kms (the transit leverage effect due to trip chaining).

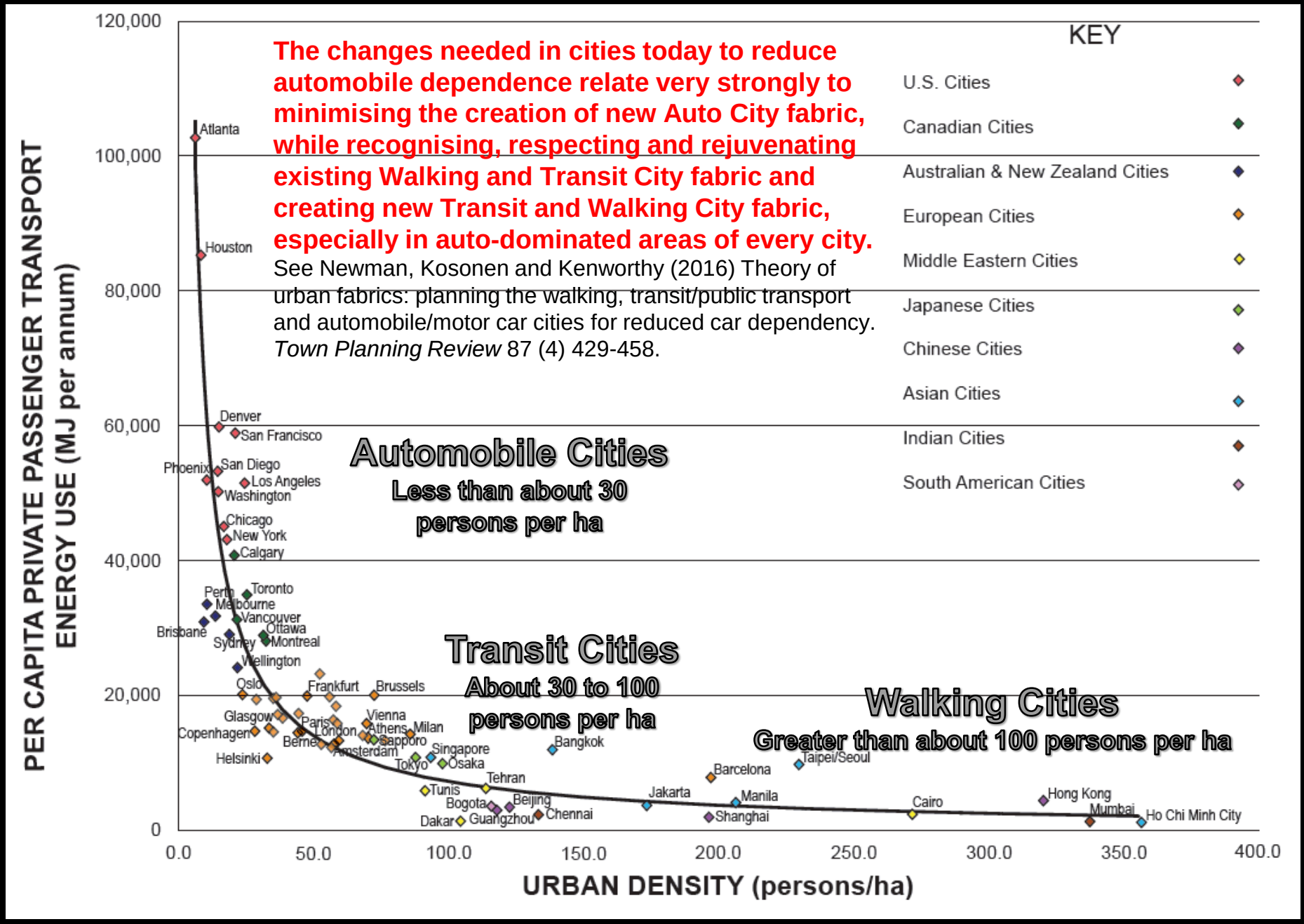
• The price of fuel may be having an effect, as may increased tele-commuting/work-at-home.

• Automobile cities have hit a travel time and distance wall. There is too much traffic and cities cannot maintain a reasonable daily travel time budget of 65 to 70 minutes per person per day (Marchetti constant) unless they restructure with faster public transport and transit-oriented development.

• Communities are now being built more around walking, cycling and public transport to meet daily needs within the travel time budget.

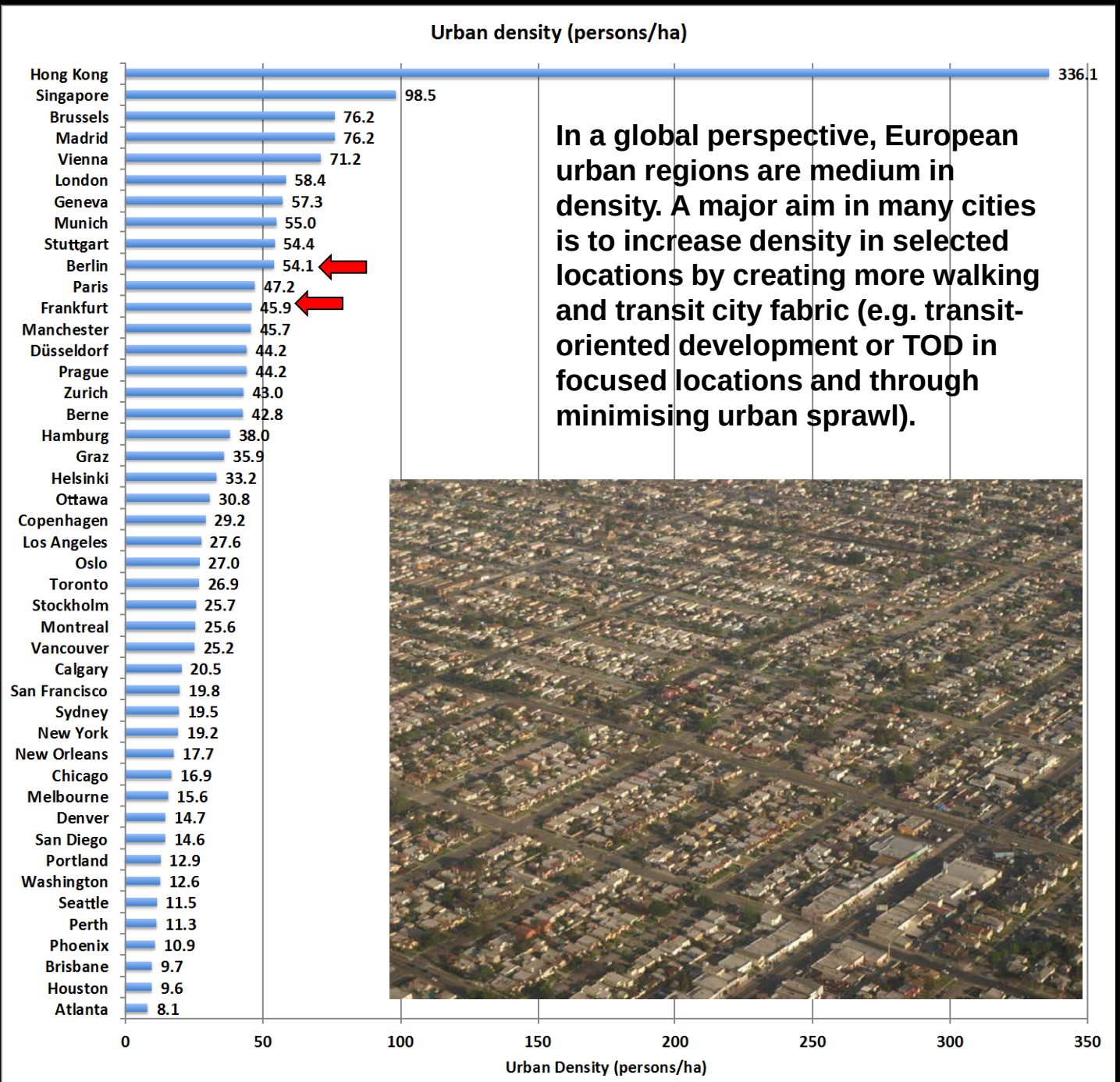
• Many cities are aging. People in their 70s drive about 50% as much as people from 20 to 50 years.

1. McIntosh, J., Trubka, R., Kenworthy, J. and Newman, P. (2014) The role of urban form and transit in city car dependence: analysis of 26 global cities from 1960 – 2000. *Transportation Research D*, 33: 95-110.



The power function link between urban density and per capita energy use/car use

Urban Density 2005

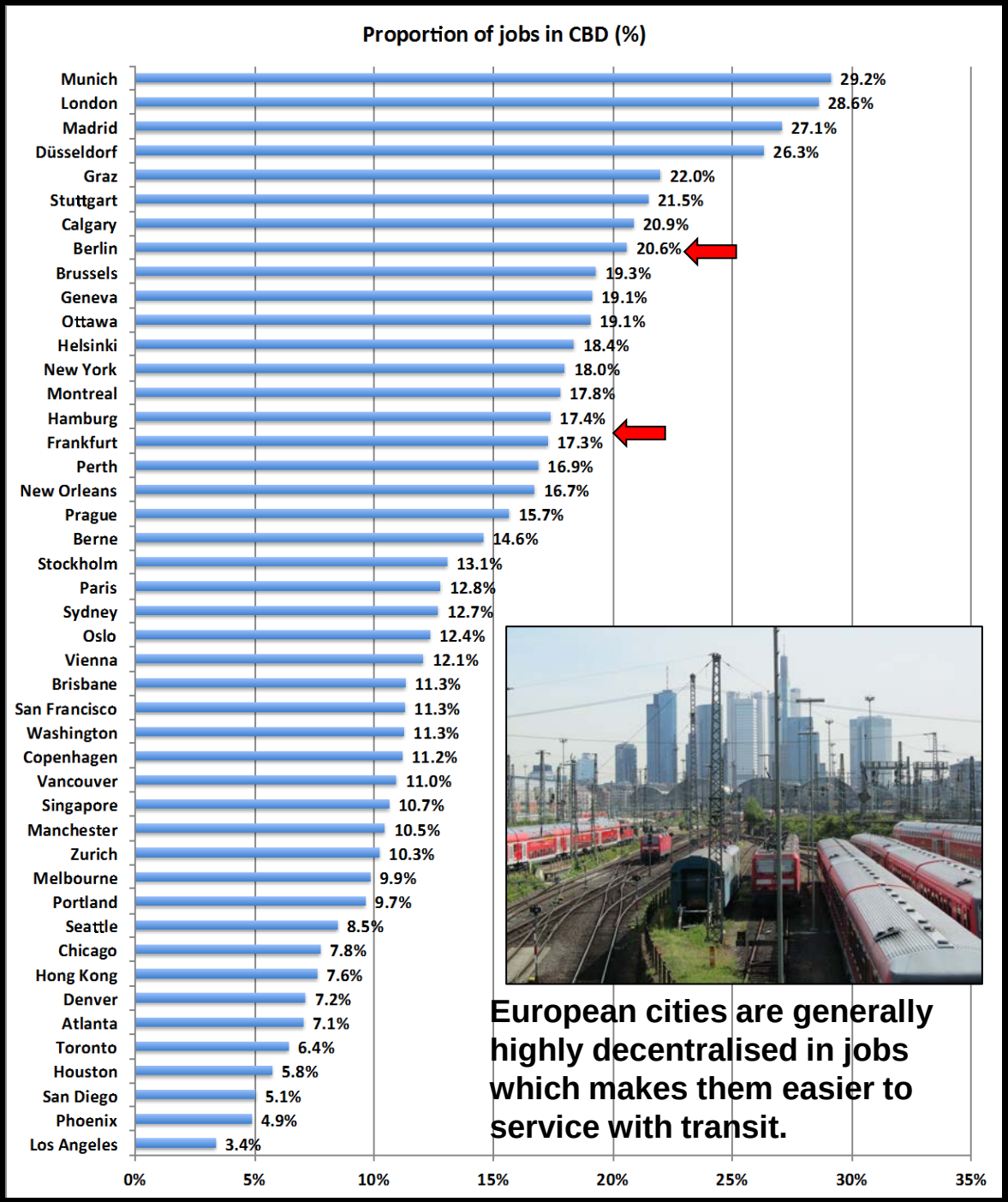


In a global perspective, European urban regions are medium in density. A major aim in many cities is to increase density in selected locations by creating more walking and transit city fabric (e.g. transit-oriented development or TOD in focused locations and through minimising urban sprawl).

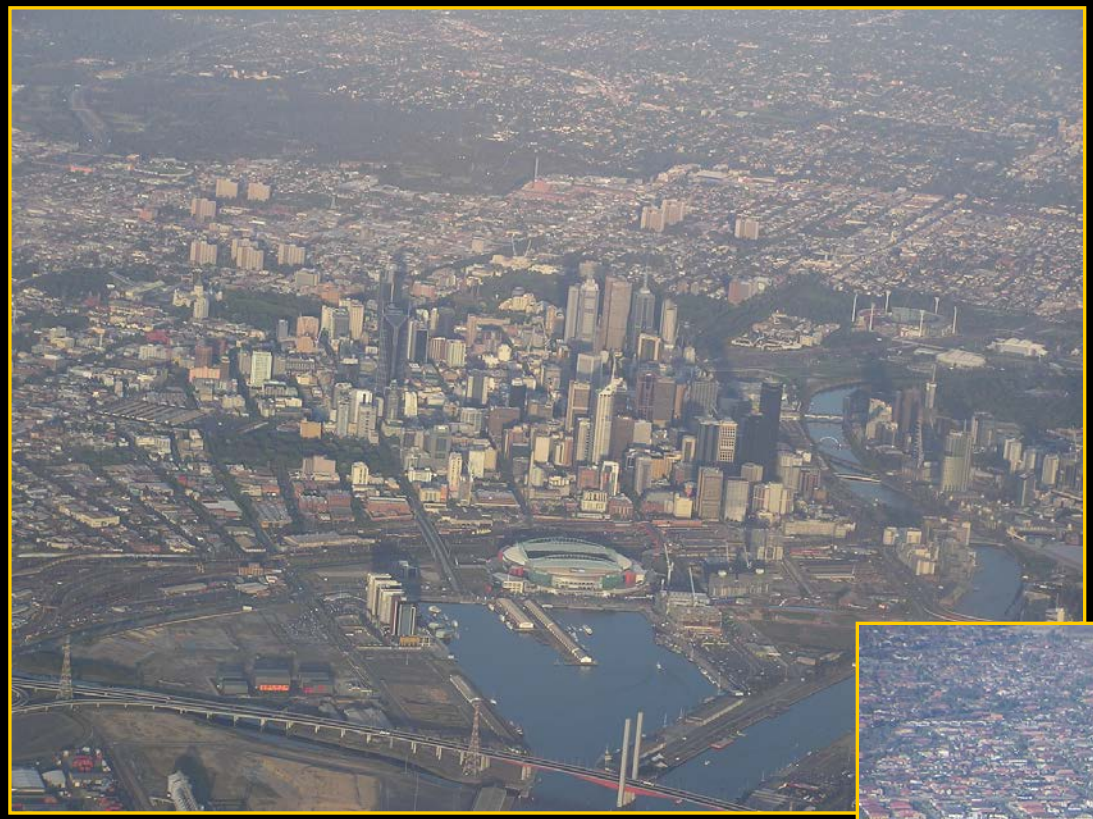
The correlation between urban density and car/energy use in the wealthy cities is very strong.

Cities must find ways of strategically raising densities to develop more sustainable transport systems.

Vällingby and Kista, Stockholm are examples of “new” Transit and Walking City fabric.



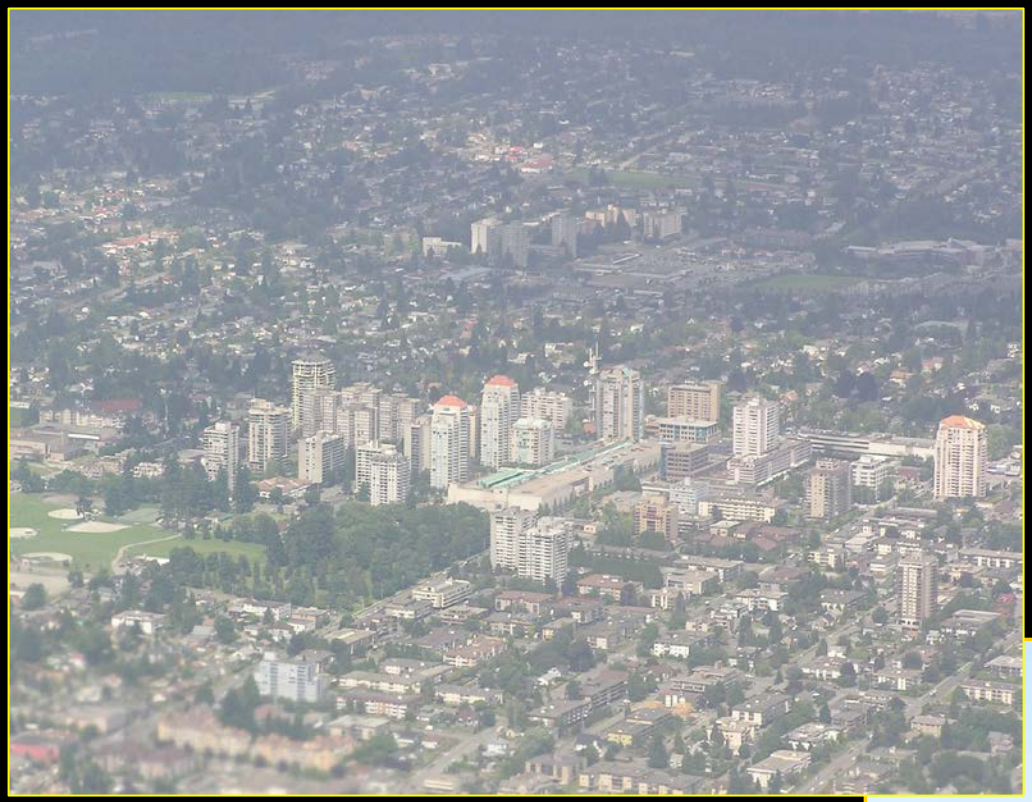
European cities are generally highly decentralised in jobs which makes them easier to service with transit.



Centralised work locations are much easier to service with public transport and non-motorised modes than sprawling decentralised patterns which are car-dominated.

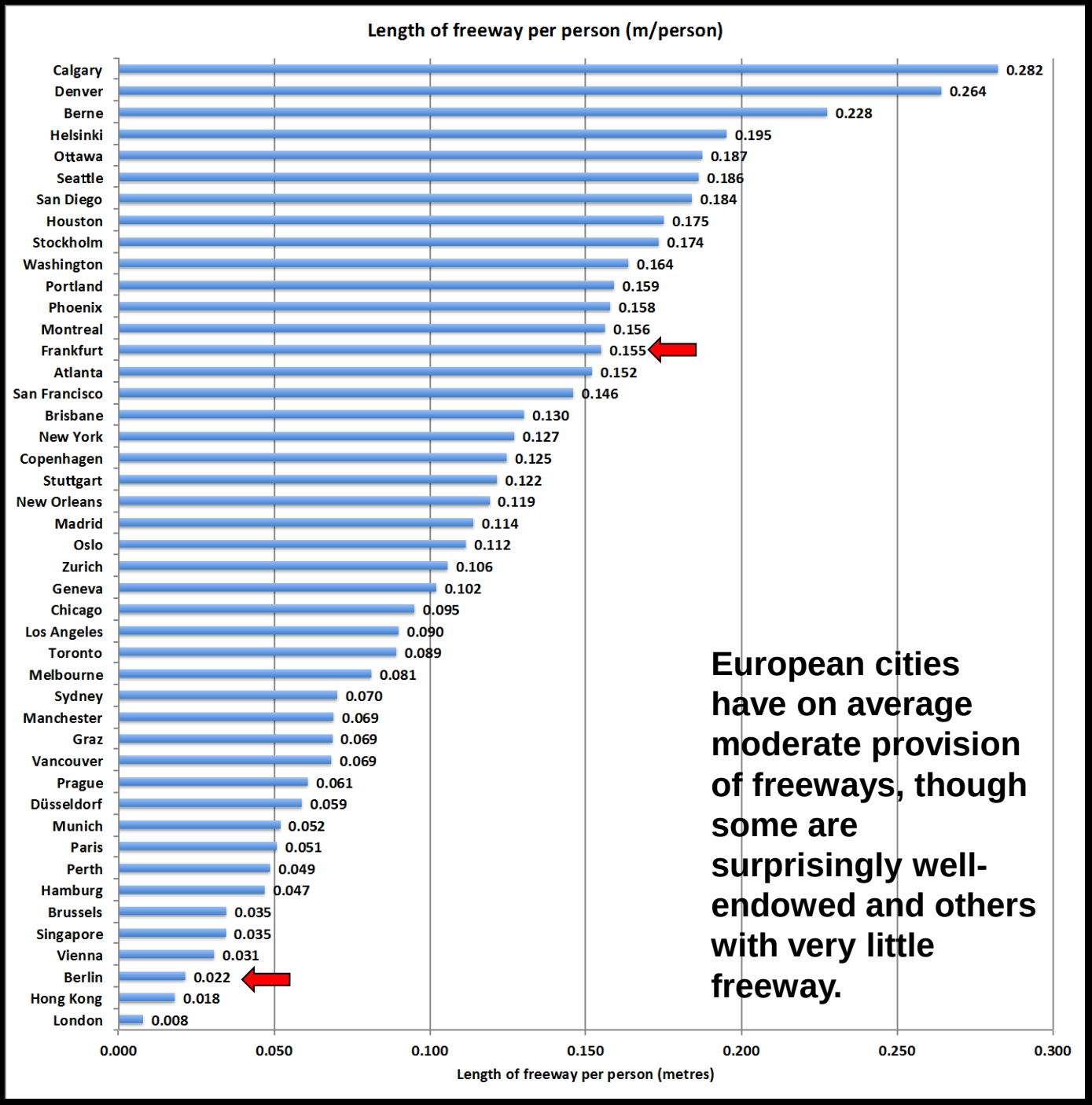
Low density areas, such as below, need to have new Transit and Walking City Fabric injected into them through new transit systems and TOD built around them.

Melbourne's denser CBD and inner suburbs are well-served by trains and trams and are walkable. Jobs in the suburbs are typically accessed by cars.



Vancouver has some noticeable examples of “de-centralised concentration” around rail stations, with a mixture of jobs and residential uses.

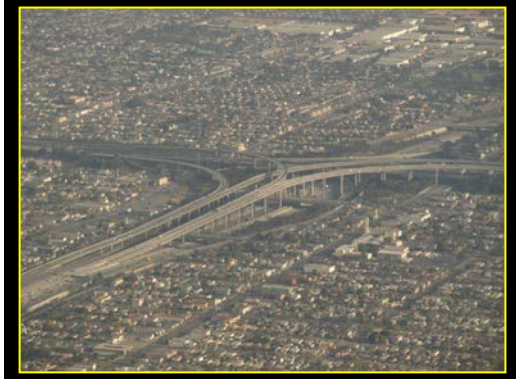
Where jobs outside the central area are concentrated into strong sub-centres linked to public transport, auto dependence can be reduced.



Freeway Supply

It has been known for decades that building more freeways pushes cities towards higher automobile dependence and less sustainable transport.

Cities need to minimise, stop or even reverse their supply of freeways, especially to restore Walking and Transit City Fabrics.



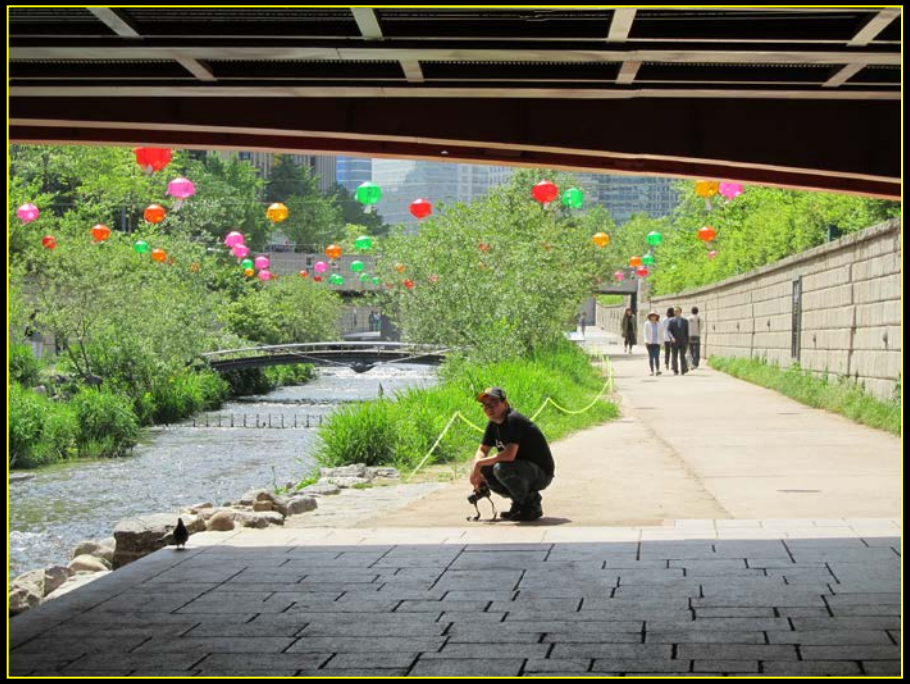
Impacts of freeways

One freeway clover leaf occupies the same area as a typical medieval walking city such as Salzburg.

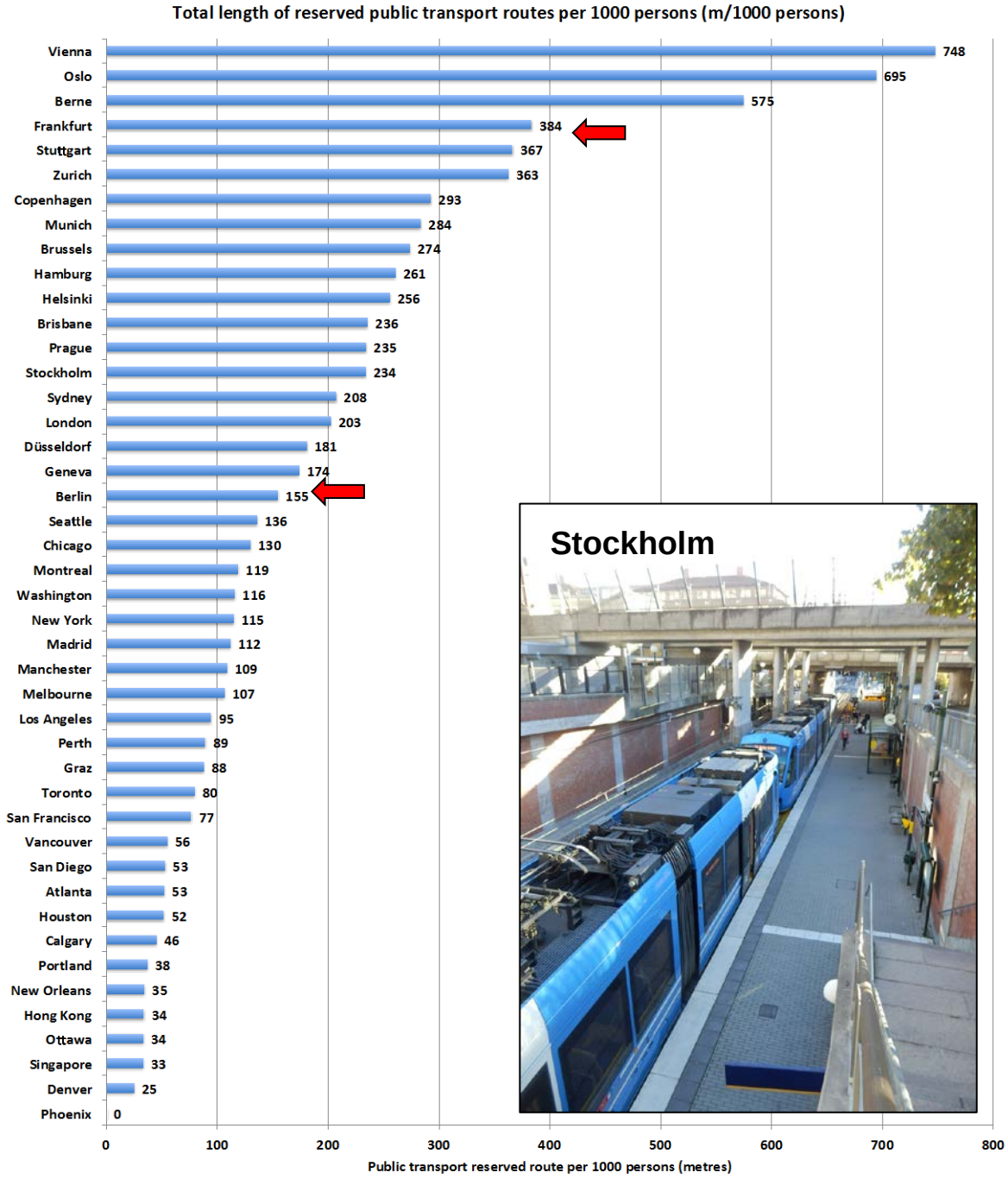
This is an example of how the imposition of Auto City Fabric has destroyed the old Transit and Walking City Fabrics of countless cities.

In Seoul they tore down 5.8 km of elevated freeway and surface road carrying a combined 170,000 vehicles per day. Average speed in Seoul increased!!. Traffic behaves like a gas, not like a liquid.

Seoul has removed a key element of Auto City Fabric imposed on the city in the 1960s and rejuvenated the Transit and Walking City Fabrics in its centre.



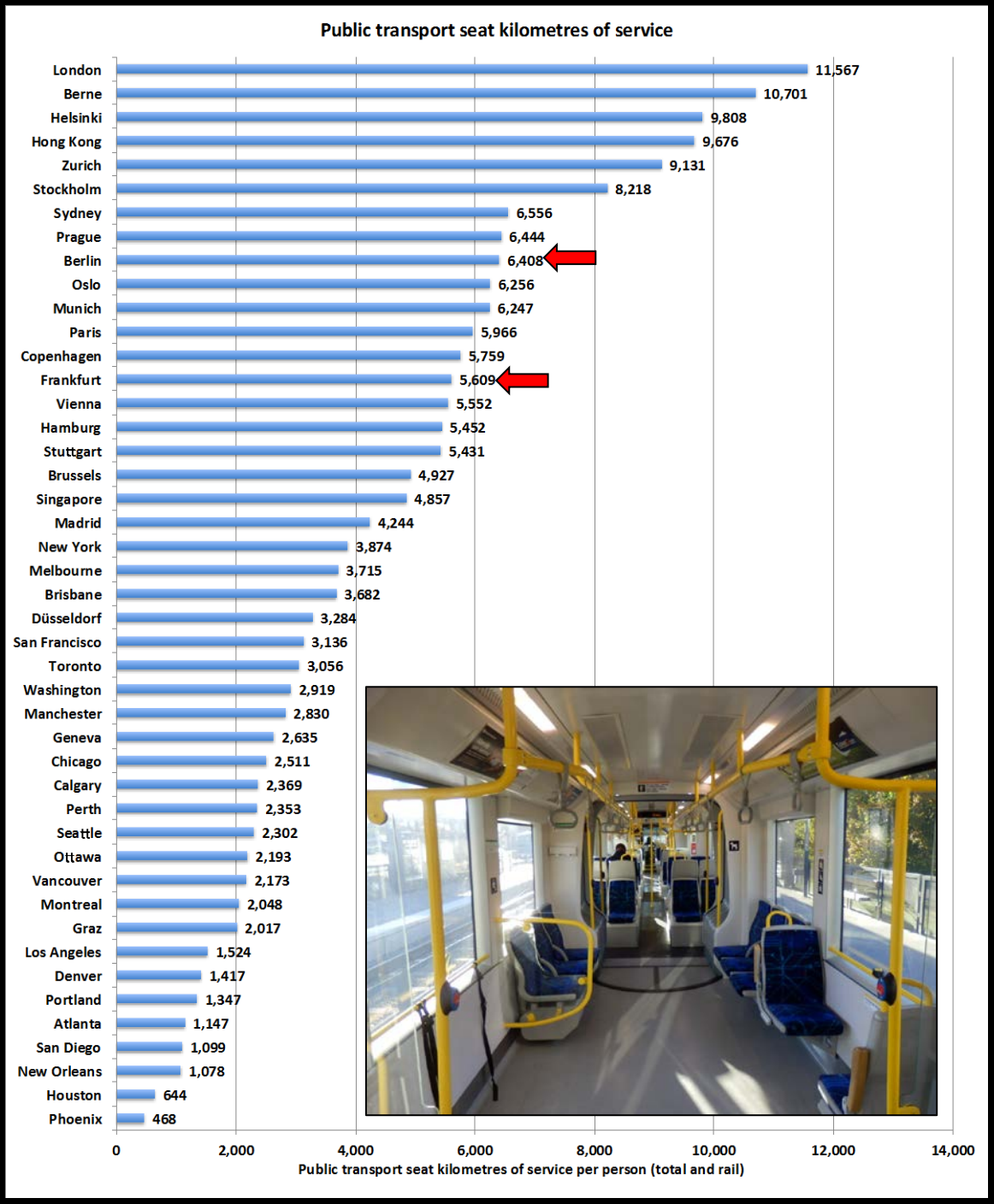
Cheonggyecheon River restoration, Seoul, South Korea



Many cities are adding significant amounts of new reserved route for transit, mainly new rail systems, both LRT and regular rail (including in China, India, Canada, Middle East). European cities generally have a lot of reserved route for transit.

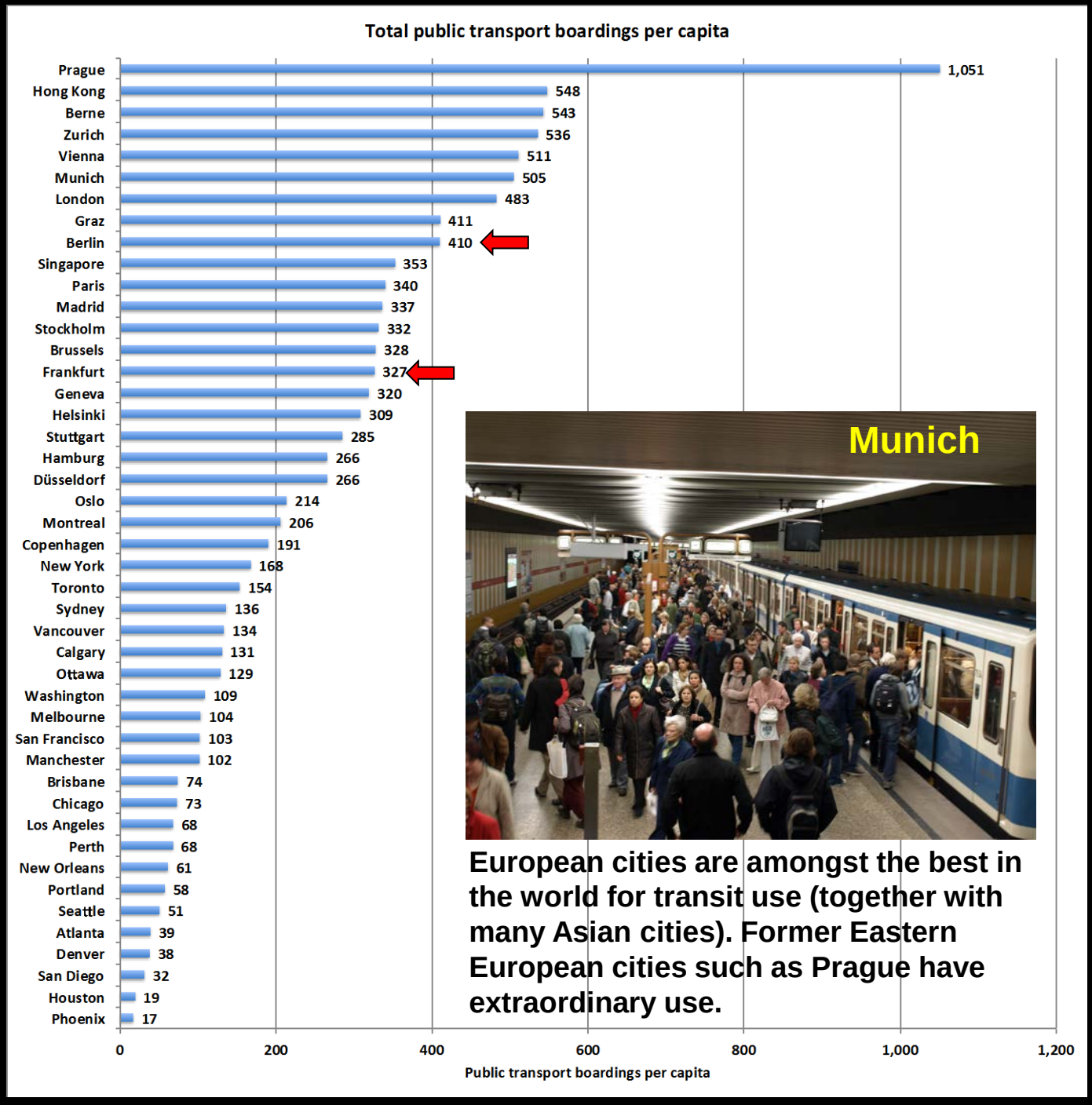
Helsinki- effective tram right-of-way

Reserved rights-of-way are critical for transit and can help cities rejuvenate Auto City Fabric with new Transit (and Walking) City Fabrics



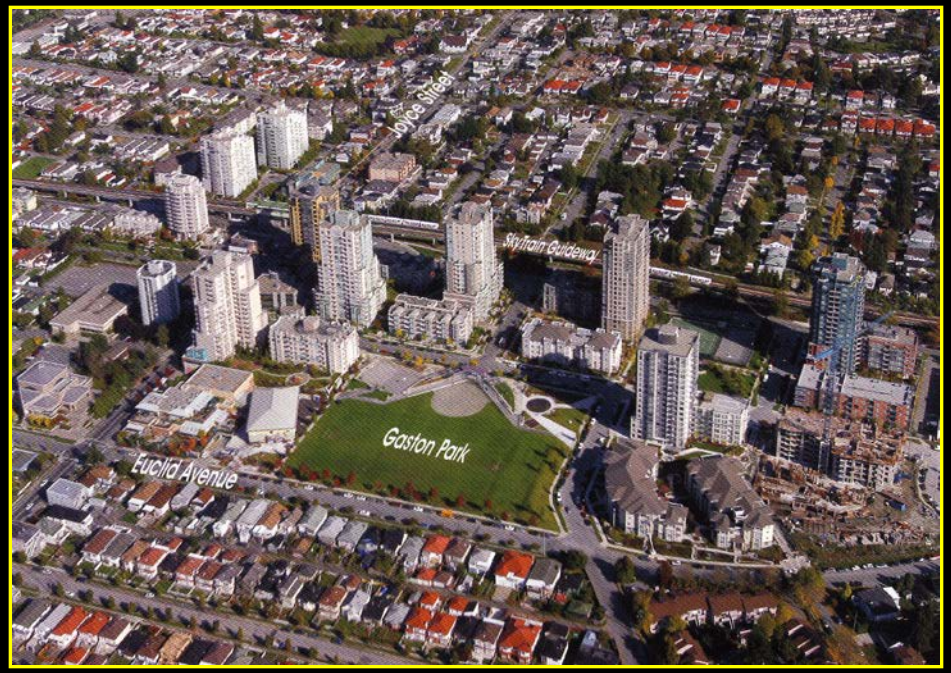
Public transport service levels in European cities are mostly relatively high with some exceptions, such as Manchester and Geneva.

Public Transit Use

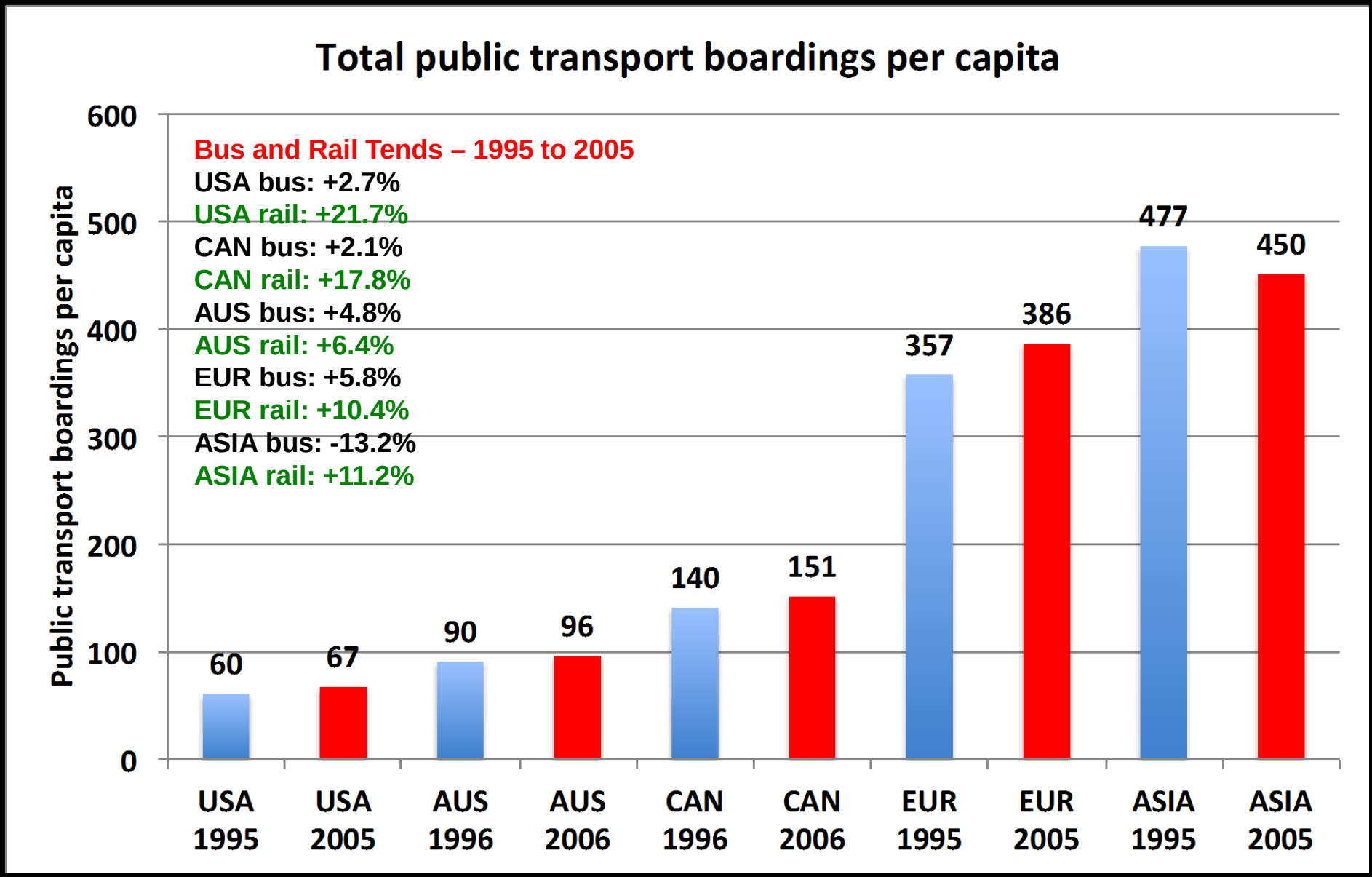


High usage of public transport is a key feature of cities with more integration of development around public transport stops, especially rail stations.

European cities are amongst the best in the world for transit use (together with many Asian cities). Former Eastern European cities such as Prague have extraordinary use.



Rail can be very powerful in influencing the form and scale of development

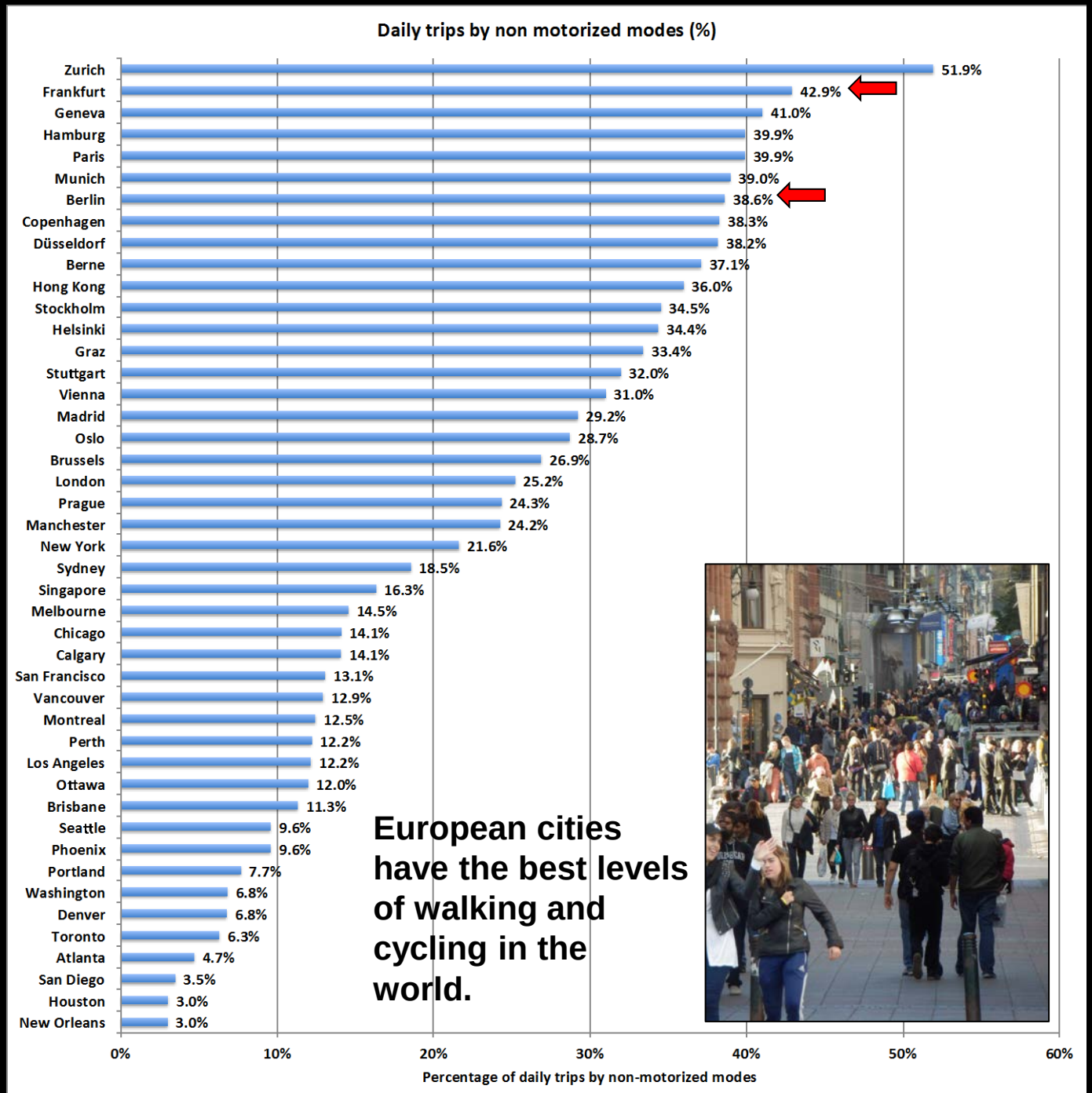


A very significant increase is occurring in urban rail systems worldwide…not just in usage, but in new rail systems throughout China, India and elsewhere. Canada is on the verge of the biggest increase in urban rail network in its history with new lines in Vancouver, Toronto, Ottawa and other parts of Ontario.

A New Golden Age of Rail

- 82 Chinese cities are building metros and nationally there is a large and growing high speed rail network between cities.
- Shanghai and Beijing now have the largest metro systems in the world, mostly built in the last 20 years.
- 51 Indian cities are building metros
- Increasing numbers of Middle eastern cities are building rail for first time (Dubai, Riyadh, etc)
- Cities in Europe are expanding rail lines (e.g. Paris circle LRT lines)
- Usage of urban rail systems is growing strongly.

Modal Split to Walking and Cycling



European cities have the best levels of walking and cycling in the world.

Improving conditions for pedestrians and cyclists is essential to the development of more sustainable transport.

Conclusions

- Sustainable Transport is a “Package Deal”. Lower car use cities have less car ownership, more competitive public transport, more public transport use, more walking and cycling, less parking, higher density housing, fewer freeways, more higher quality transit lines, lower energy use and emissions and so on. There is, however, little relationship to wealth.

- Some important things that cities need to do to move beyond automobile dependence revolve around minimising Auto City Fabric and maximising Transit and Walking City Fabric :
  - Increase densities strategically around transit stops;
  - Build more high quality transit infrastructure, especially rail;
  - Improve their urban centres and enhance their public spaces for pedestrians and cyclists;
  - Stop building destructive freeways and even take out some of the most destructive sections;
  - Introduce vehicle car and bike sharing and car-on-demand schemes to help reduce car ownership (both electric cars and e-bikes);
  - Have Integrated Mobility Management systems that link all modes through IT.
  - Congestion charging