

Land Use and Transport for Low Carbon Cities

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Cities

Cannot live without them, cannot live in them,

> Can we adapt them?

Home to over 50% of the population

- >Economic centres for countries
- >Magnets for opportunities
- >Larger the cities higher the labour opportunities
- >Are also large polluters
- Consume land and energy
- Contribute to environmental problems at a larger scale

Slumless smokeless cities (1902)

- Garden cityGroop Matrono
- > Green Metropolis
- > Ebenezer Howard
- > 2 cities built! -Welwyn Garden City and Letchworth Garden City, both in Hertfordshire England





The 1925 view of a 1950 city





http://arsvivendi.tumblr.com/post/17195781121





Atomurbia (1946)

http://longstreet.typepad.com/thesciencebookstore/2010/05/jf-ptak-atomurbia-responding-to-atomic-threat-by-moving-everyone-everywhere-1947it-is-probably-not-worth-putting-all-r.html



The Le Corbusier Model

https://io9.gizmodo.com/10-failed-utopian-cities-thatinfluenced-the-future-1511695279





Kinds of cities

>Or how cities evolved and how we want them 1: Monocentric city











- Black arrows are strong links

- Brown arrows are weak links

3: Composite city

4: Urban Village

Concept of Alain Bertaud, 2001



Way we live



Alain Bertaud, 2001



Way we move

Cities with similar population and the use of private transport









Mexico city

Change from 1910 until date





What it does to our cities



Photo by Santhosh Kodukula, 2011



Still we like our cars and we give them what they want





Precious space





Resulting in

 $\bullet \bullet \bullet$



Transport and energy demand

Transport-related energy consumption Gigajoules per capita per year







Global emissions





Source: Kodjak D, 2015, Policies To Reduce Fuel Consumption, Air Pollution, and Carbon Emissions from vehicles in G20 Nations, May 2015, The International Council for Clean Transportation (ICCT)



Public Transit and urban density

Country Australia 65.00% 0 Austria Bogota Belgium 2008 60.00% Canada China Paris 2010 Colombia 55.00% Denmark 0 France 0 Mumbai Germany 50.00% Tokyo 0 2011 📕 Hungary 2008 Ó Moscow 0 Delhi India O Singapore Budapest 45.00% 2011 O Stockholm Indonesia 2011 2011 Italy 2004 0 Japan 40.00% Milan 0 Lithuania oLondon Public Transport 32.00% 2007 Barcelona Netherlands 2016 0 0 2013 New Zealand Jakarta 0 0 Stuttgart o Norway 2011 O Madrid 0 0 Bilba Osaka Shanghai Poland 2004 2006 2004 2000 Oslo 2011 0 Russia 2013 000 Berlin 0 0 Singapore 2012 Amsterdam 0 Brussels 2014 0 0 0 Spain O Bremen O 2010 25.00% Vilnius Sweden 2011 2004 Switzerland 00 0 0 Vancouver 📕 Taiwan 20.00% Munich 2016 0 0 Malmö United Kingdom 2011 0 Melbourne Pune-Pimpri Chinchwad 2011 United States 2016 Ø 2011 15.00% 2011 O Chicago 0 0 0 0 0 Boston 8 0 Rajkot 2016 00 0 2011 10.00% 0 San Jose 0 2016 Eindhoven O^{Turin} 2004 5.00% 0 0 2004 8 0 0 0.00% ОK 1К 2К ЗK 4К 5K 6K 7K 8К 9К 10K 11K 12K 13K 14K 15K 16K 17K 18K 19K 20K 21K 22K Urban Density

Sum of Urban Density vs. sum of Public Transport. Color shows details about Country. The marks are labeled by City and sum of F9.

Source: Kodukula and Rat, 2018

Urban Density vs Public Transport use



Air Quality

- In most of the developing cities
- >India and China are getting worse >Majority of
 - urban emissions from transport



Induced Demand

> Greater

- Demand for space
- Impact on health
- Deterioration of environment
- Impact on traffic
- Demand for travel









Tale of two cities



Atlanta, GA, USA

- > Population: 5.25 million
- > Urban area: 4,280 km²
- CO2 Emissions from urban transport: 7.5 T CO₂ /ha/yr (public + private transport)
- > About 500,000 public transport trips / weekday

- > Population: 5.33 million
 - > Urban area: 162 km2
- CO2 Emissions from urban transport: 0.7 T CO2 /ha/yr (public + private transport)
 - > About 2.6 million trips / day
 - > 953 million boardings/year



Barcelona, Spain



Car oriented planning

- >Low Density
- Segregated Land Use
- >Excessive road infrastructure
- Preference to mobility over accessibility





Why do cities grow?

- >What is land use/transport?
- >What influences it?
- >What does it influence?





The 3Ds of land-use

> Density
> Diversity / mixed land use
> Design

> Destinations (availability of jobs etc.)

> Distance to transit







Density



Density: How not to...

- >Inhuman scale
 >Not integrated with transit
 >Segregated zoning
- >What is the problem with a downtown?

Houston, TX, USA - Source: http://www.photohome.com/pictures/texas-pictures/houston/downtown-houston-4a.jpg



Source: http://travelingcolors.net/post/24217917137/urban-sprawl-las-vegas-nevada-by-cocoim



Diversity

>Is this diversity?





Diversity

- > Mixed Land-use reduces the necessity to make some trips
- Distance travelled is greatly reduced
- Complemented by a good public realm with space for walking and cycling





Design: Who do we give the space?





Who do we design the spaces for



Intersección Gascón, Costa Rica y J. Álvarez - Antes y después Source: City of Buenos Aires, 2015



Design of services

>Not just urban space

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Source: City of Buenos Aires, 2015



Transit Oriented Development

A transit spineCore high density

>Decreasing densities





In the TOD

Core is Transit bound
Walking at 200 m
Cycling upto 800 m





Example from Curitiba





Intervention from Bogota

- Govt. to locate public facilities (schools, colleges, recreational centers, etc.) along PT corridors
- Bogota built several schools along TransMilenio corridor





Copenhagen

- Concept of 1947
- >Over 170 kms of s-tog train lines
- >Over 400 km of bicycle lanes





Current Model Superblocks Model PUBLIC TRANSPORT NETWORK PRIVATE VEHICLE PASSING DUM PROXIMITY AREA E BICYCLES MAIN NETWORK (BIKE LANE) RESIDENTS VEHICLES ACCESS CONTROL URBAN SERVICES AND EMERGENCY BASIC TRAFFIC NETWORK BICYCLES SIGNPOSTS (REVERSE DIRECTION) DUM CARRIERS FREE PASSAGE OF BICYCLES SINGLE PLATFORM (PEDESTRIANS PRIORITY)

Barcelona



Superblocks benefits





In conclusion

Growing Economy	• Car ownership Traffic volumes					
Urban Sprawl	 Longer trips Time lost in traffic Higher infrastructure costs 					
Climate Change	 Higher emissions Air pollution 					
Road Safety	 Higher speeds Increased Fatalities Conflict among modes 					
Energy Consumption	 Transport consumes about 30% of energy GHG Emissions 					



What carries how much?

Suburban Rail (e.g. Mumbai) Heavy Rail/ Metro Equivalency road width: In order to carry 20,000 BRT automobile commuters double lane PHPD, a highway must be at Pedestrians Light Rail least 18 lanes wide. BRT Cyclists single lane (assumption 1.2 passengers Regular Bus Mixed Traffic per automobile) İ **•** • • • i i 60k - 90k 9k 14k 18k - 20k ?? 40k - 60k **PPHPD Range** 1.5k-2k 5k 19k Maximum PPHPD 43k, >100k, 80k, 15k, Curitiba 2k 20k 8k 19k 14k achieved Mumbai Bogota HKK

Source: Manfred Breithaupt (2016) based on Botma & Papendrecht, TU Delft 1991 and own figures



We know it is bad....but

Average time spent commuting to work in selected metropolitan areas in Brazil and other countries^{1,2}



Source: Brazil - National Household Sample Survey (PNAD/IBGE); Santiago (Chile) – data available at: <http://www.sectra.gob.cl>; data from all other metropolitan areas from Toronto Board of Trade (2012).

Notes: ¹ Tokyo: 2005; Santiago and Europe: 2006; Brazil: 2009; Australia, Canada, Shanghai and USA: 2010.

² Commute time data from Eurostat is available only at the regional level. However, the delimitation of these boundaries is not strictly defined and may vary greatly across European MAs. Data from the USA is based on Metropolitan Statistical Area.



What to prioritise

>Cities for People

OR

>City for cars





How do we do it?

- >Integrate land use and transport
- >Don't focus on single corridor solutions
- >Integrate, integrate, integrate
- >Don't control land prices but guide urban development
- >Know what kind of city you want!







Questions for you.

>Land Value Capture
>Any other alternatives to TOD?
>What is being done in your city?



Thanks for the attention

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