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China's City Clusters:

the emergence of the largest urban labor markets in the world or just more congestion and pollution?

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Question

1. Could China create integrated urban labor markets of more than 50 million people with the enormous productivity associated with their size?

2. or would large expanded city clusters create just more congestion and pollution within adjacent but fragmented smaller less productive labor markets ?

A. Large labor markets are more productive and creative than smaller ones

1. Scale economies
2. Agglomeration economies
3. Knowledge spillover

Potential vs. effective size of labor markets

- The effective size of a city's labor market depends on the ability of the transport system to link all households' residences and jobs' locations in less than one hour
- As a city area expands, speed of transport becomes the key parameters to allow effective labor markets to expand [1]

[1] *Prud'homme, Rémy & Chang-Woon Lee. 1999. "Size, Sprawl, Speed and the Efficiency of Cities". Urban Studies.*

the size of labor markets

- The productivity and the capacity for innovation of cities are increasing with the size of their labor market

- However, the size of a labor market is limited by the capacity of the transport system to link workers and jobs in less than one hour commuting time

Currently, the productivity of existing Chinese large urban clusters is only potential because of the low speed of transport

The current 11 city clusters identified by the Chinese Government (2015) are

- covering 10 percent of the country's area,
- Including one third of the country's population,
- Accounting for two thirds of the entire China’ s economic output

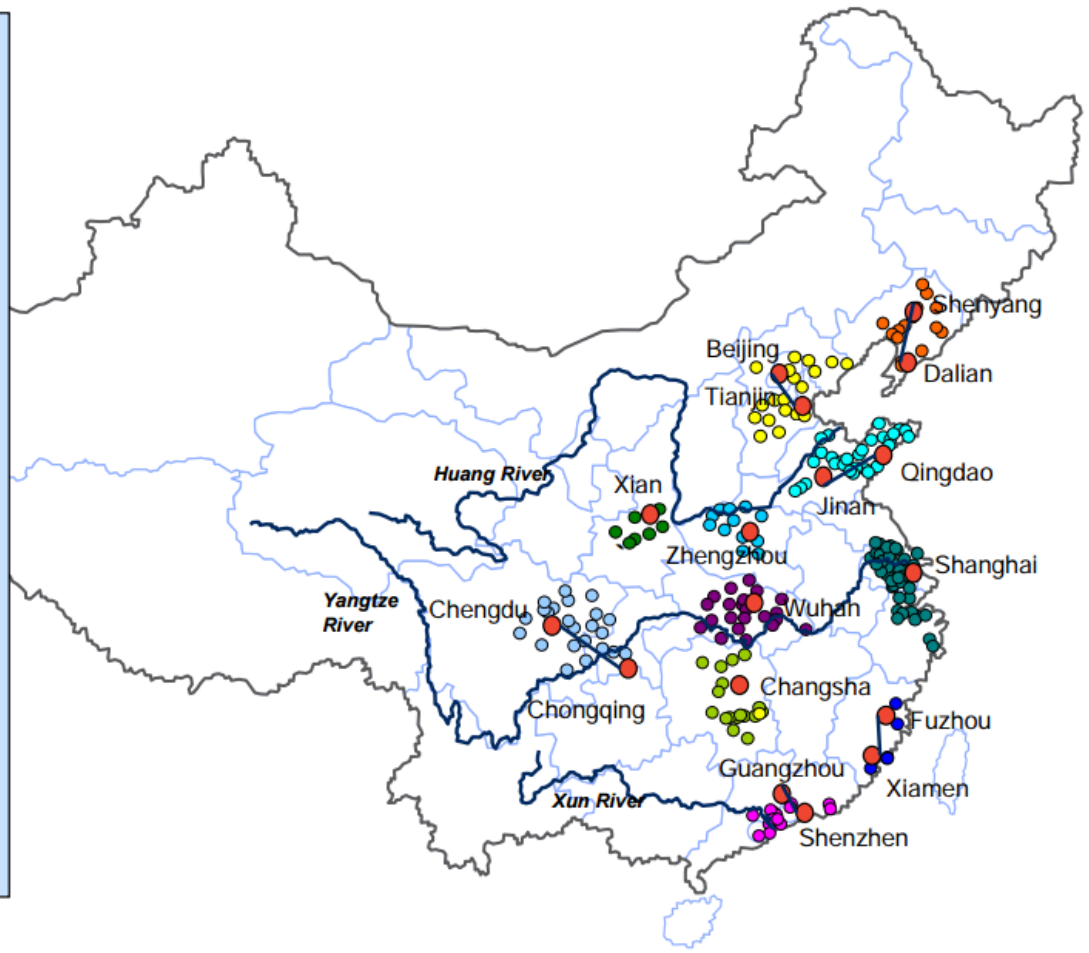
B. New Chinese urban policy: focusing new infrastructure investments on clusters of cities rather than on large monocentric cities

China's National Development and Reform Commission National Plan on New Urbanization (2014-2020)

Hub and spoke would see China's 11 networks of cities integrating and growing rapidly

Economic regions

Regional hubs	Number of cities in region
Beijing/Tianjin	28
Shenyang/Dalian	22
Qingdao/Jinan	35
Xian	8
Zhengzhou	23
Shanghai*	58
Chengdu/ Chongqing	31
Wuhan	27
Changsha	20
Xiamen/Fuzhou	14
Guangzhou/ Shenzhen**	23

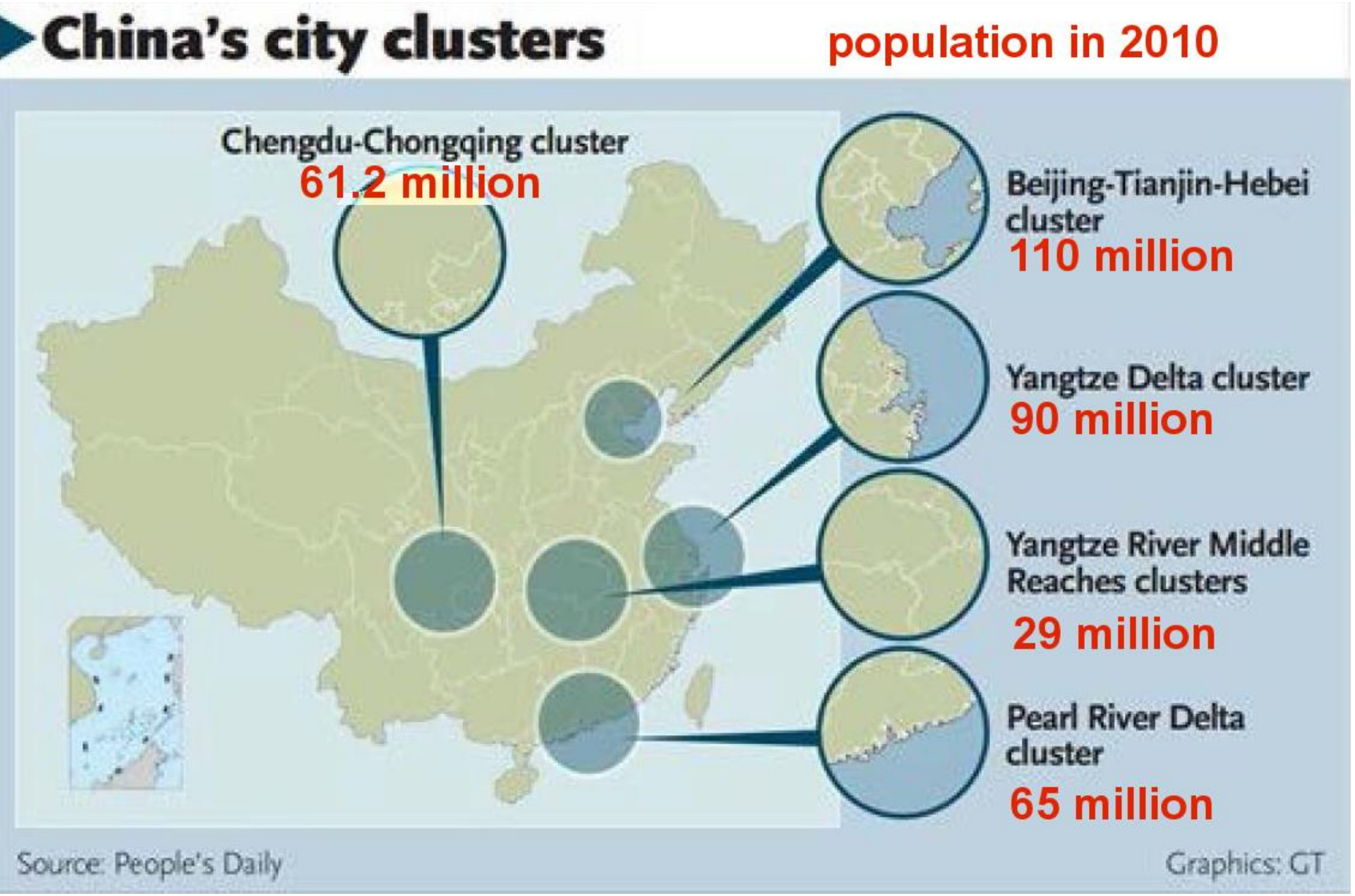


* Yangtze River Delta Cluster.

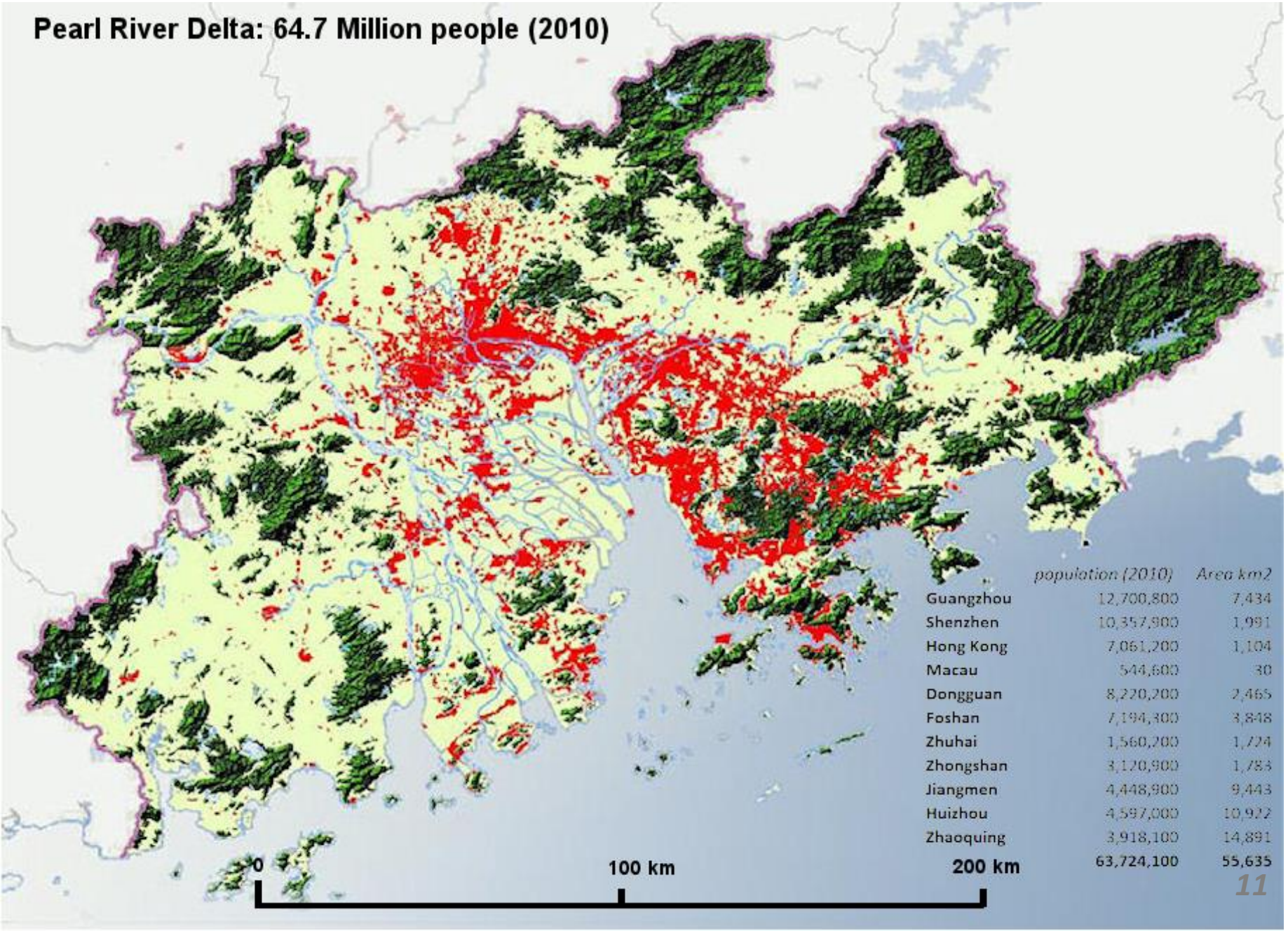
** Pearl River Delta Cluster, with strong linkages to Hong Kong.

Source: McKinsey Global Institute analysis

China's 5 larger clusters

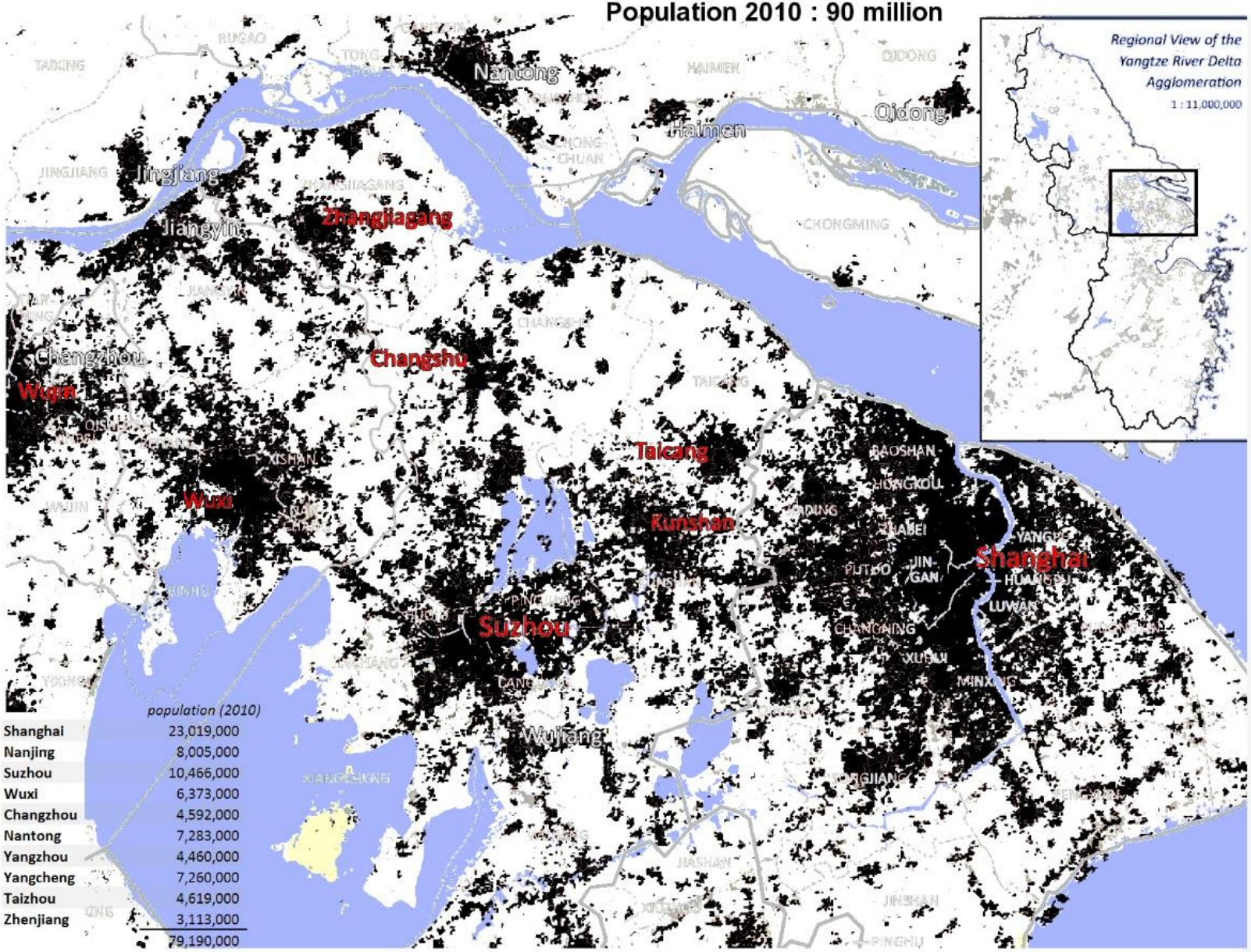


C. The scale of the new Chinese city clusters make them different from any existing form of urbanization


Pearl River Delta: 64.7 Million people (2010)
population (2010) Area km2
Guangzhou 12,700,800 7,434
Shenzhen 10,357,900 1,991
Hong Kong 7,061,200 1,104
Macau 544,600 30
Dongguan 8,220,200 2,465
Foshan 7,194,300 3,848
Zhuhai 1,560,200 1,724
Zhongshan 3,120,900 1,783
Jiangmen 4,448,900 9,443
Huizhou 4,597,000 10,922
Zhaoquing 3,918,100 14,891
63,724,100 55,635
0
100 km
200 km

The built-up area of the Metropolitan Region formed by Shanghai, Suzhou, Changzhou in 2010

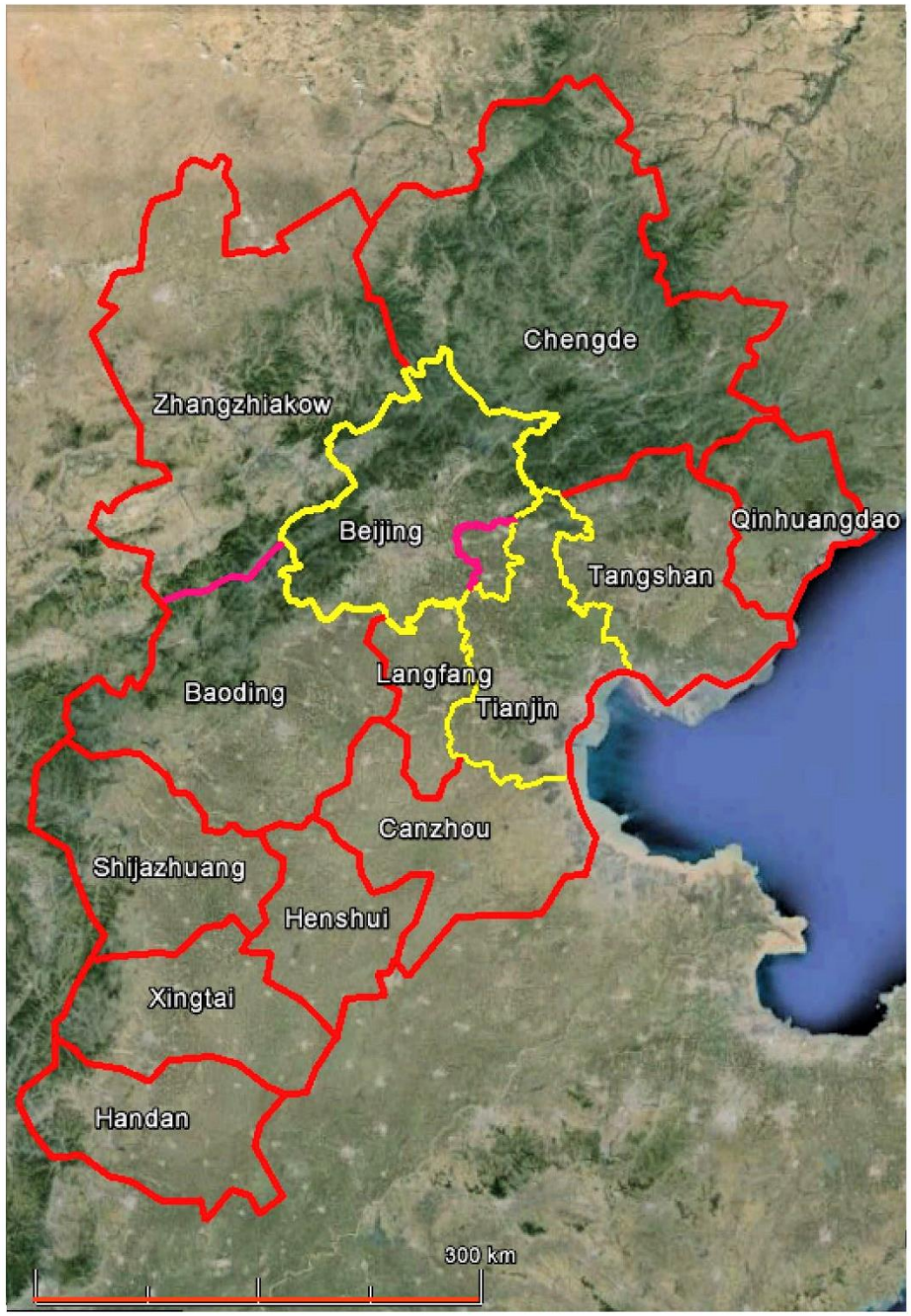
Population 2010 : 90 million



	population (2010)
Shanghai	23,019,000
Nanjing	8,005,000
Suzhou	10,466,000
Wuxi	6,373,000
Changzhou	4,592,000
Nantong	7,283,000
Yangzhou	4,460,000
Yangcheng	7,260,000
Taizhou	4,619,000
Zhenjiang	3,113,000
	79,190,000

Source: Map prepared by the University of Wisconsing-Madison, May 2013.

0 150 km



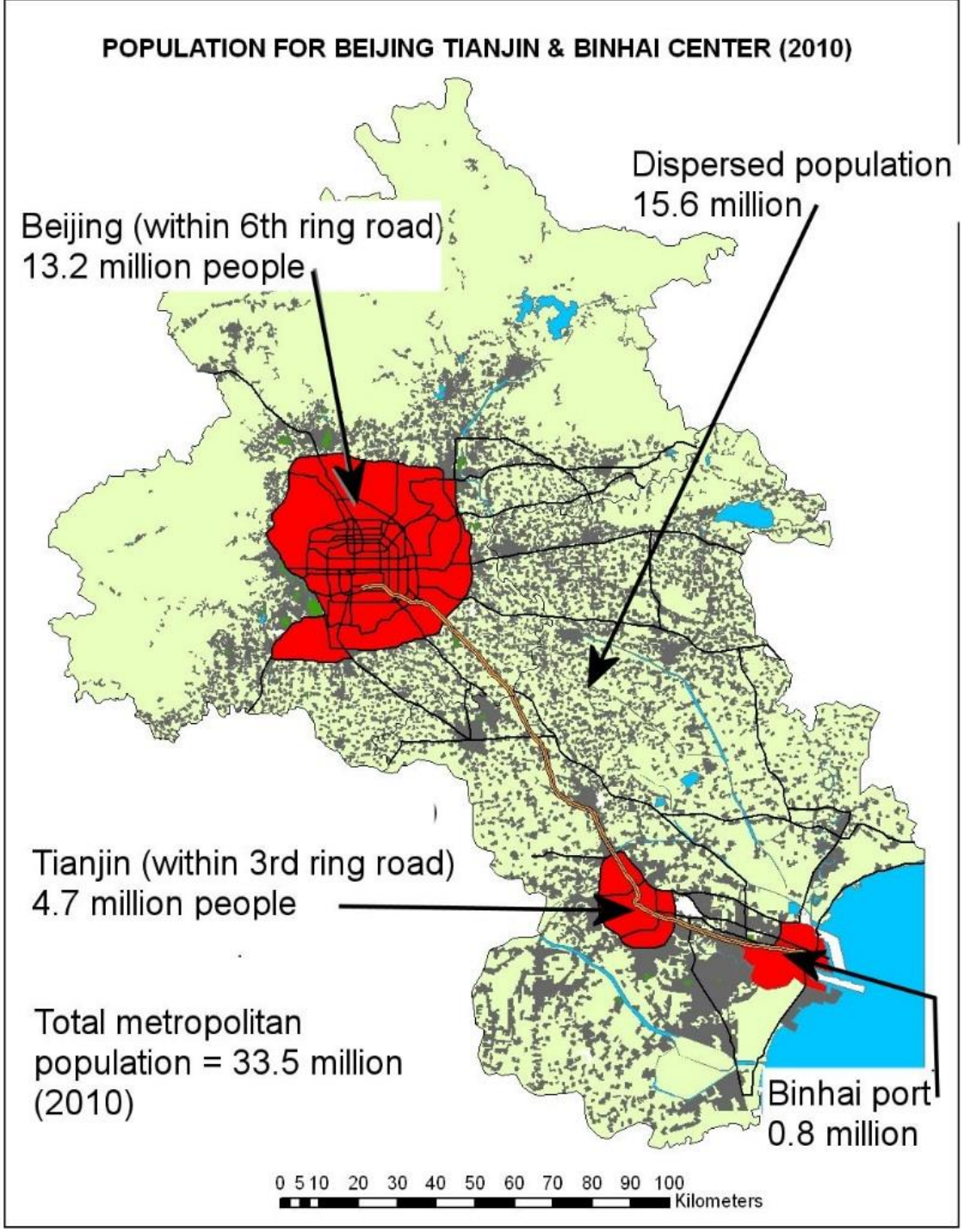
Jing-Jin-Ji cluster 109 million people (2010)

Components of Jing-Jin-Ji

Jurisdiction	Total Population (2013)	Density (per KM2)	Principal Urban Area Population (2015)	Urban Density (per KM2)
Beijing	21.2	1,300	20.2	5,100
Tianjin	14.7	1,200	10.9	5,400
Jing-Jin-Ji Core	35.9	1,300	31.1	5,200
Baoding	10.2	500	1.3	5,900
Langfang	4.4	700	0.5	3,800
Canzhou	7.2	500	0.5	3,800
Tangshan	7.5	600	2.4	8,700
Zhangzhiakow	4.6	100	1.2	9,200
Qinhuangdao	2.9	400	1.0	6,500
Chengde	3.7	100	0.1	4,300
Inner Jing-Jin-Ji	40.5	300	7.0	6,600
Shijiazhuang	10.4	700	3.4	17,000
Handan	9.2	800	2.0	11,900
Xingtai	7.1	600	0.7	6,000
Henshui	4.3	500	0.4	11,800
Outer Jing-Jin-Ji	31.0	600	6.5	12,500
Jng-Jin-Ji	109.2	500	44.6	5,900

Population in millions.
Jurisdition population from government sources
Urban area population from Demographia World Urban Areas

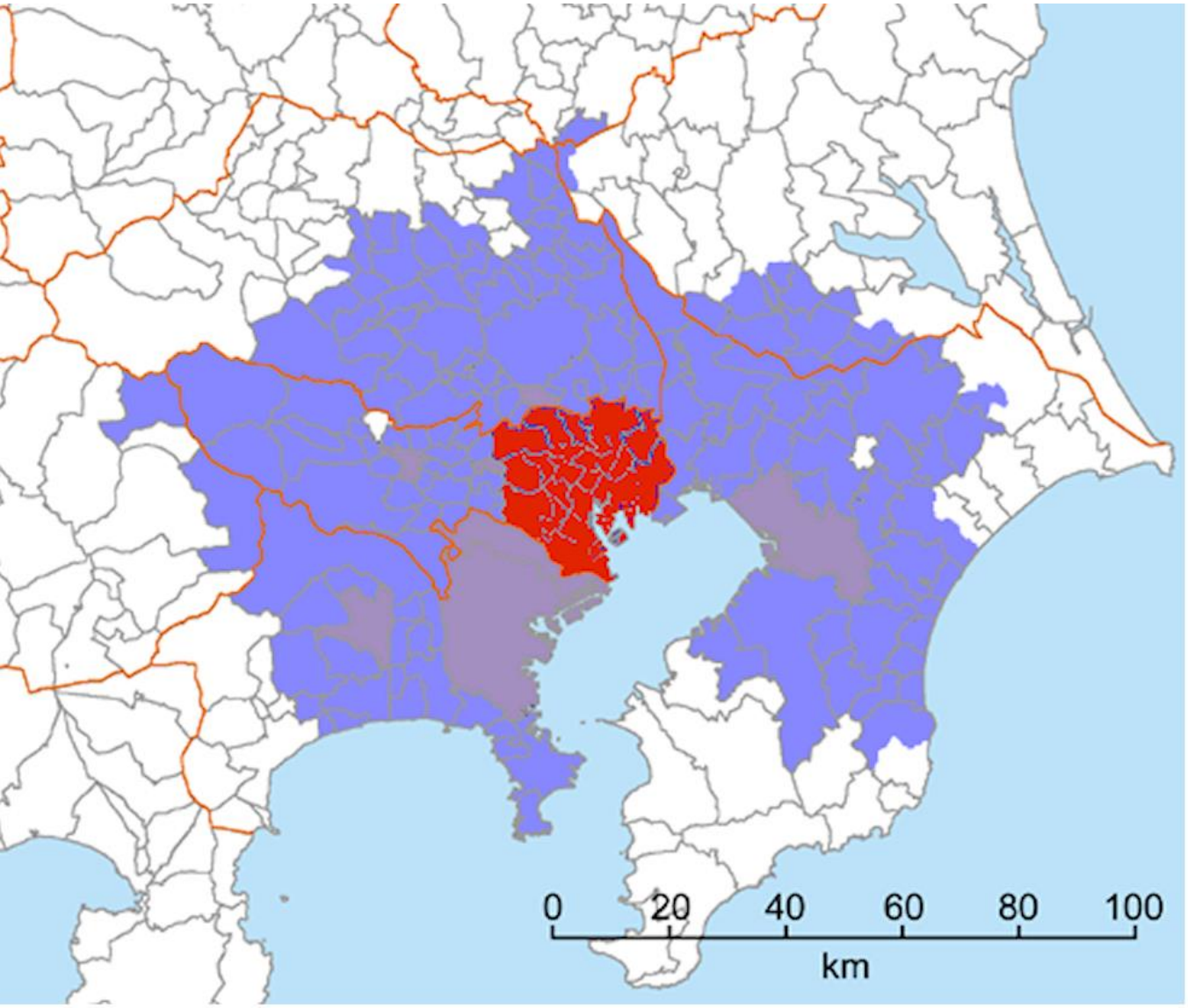
The size of China's urban clusters is unprecedented (Beijing Tianjin Hebei cluster will eventually include about 100 million people)



Detailed map of a segment of Jing-Jin-Li cluster, including about1/3 of the cluster current population

In urban clusters, the spatial pattern of population densities and job distribution is already very different than in more traditional forms of urbanization

Tokyo Metropolitan employment area is the only urban labor market that would be comparable to the planned Chinese urban clusters but it has only 1/3 of the population of the largest Chinese cluster



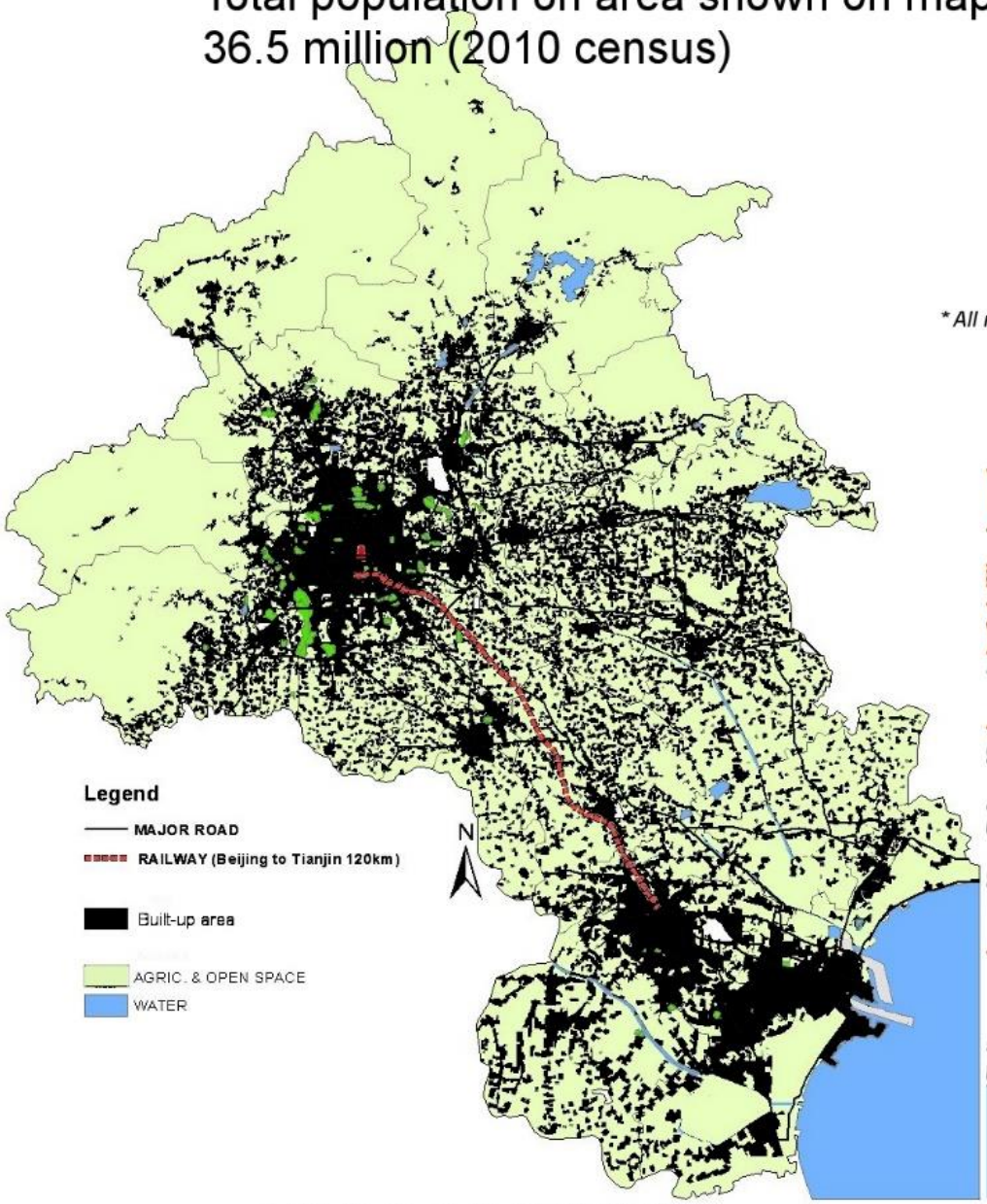
Tokyo historical area
23 wards
8.95 million people

Tokyo Metropolitan Employment Area *
31.7 million people

*all municipalities that have at least 10% of their population commuting to the 23 wards historical area

Center for Spatial Information Service, University of Tokyo

Beijing and Tianjin built up area (2013)
Total population on area shown on map:
36.5 million (2010 census)

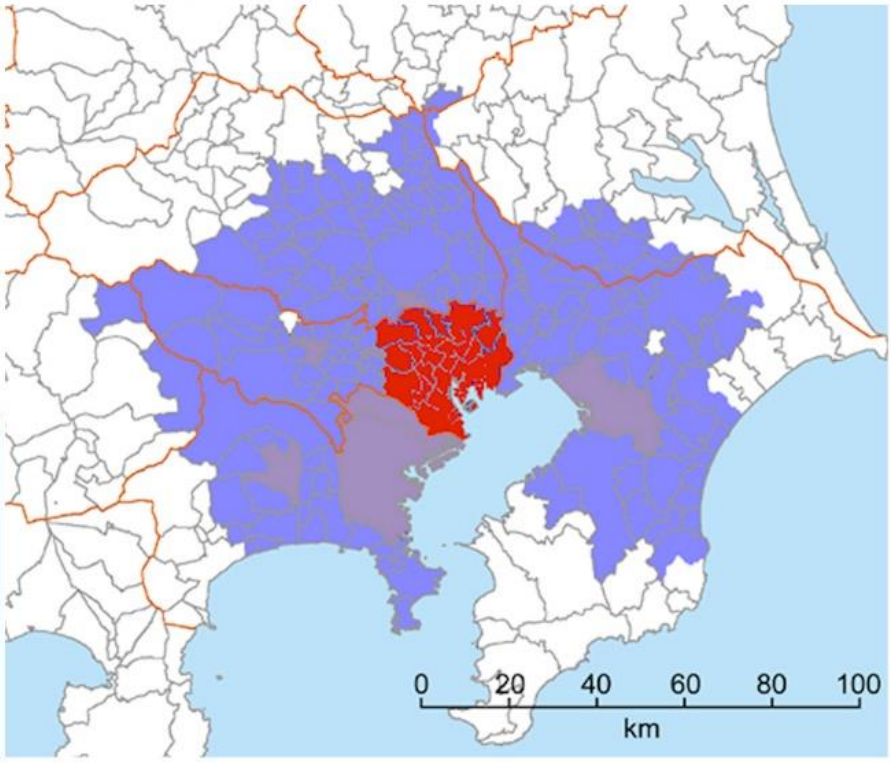


Tokyo Metropolitan Area
as shown on map:
31.7 million

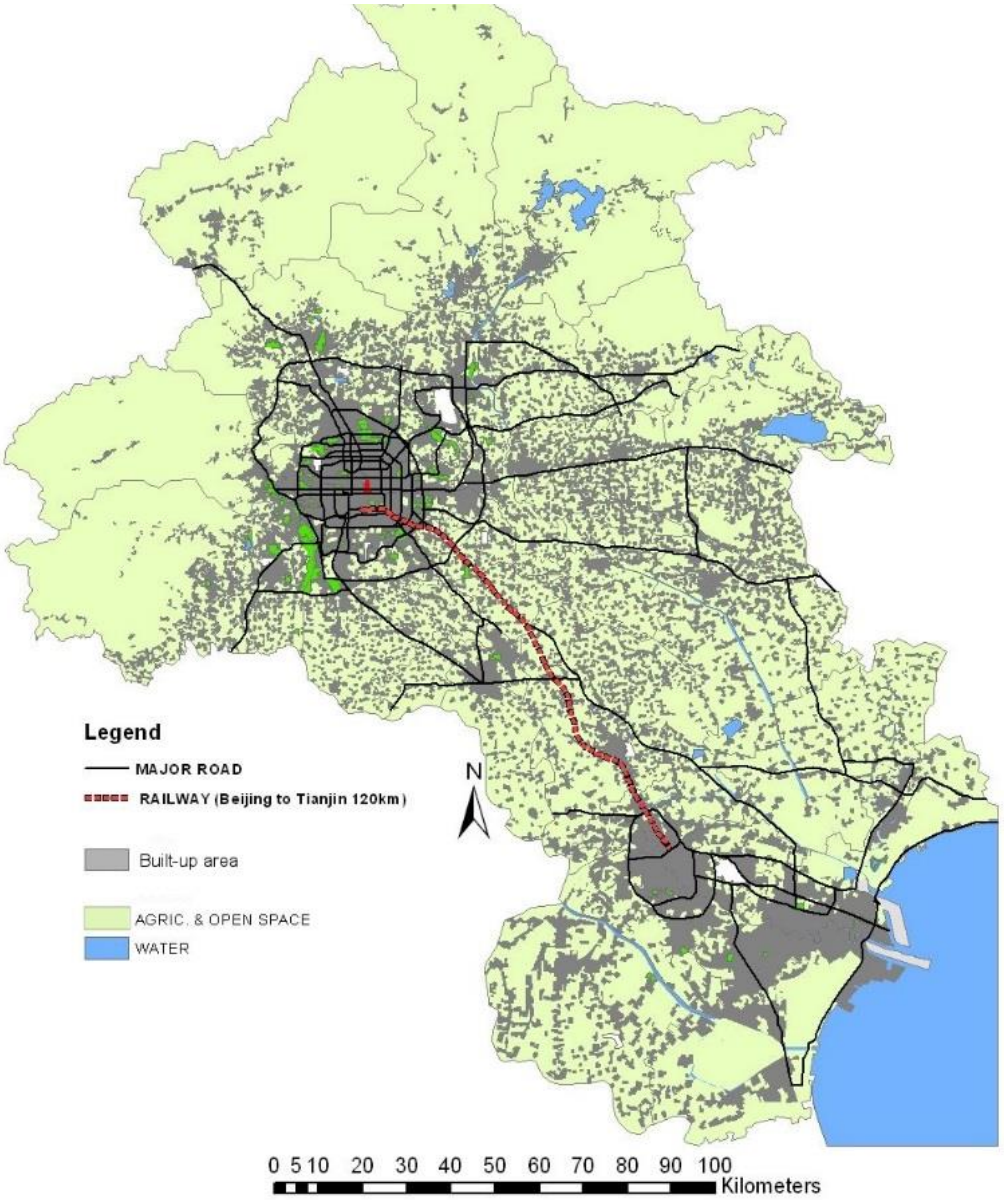
Tokyo historical area
23 wards
8.95 million people

Tokyo Metropolitan Employment Area *
31.7 million people

** All municipalities that have at least 10% of their population commutting to the 23 central wards*

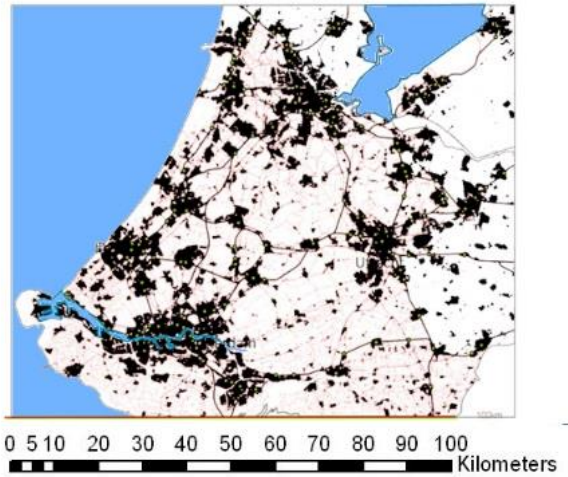


Beijing & Tianjin built-up area (2013 -total population of the area shown on map: 36.5 million (about 1/3 of Jing Jin Li cluster) .
The Randstad shown at the same scale has 7.1 million people



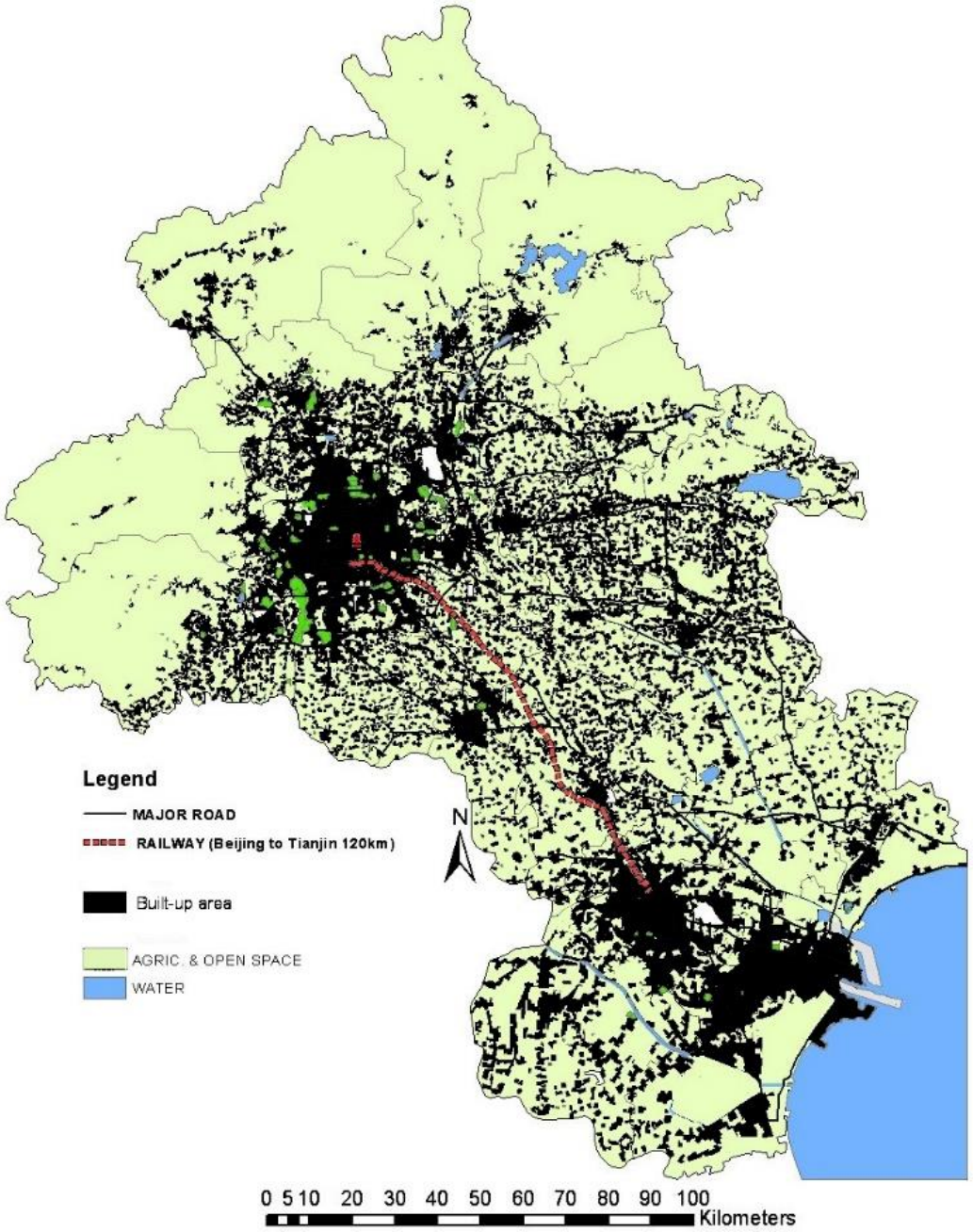
Total Randstad Population (2008)

Amsterdam	0.8 million People
Rotterdam	0.6
The Hague	0.5
Utrecht	0.3
	2.2
Other urban	4.4
Rural	0.5
Total Randstad	7.1 million People



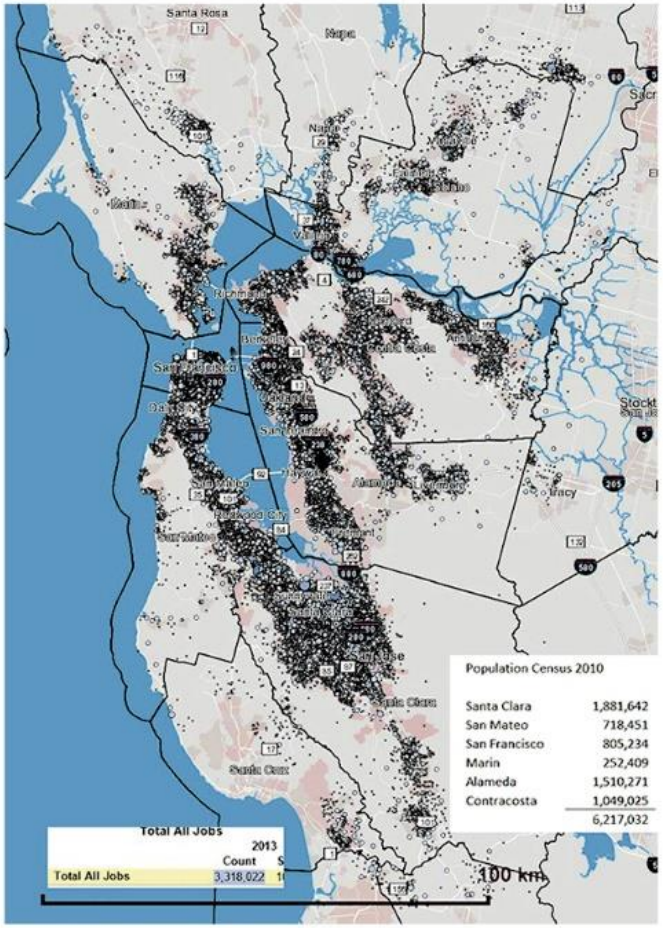
BEIJING & TIANJIN BUILTUP AREA - 2013 -

Total population in areas shown on map: 36.5 million (2010 census)



San Francisco Bay Area
Population Census 2010

Santa Clara	1,881,642
San Mateo	718,451
San Francisco	805,234
Marin	252,409
Alameda	1,510,271
Contracosta	1,049,025
	6,217,032

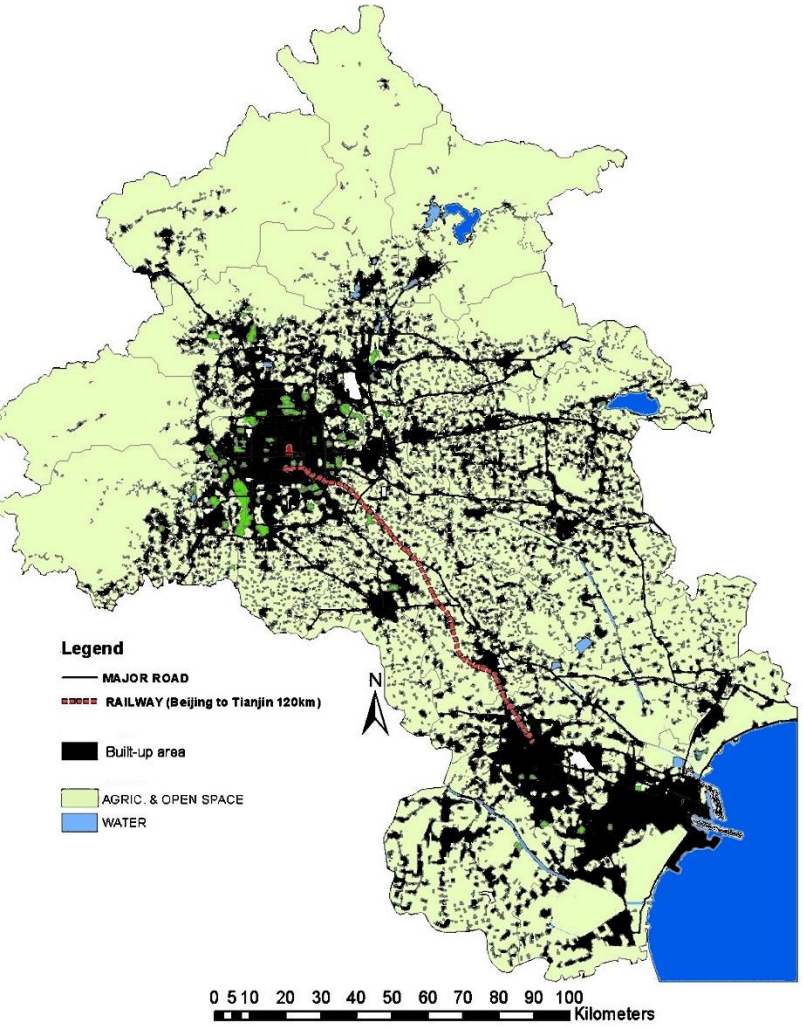


China's urban clusters are dwarfing traditional existing megacities

Beijing-Tianjin shown at the same scale as Seoul and Paris metropolitan areas

BEIJING & TIANJIN BUILTUP AREA - 2013

Total population in areas shown on map: 36.5 million (2010 census)

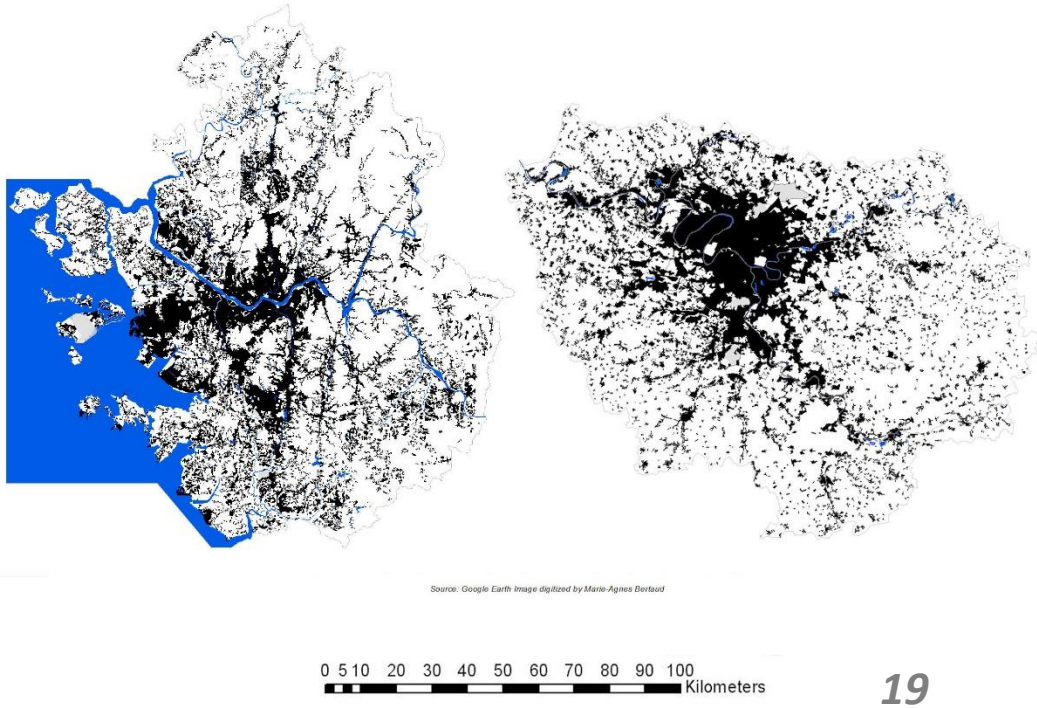


Seoul Metropolitan Region

Built-up area 2009 : 3,028 km2
Population : 24.8 million
Built-up density : 82 p/ha

Paris - Ile de France Region

Built-up area 2006 : 2,871 km2
Population : 11.66 million
Built-up density : 41 p/ha



In China, the development of current urban clusters , outside the extension of monocentric cities, has been demand driven , not planned,
largely driven by collectively owned Town and Village Enterprises (TVEs), which have replaced many of the original privately owned TVEs created in the 80s

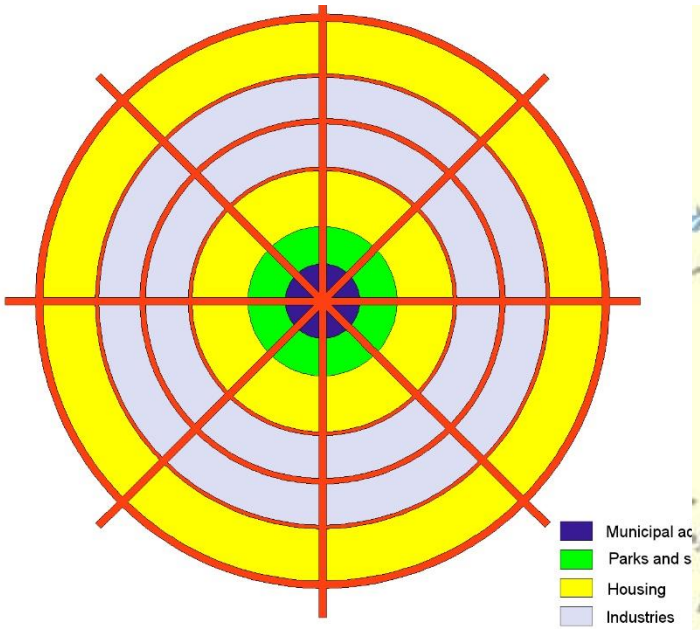
The spatial development of cities had so far consisted of:

- Large supply driven development with large industrial areas built by local government on land adjacent to the concentric ring roads that characterize the large monocentric cities
- Spatially fragmented small enterprises developed originally by village collectives, which form the backbone of flexible supply chain made of small enterprises

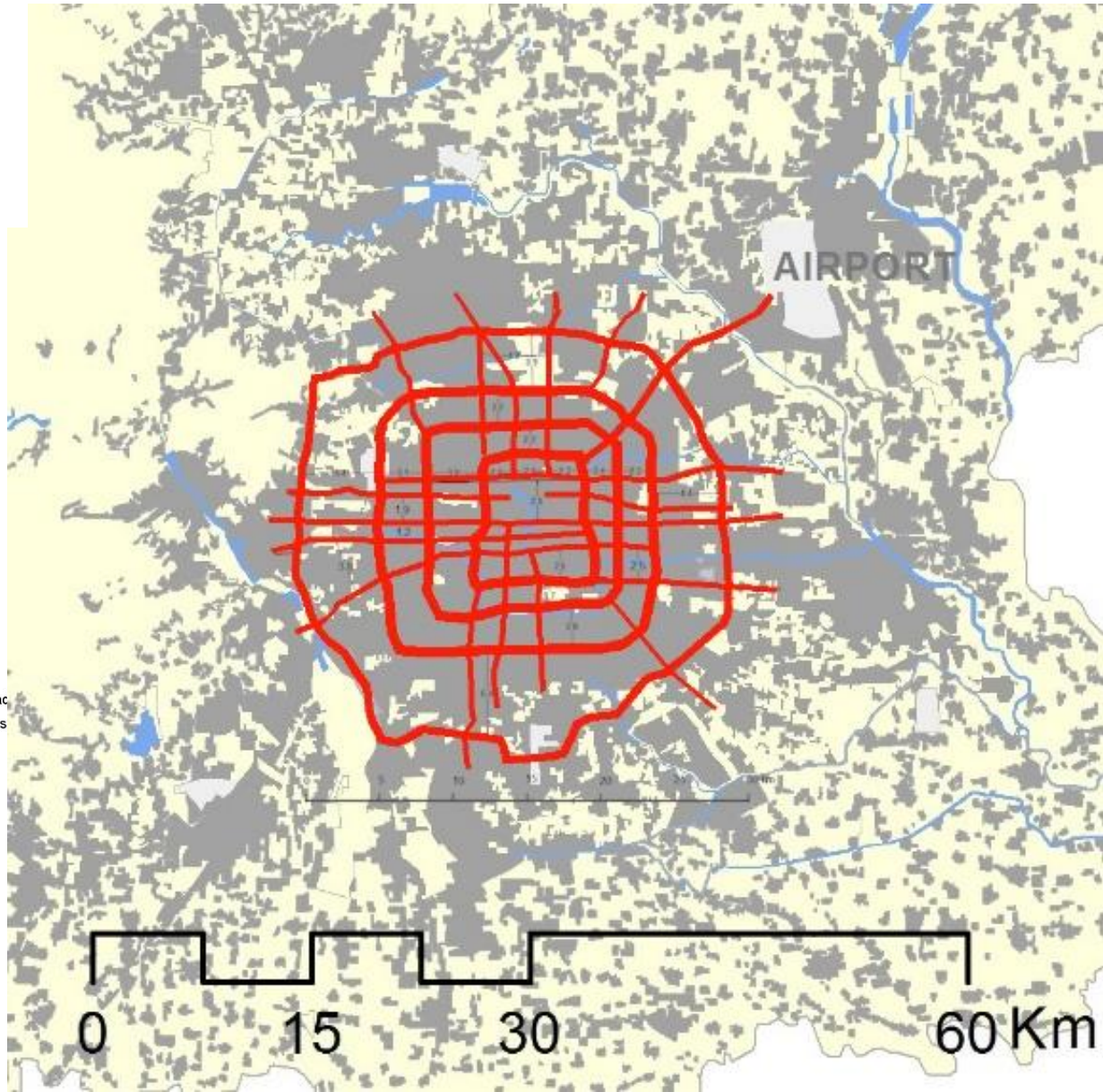
D. Departure from past policies motivated by pollution and congestion generated by current urbanization model

Until 2015 Chinese cities expanded around concentric ring roads

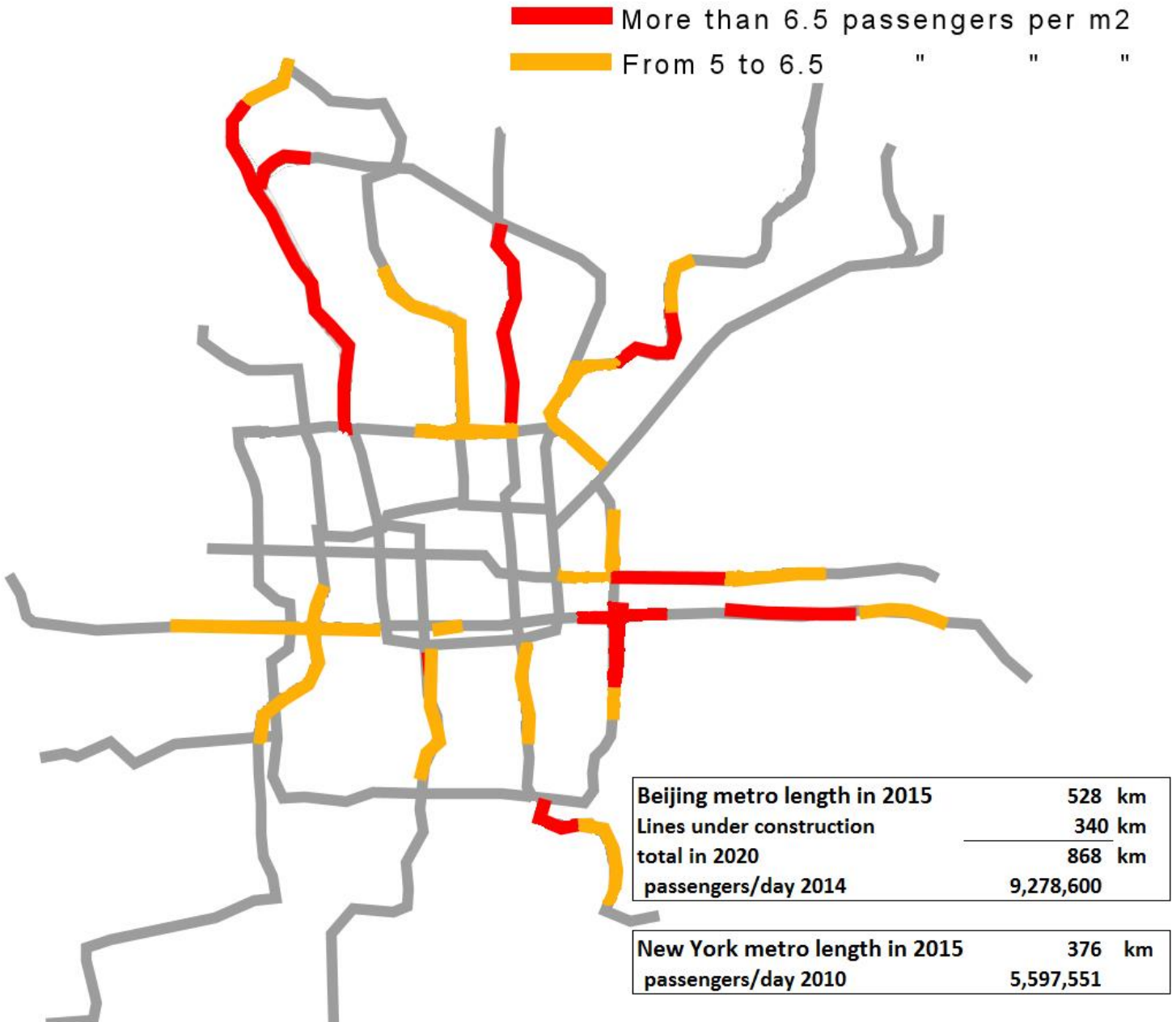
Schematic model of Chinese cities under communist party guidelines (1983)



Beijing Built-up area 2012



Congestion in Beijing subway at peak hour (2015) a reason for abandoning the radio-concentric model?



Beijing metro length in 2015	528	km
Lines under construction	340	km
total in 2020	868	km
passengers/day 2014	9,278,600	

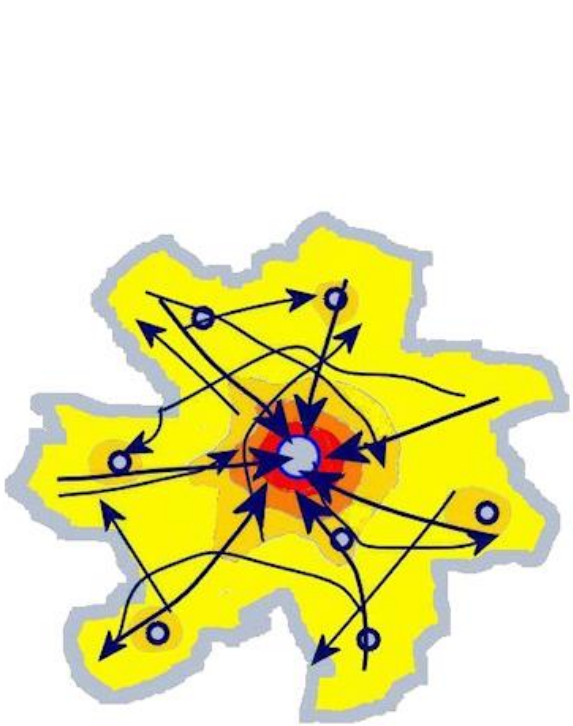
New York metro length in 2015	376	km
passengers/day 2010	5,597,551	

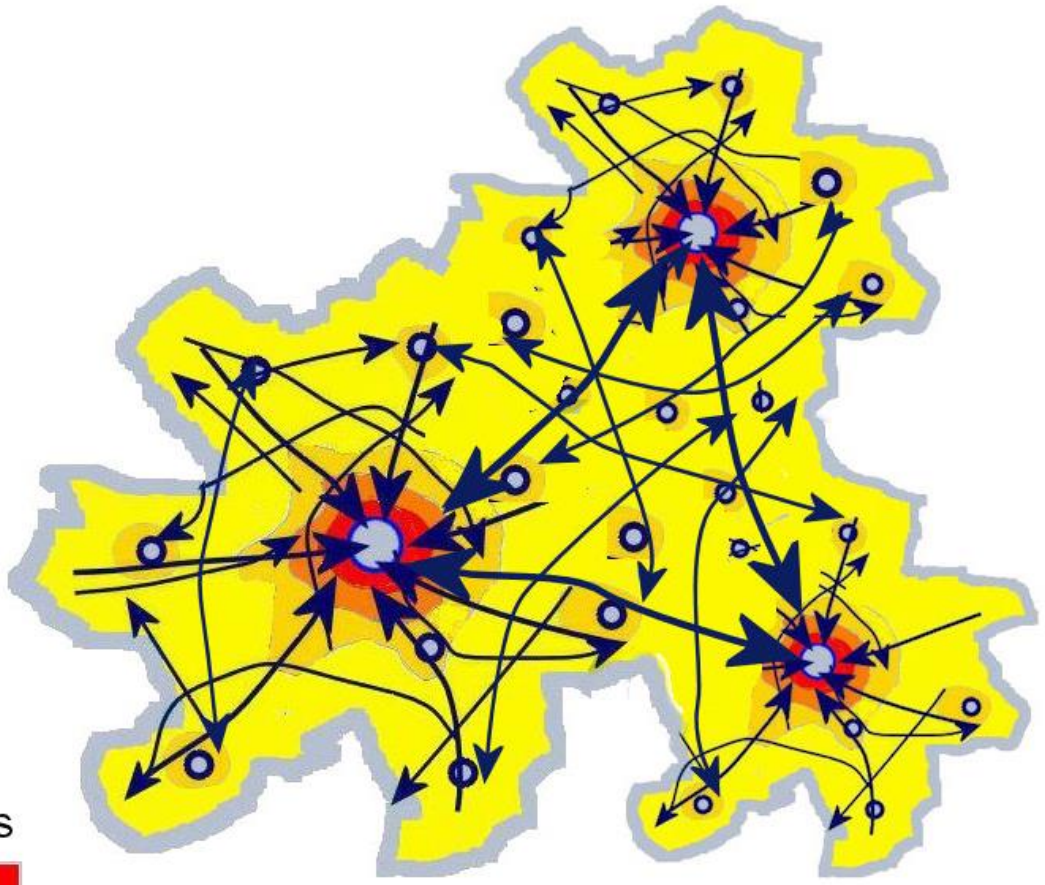
E. Current transport modes will be unable to provide the mobility necessary to integrate the large potential labor markets created by Chinese city clusters

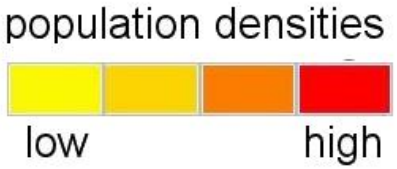
The dispersion of trips origin and destination will increase in China's large urban clusters

Typical trips pattern in a metropolitan area

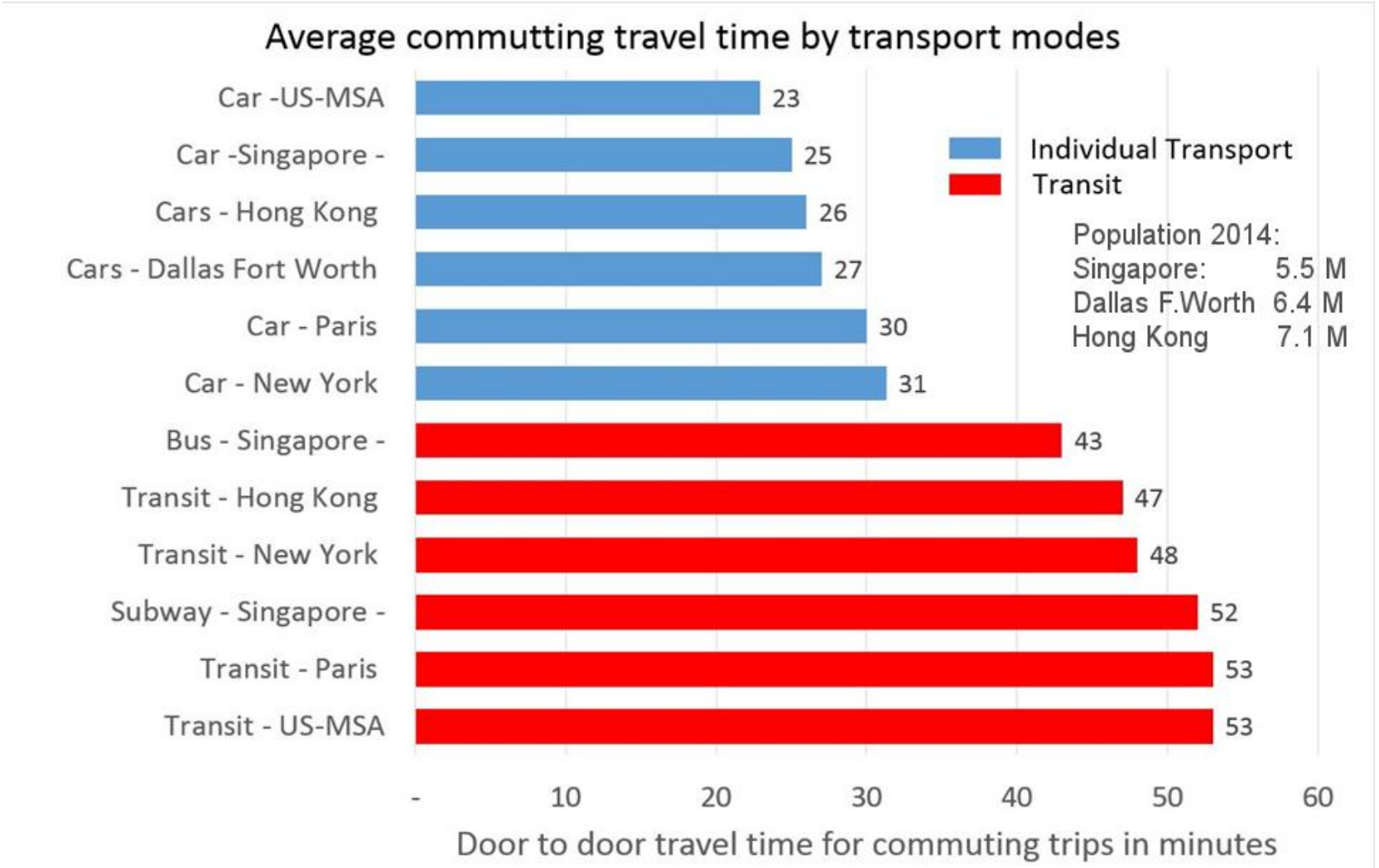
Expected trips pattern in an urban cluster







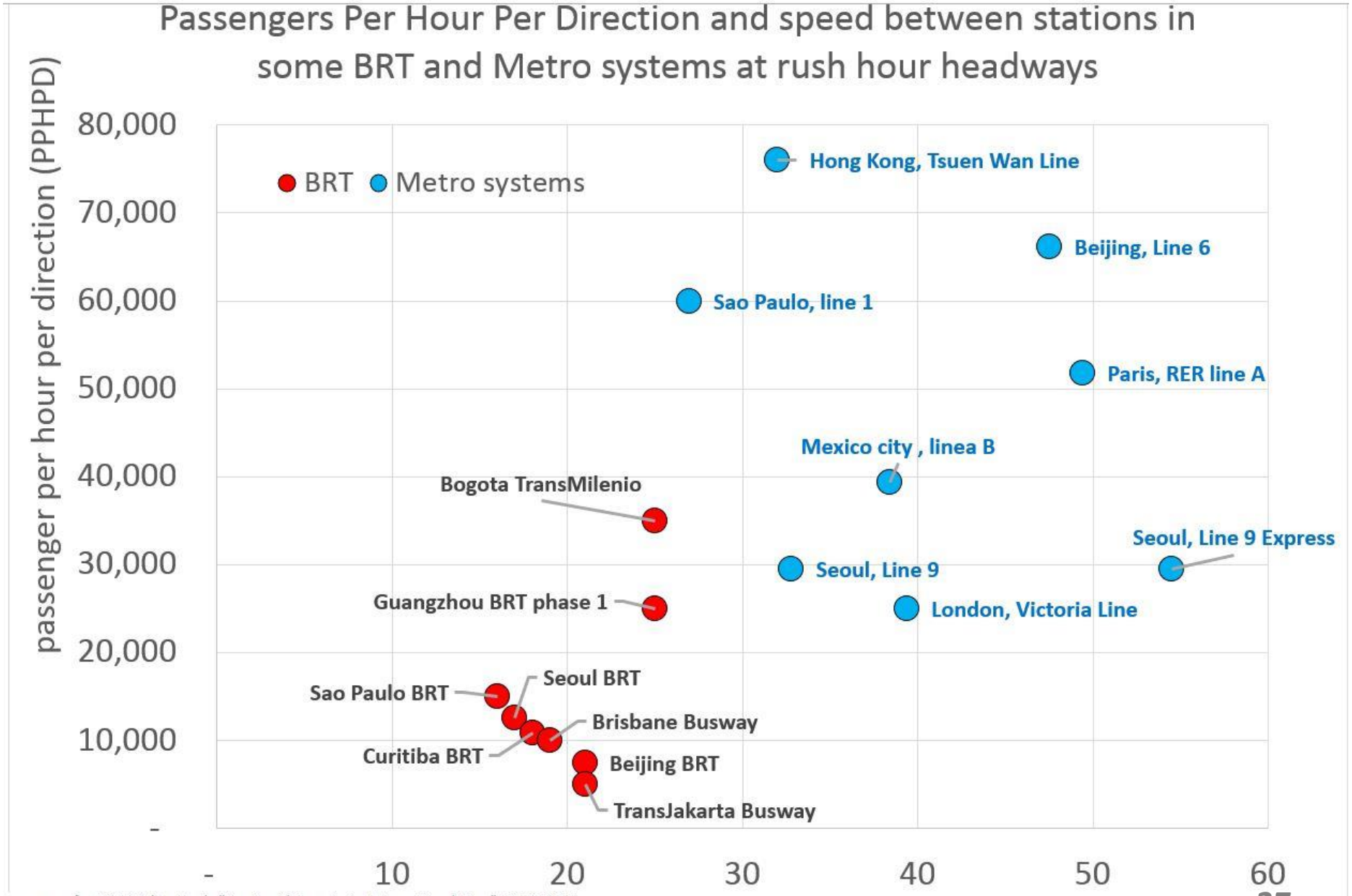
Transit provides high capacity but slow door to door speed current cars have higher speed but low road capacity



sources
US: Commutting in America 2013 US DOT Census Transportation Planning Products Program
Paris:Deplacements des Franciliens -DREIF 2004
www.lta.gov.sg/corp_info/doc/Statistics%20in%20Brief%202009.pdf
New York City census 2010 -CTPP Profile

AB_travel time US Singapore Paris - Excel

The faster transit systems seem to have difficulties breaching the 50km/h speed barrier

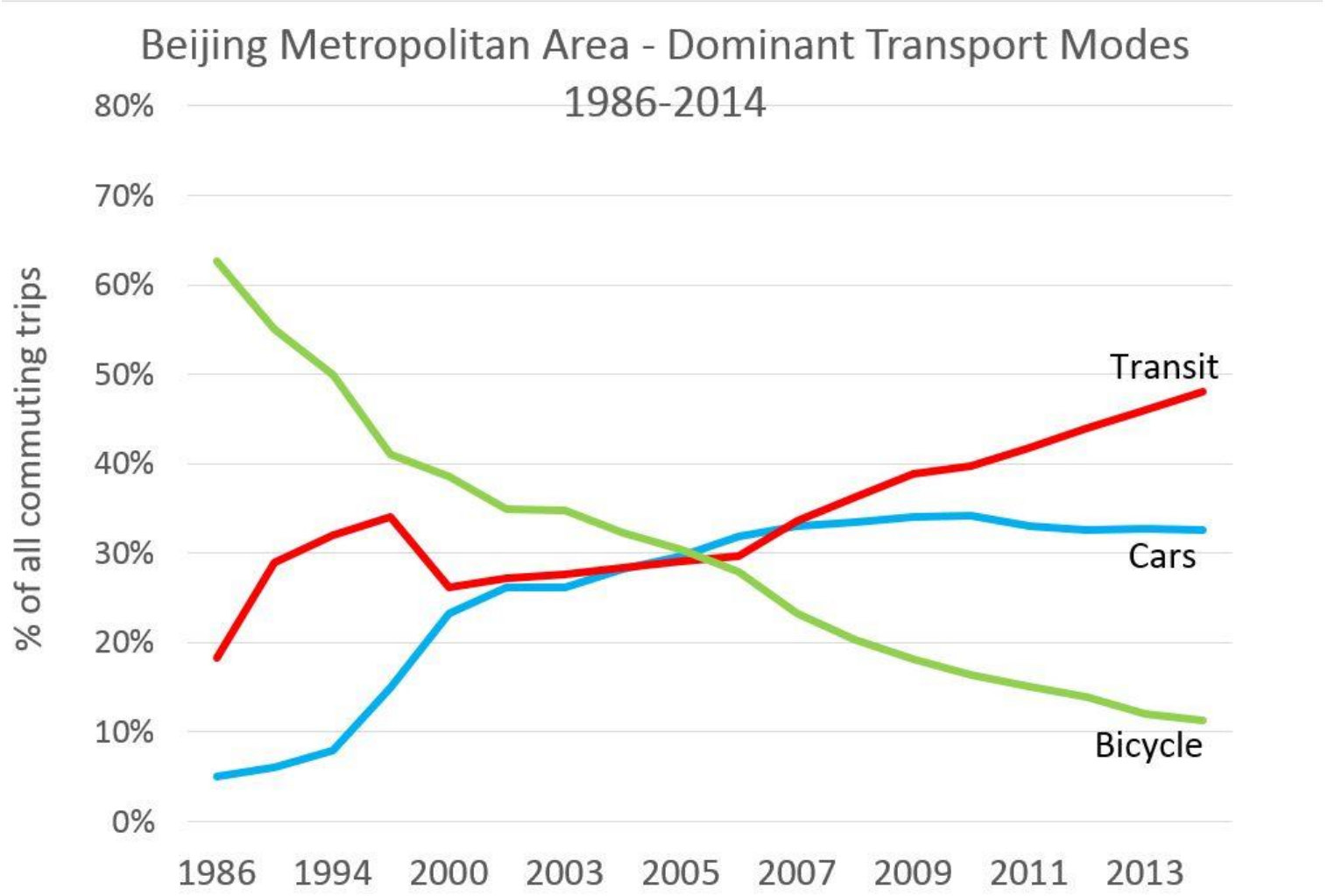


source: for BRT: Walter Hook, "Bus Rapid Transit: An International View", IDTP, 2008
MTR Business Overview, Operations and Services, WWW.MTR.COM.HK, 2014
Author calculations based on schedules, train composition and headway

file Curitiba BRT 1 Excel

In Singapore, in spite of the excellent design for the bus-subway connection, the average commuting time for transit commuter is 52 minutes (similar to US MSA 53 minutes)

Transport modes adapt to changing urban structures and households income, the expansion of urban clusters is likely to trigger more changes in transport modes



Source: Beijing Transport Research Center

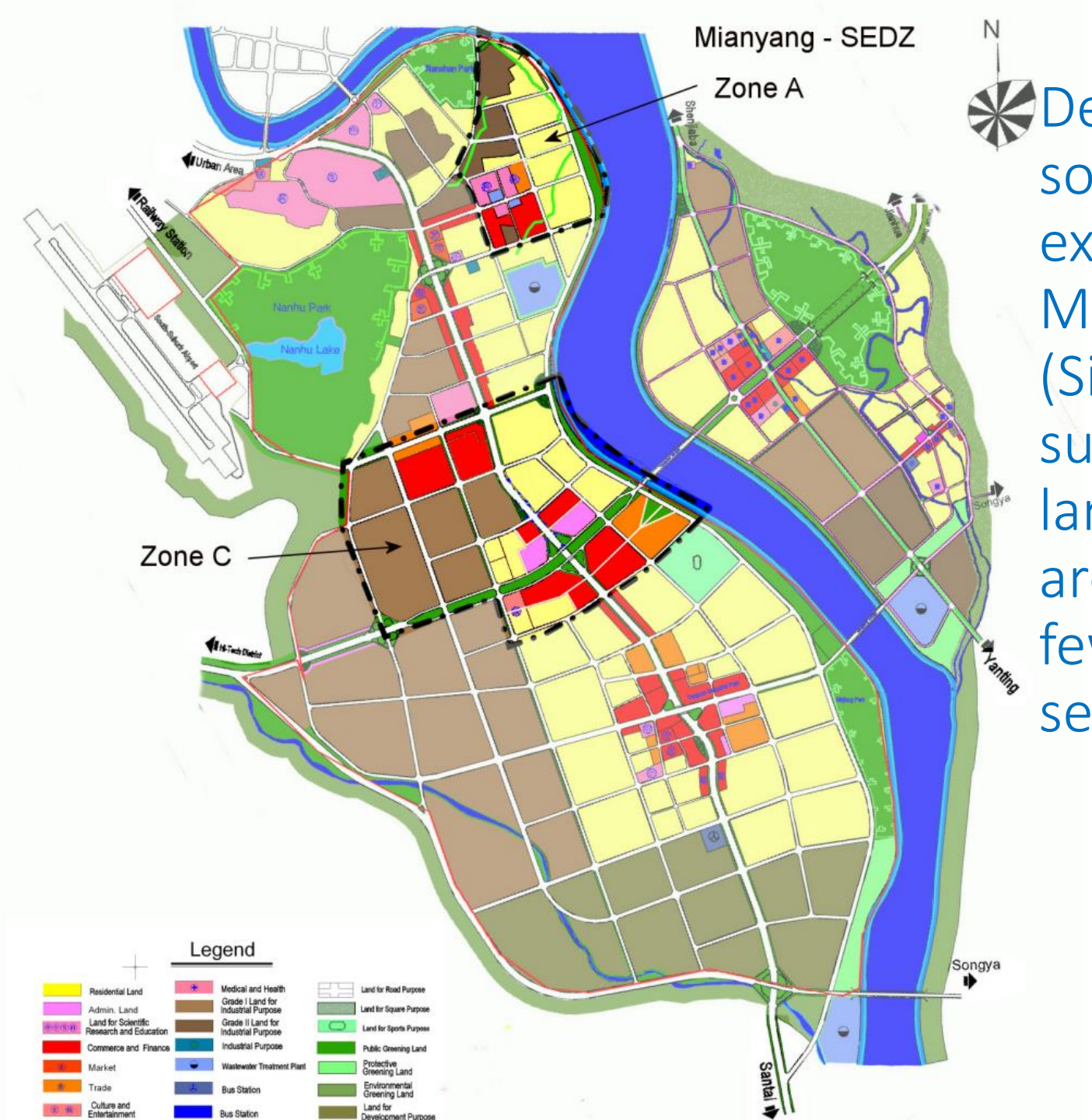
The combination of transport modes currently used in large metropolis seems to have reached its limits to maintain large integrated labor markets:

- transit is too slow to accommodate commuting trips of more than 30km,
- cars consume too much valuable real estate for circulation and parking

F. Possible approach to transform large potential labor markets into effective ones:

1) Creation of land markets, reform of land development practices,
2) New transport technology: fast rail combined with low footprint individual transport
3) Investment in an urban highway system with a grid like structure away from concentric ring roads

Current land development practices in China are inconsistent with the development of urban clusters



Development of southern extension of Mianyang (Sichuan)
supply driven large industrial areas
few areas for services

A real urban land market will have to be created

- Village collectives should be able to develop and sell land, rather than just rent it
- Land use should be more demand driven and less “master plan” driven

Residential area in Northern suburb of Beijing: large scale development with only one use: consequence of government monopoly on land development

Development of a village collective between Beijing and Tianjin around which many TVEs are located

New modes of transport combining rapid transit with low impact individual modes of transport

Very fast mode of rail transport should be used to move workers on commuting distance as long as 80 km

(The Maglev train linking Pudong Airport to Shanghai city center, fast but not necessarily the solution!)

Individual modes of urban transport providing door to station and station to door trips will have to be invented to allow door to door commuting speed compatible with the long distance travelled

Fast trains linking high density clusters would have to be associated with fleets of shared small individual vehicles for trips covering the first 5 km from trip origin to stations and the 5 km from station to final destination

This fleet of vehicles already exists in a primitive form around some suburban Beijing subway stations

Small footprint shared electric vehicles fleets already operate on an experimental basis next to some suburban rail stations in Japan and Europe

The Lumeneo Smera is available now in Paris

Toyota's i-ROAD is a fully-enclosed, two-seater, three-wheeled, fully-electric, Personal Mobility Vehicle (PMV)

Self driving cars, when fully operational, would be perfect for the first and last 5 km to and from stations in very large urban clusters

China's unprecedented large urban clusters have already the potential to open a new era of high urban productivity and creativity

However, to avoid the fragmentation of those potentially very large labor markets, the following changes will be necessary :

A. Transport
- Introduce networks of fast rails with few stops across the clusters
- Allow fleets of small non polluting vehicles around stations to go the last 5 km to destination
- Create a grid shaped highway network away from the current radio-concentric one
- Price major road space through congestion tolls

B. Land use regulations
- allow faster land conversion from agricultural to urban
- Let markets set floor area ratio and densities (the mantra "compact cities" will not apply)

C. Land development practices
- Allow farmers to sell and develop land
- Fragment properties in small lots
- Finance trunk infrastructure through land taxation and tolls rather than through the direct sale of land