'Proximity logistics': characterizing the development of logistics facilities in dense, mixed-use urban areas around the world

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Urban logistics is changing rapidly, with consumer demand and supply as first force of change: e-commerce, omnichannel retail, 'logtech' and the gig economy

Parcel deliveries in Paris

Instant grocery deliveries in Amsterdam

Grocery deliveries in Paris

Parcel deliveries in Brussels
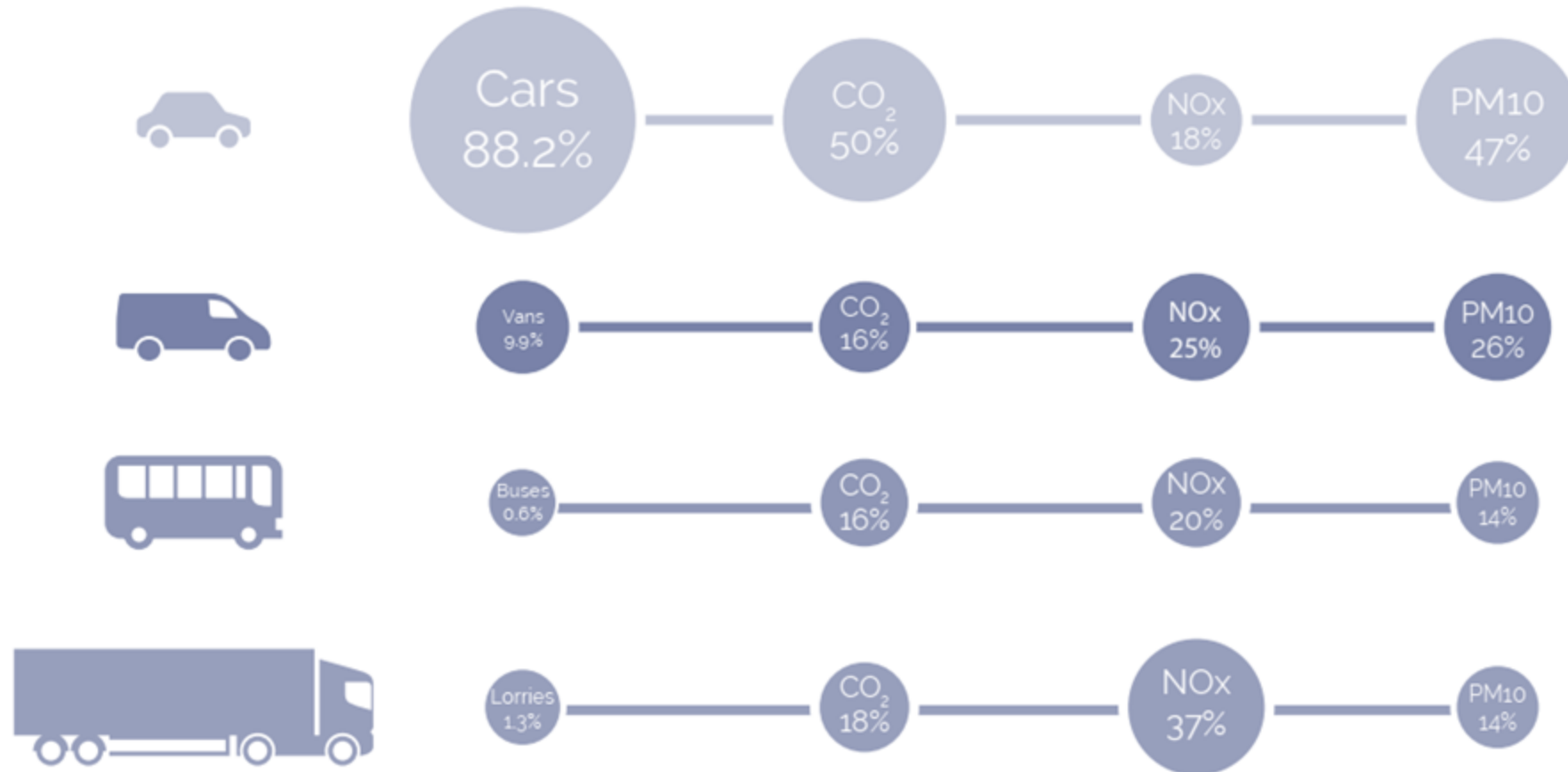

Parcel deliveries in New York
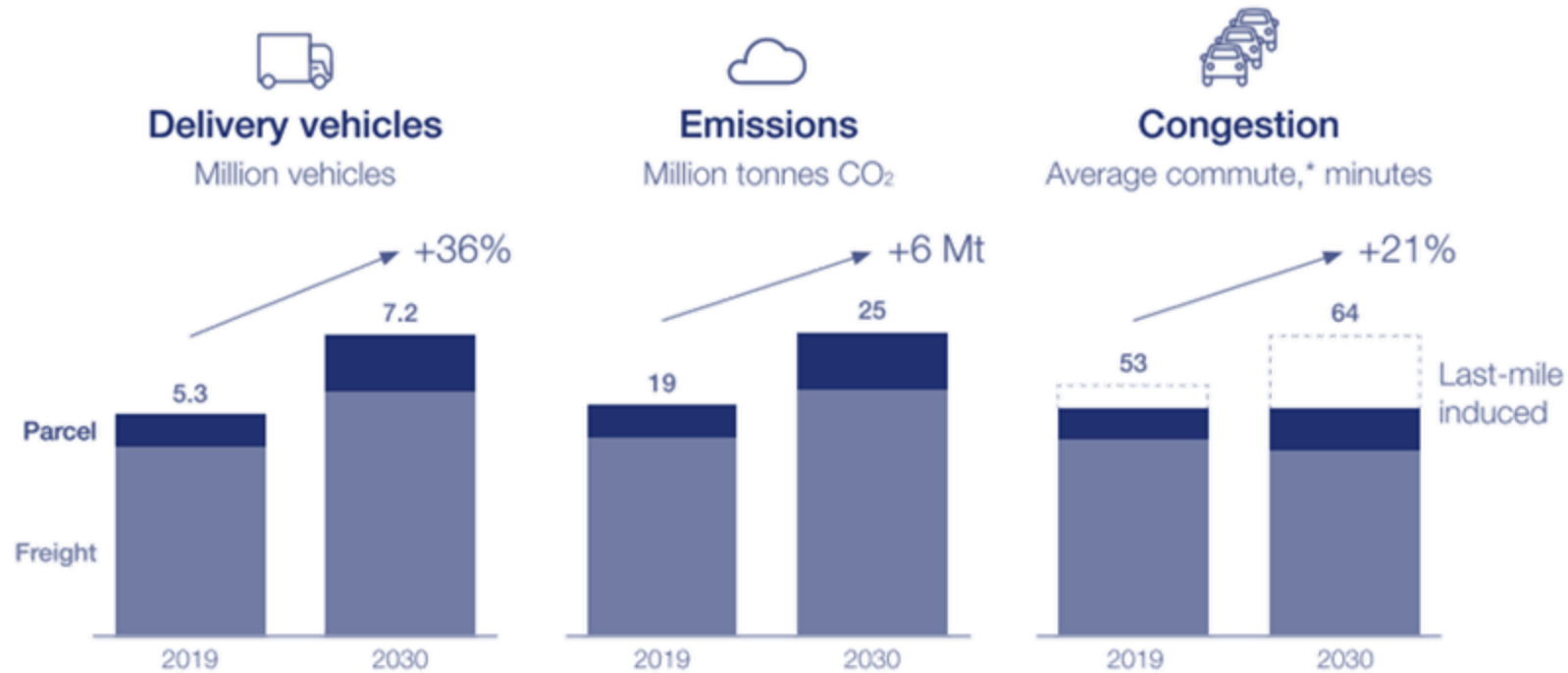

Meal deliveries in Paris

Parcel deliveries in Paris

Policies and planning addressing goods transport's negative impact, both restrictive and supportive, are a second force of change

|			
Cars 88.2%	CO_2 50%	NOx 18%	PM10 47%
Vans 9.9%	CO_2 16%	NOx 25%	PM10 26%
Buses 0.6%	CO_2 16%	NOx 20%	PM10 14%
Lorries 1.3%	CO_2 18%	NOx 37%	PM10 14%

Without intervention, the number of e-commerce delivery vehicles will increase by 36% until 2030, increasing emissions from delivery traffic by 32% and congestion by over 21%

2030 base case scenario

Delivery vehicles
Million vehicles

+36%

7.2

5.3

Parcel

Freight

2019   2030

Emissions
Million tonnes CO$_2$

+6 Mt

25

19

2019   2030

Congestion
Average commute,* minutes

+21%

64

53

Last-mile induced

2019   2030

* Average commute for representative city

NOTE: Top 100 cities globally only.

Efficient and zero-emission urban logistics relies on facilities closer to where goods are consumed, especially in high-demand areas

Reference: Holguin-Veras et al., 2021
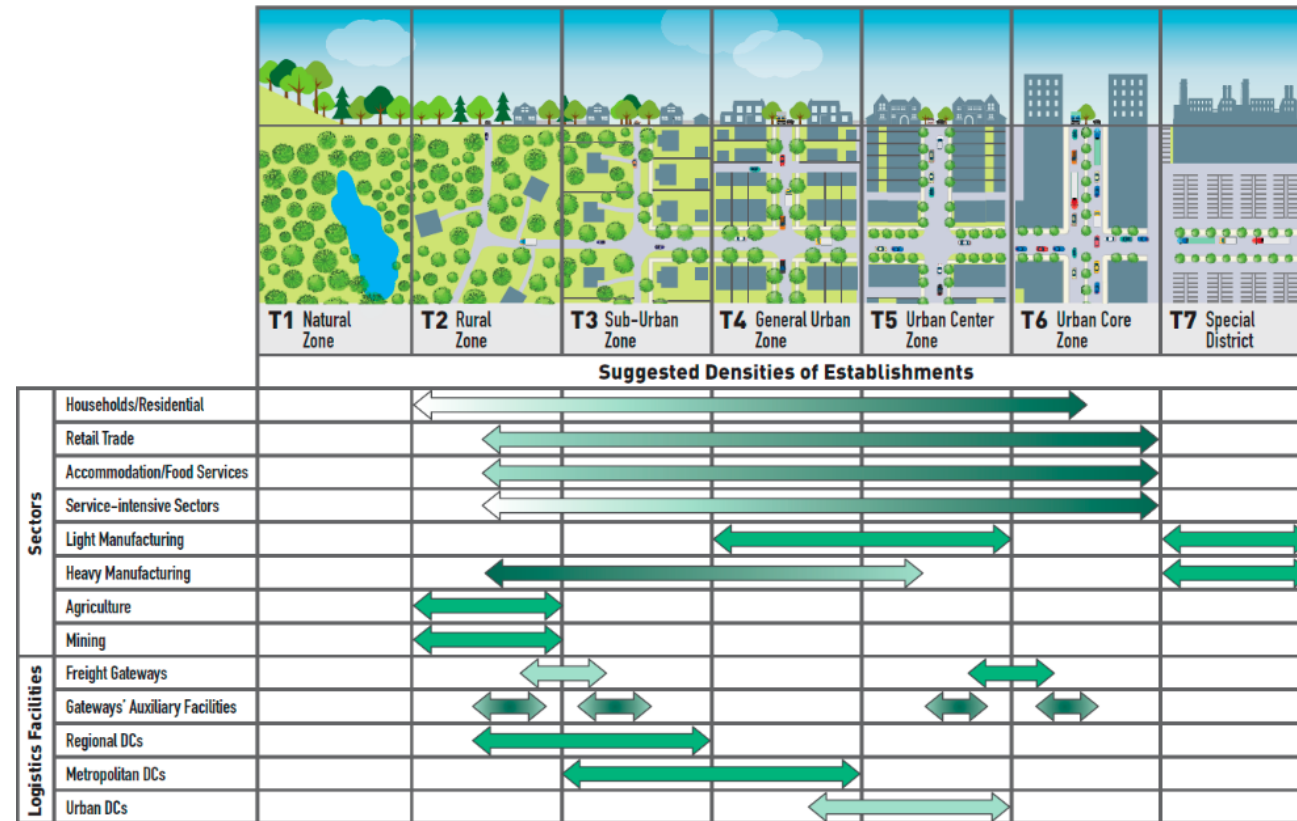
'Proximity logistics', or the development of logistics facilities in dense, mixed-use urban areas, extends and refines global logistics networks and counteracts some effects of 'logistics sprawl'
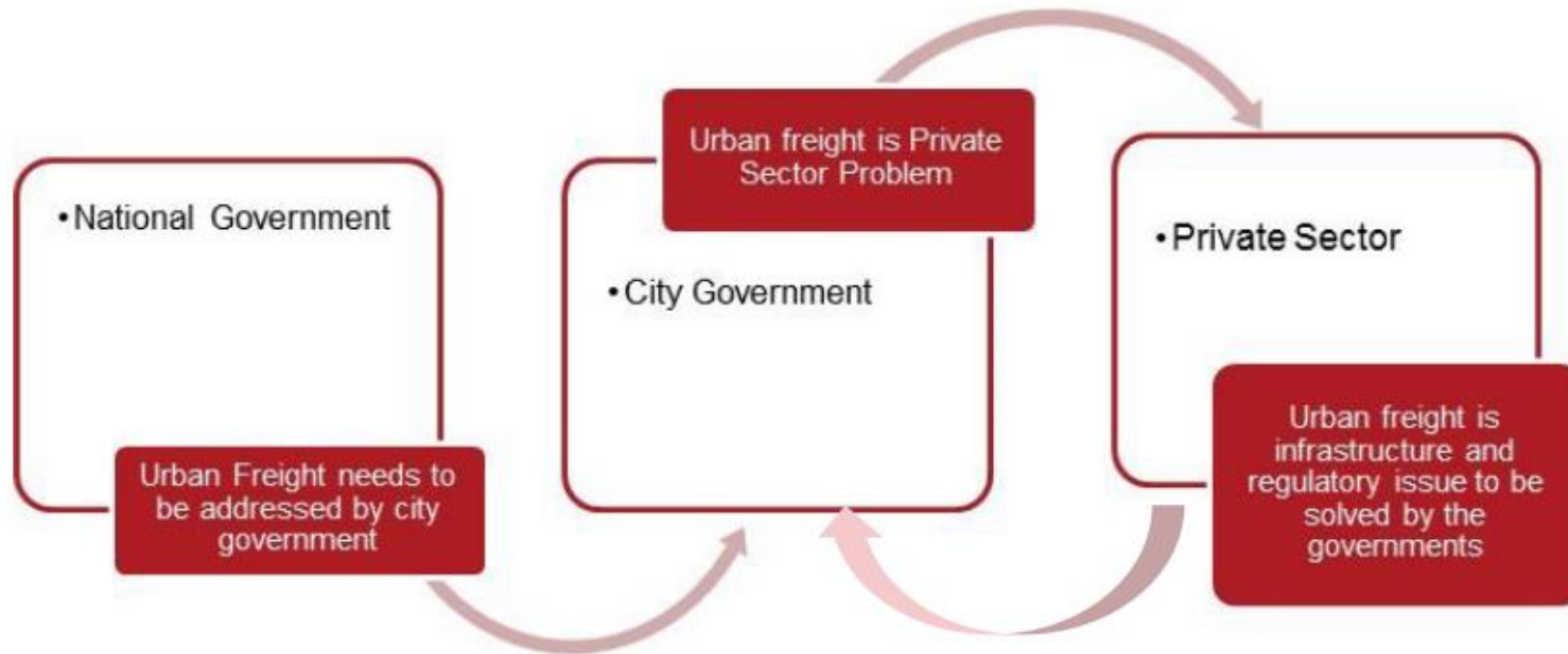

Amazon specialized warehouses in USA in 2021 (January, 1)
Sources : MWPVL©, OpenStreetMap Contributors

Warehouses squarefeet
- 2 M
- 1,5 M
- 1 M
- 500 000
- 100 000

Warehouse type
- "Last Mile" Delivery Station - Heavy/Bulky Merchandise
- "Last Mile" Delivery Station - Small Packages

States boundaries

"Our results suggest that Amazon's expansion led to significant shipping cost savings, facilitated the realization of aggregate economies of scale, and lowered the external costs of e-commerce (Houde et al., 2021)."

Reference: Schorung, 2021

Research objective is to characterize and contextualize proximity logistics through collaborative, comparative international case studies: New York City, Paris, Seoul, Shanghai and Tokyo

Research questions center around regulatory context towards and characteristics of urban logistics facilities in each case study city


National Government
- Urban Freight needs to be addressed by city government

City Government
- Urban freight is Private Sector Problem

Private Sector
- Urban freight is infrastructure and regulatory issue to be solved by the governments

Reference: Smart Freight Centre, 2017

A typology of seven urban logistics facility types, providing a consistent base for discussing the case studies

Logistics facility (Rodrigue, 2020)	Size (Onstein et al., 2021)	Service area (Onstein et al., 2021)	Activity (Rodrigue, 2020)
Inbound cross-dock facility **Air hub**	M to XXL	Regional, national or international	Storage
Fulfillment center	M to XXL	Regional, national or international	Storage and fulfilment
Parcel hub	S to XXL	Regional	Storage and fulfilment
Sortation center	S to XXL	Regional	Cross-docking
Delivery station	XS	Local	Cross-docking
This facility type also covers **urban consolidation centers** (Dupas et al., 2020; Marujo et al., 2018; Rudolph et al., 2021); **micro-consolidation centers** (Janjevic and Ndiaye, 2014; Marujo et al., 2018; Rudolph et al., 2021); **micro-hubs** which can be independent, shared or consolidated (Kim and Bhatt, 2019; Rudolph et al., 2021; Russo et al., 2021; Schodl et al., 2019); and **mobile hubs** (Arvidsson and Pazirandeh, 2017; Sheffi, 2020; Srivatsa Srinivas and Marathe, 2021; Verlinde et al., 2014).			
Fast delivery hub	XS	Local	Storage and fulfilment
This logistics facility type also covers **urban satellites** (Alfieri et al., 2021); **dark stores**; and **warestores** (Sheffi, 2020).			
Pick-up location **Local freight station**	XXS	Local	Collection
These facility types also cover **parcel lockers**; **pick-up points** (Onstein et al., 2021); **click-and-collect stores**; and **drives** (Buldeo Rai et al., 2019).			

New York City (Tejada & Conway): different entities involved, logistics facilities can be developed in all areas except residential without specific permission
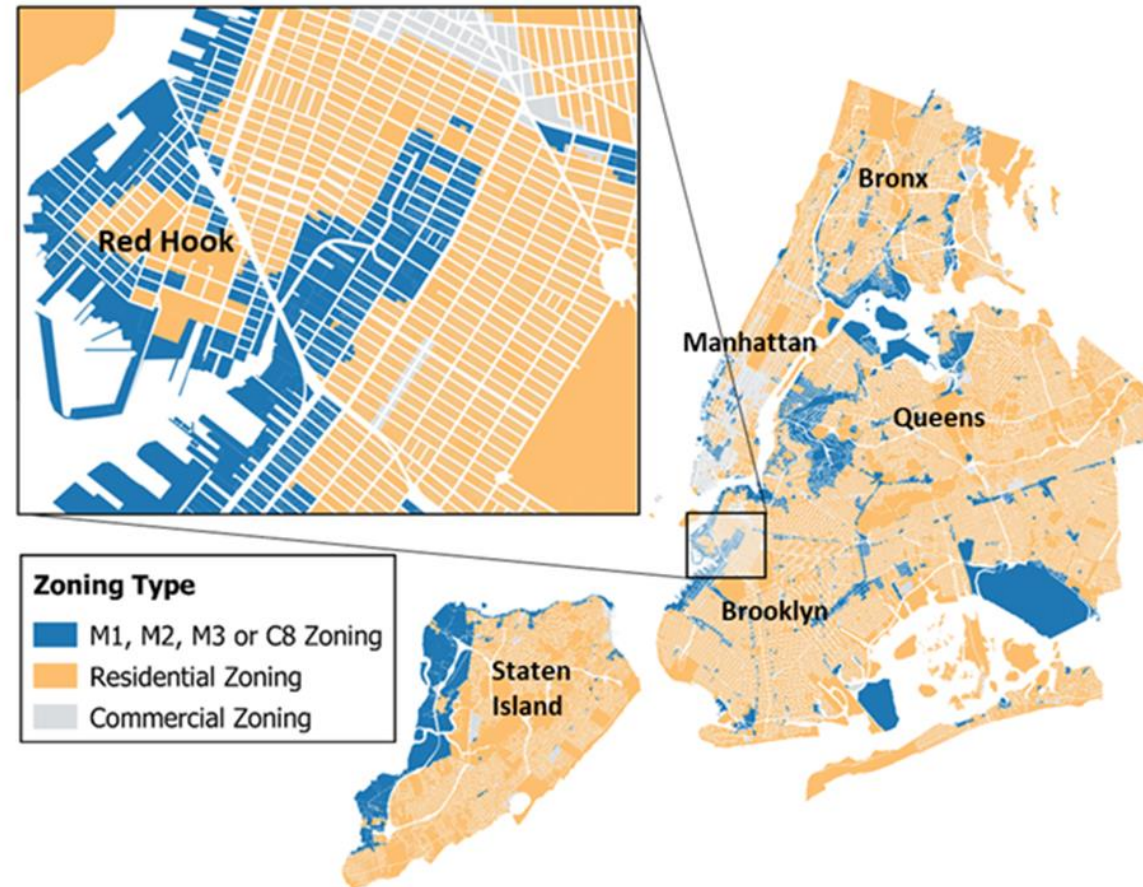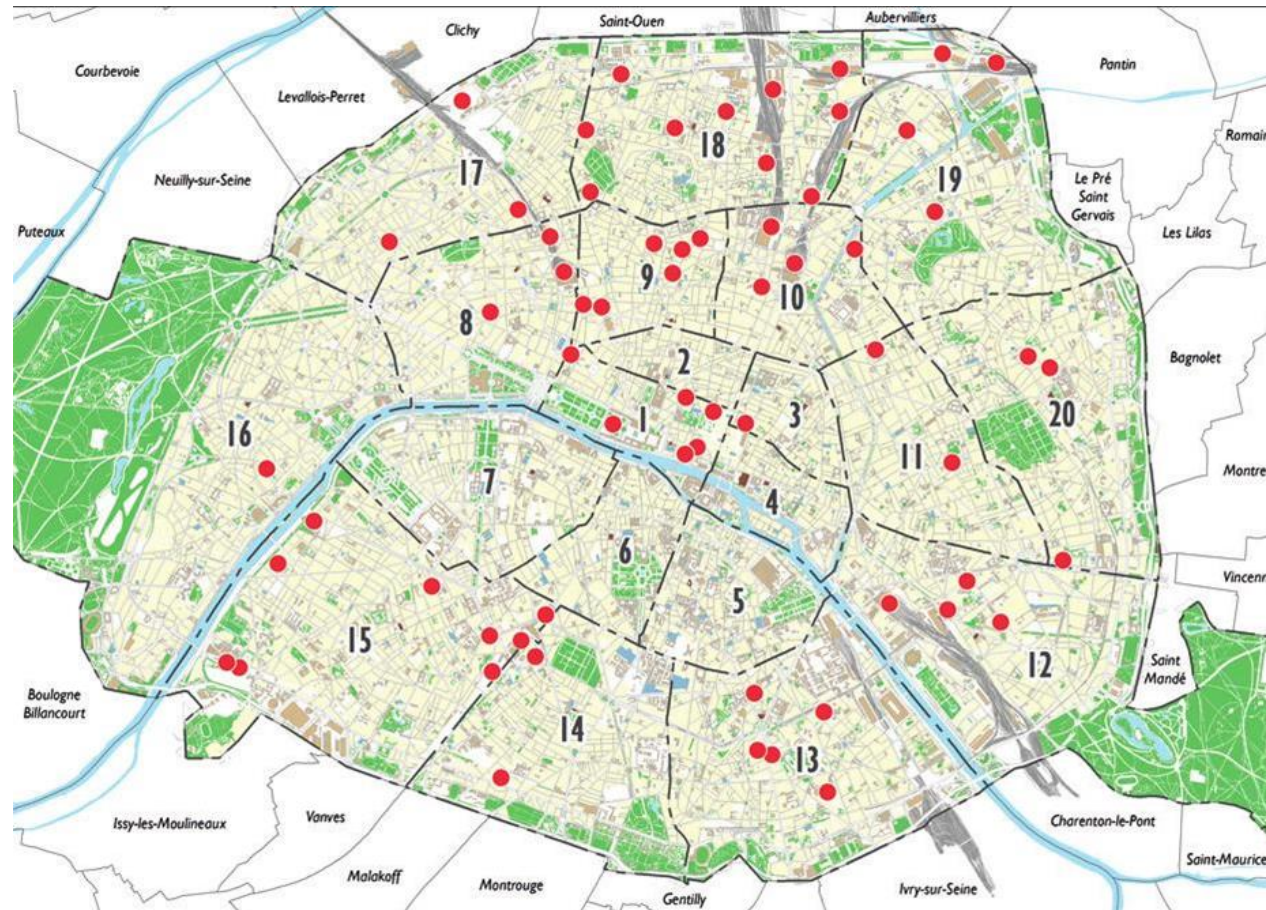
New York City (Tejada & Conway): large fulfillment centers in Staten Island, few multi-story developments in Brooklyn and Queens, Amazon has largest logistics footprint
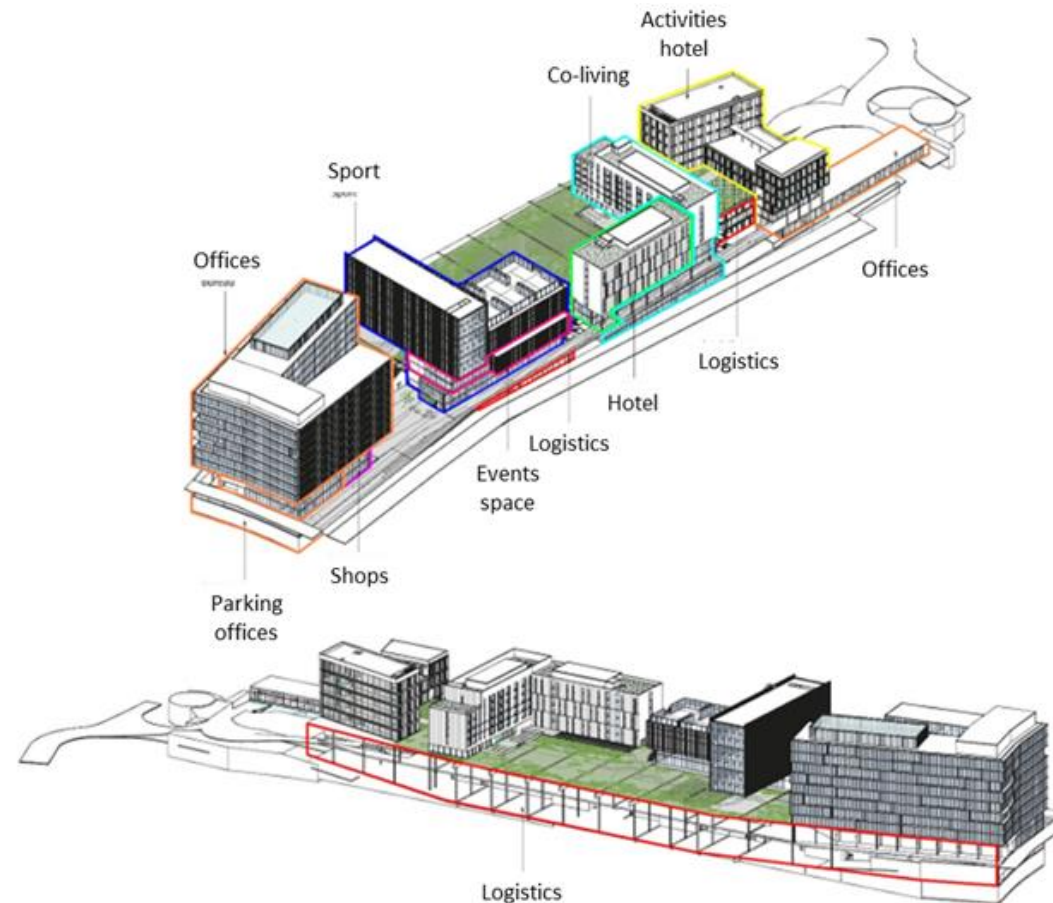
Paris (Buldeo Rai & Dablanc): urban planning code regards logistics facilities as 'necessary', introducing location perimeters on which development or reconstitution is obligatory
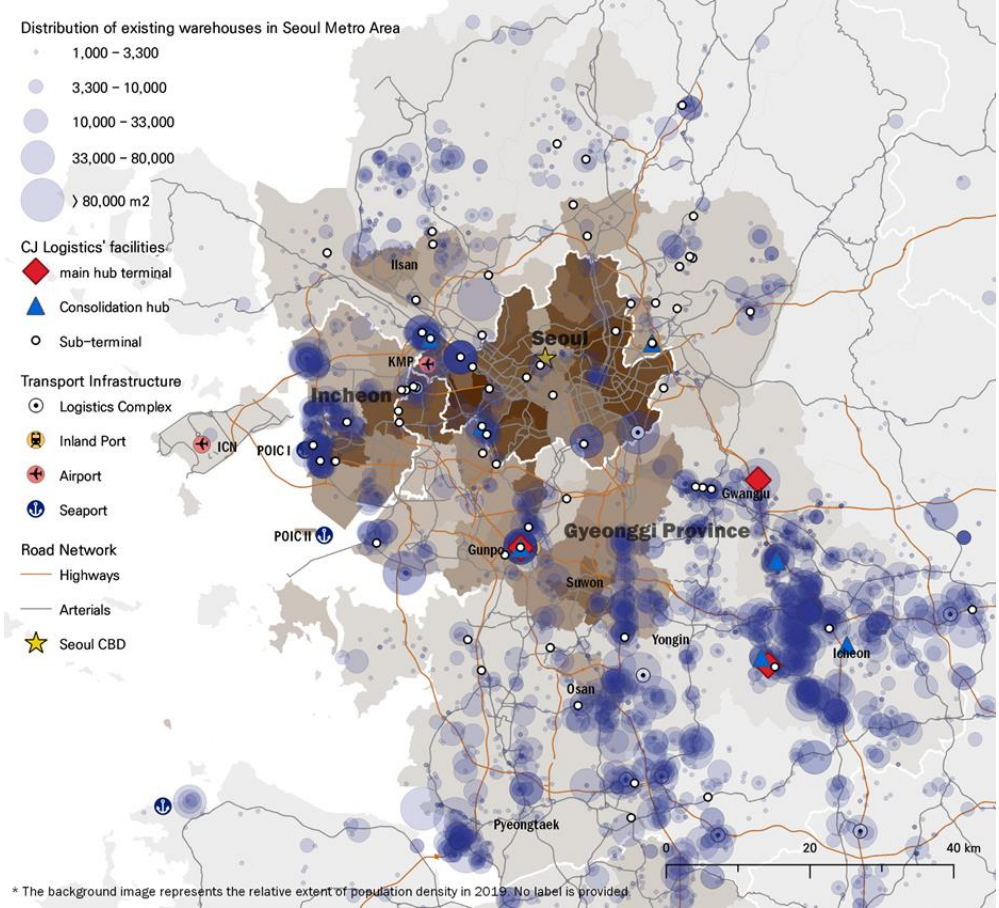
Paris (Buldeo Rai & Dablanc): some historical sites and large multi-activity and multi-story redevelopment projects, many micro delivery stations

Seoul (Kang): need for urban logistics facilities acknowledged by urban freight plans and national master plan, recent enactment enabling public interventions in development of facilities

Distribution of existing warehouses in Seoul Metro Area
- · 1,000 – 3,300
- 3,300 – 10,000
- 10,000 – 33,000
- 33,000 – 80,000
- 〉 80,000 m2

CJ Logistics' facilities
- ◆ main hub terminal
- ▲ Consolidation hub
- ○ Sub-terminal

Transport Infrastructure
- ⊙ Logistics Complex
- Inland Port
- ⊕ Airport
- Seaport

Road Network
- Highways
- Arterials
- ★ Seoul CBD

* The background image represents the relative extent of population density in 2019. No label is provided
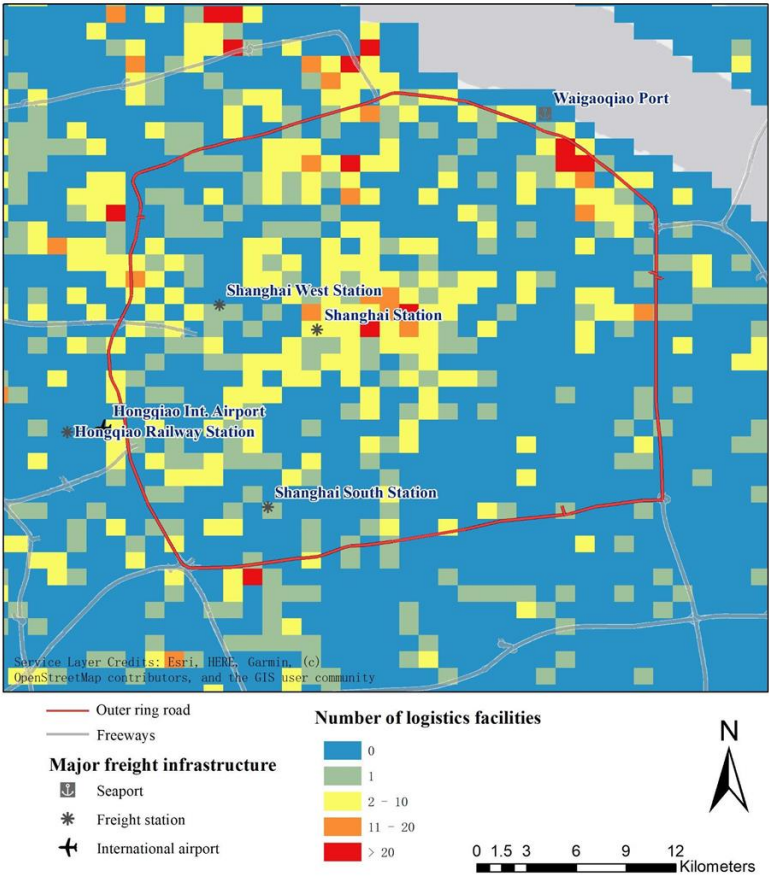
Seoul (Kang): revamping and remodeling outdated sites into mixed-use, multi-story, automated logistics facilities

Shanghai (Yuan): promotion of shared urban logistics facilities supported by national government agencies and urban plans and guidances, but difficulties remain
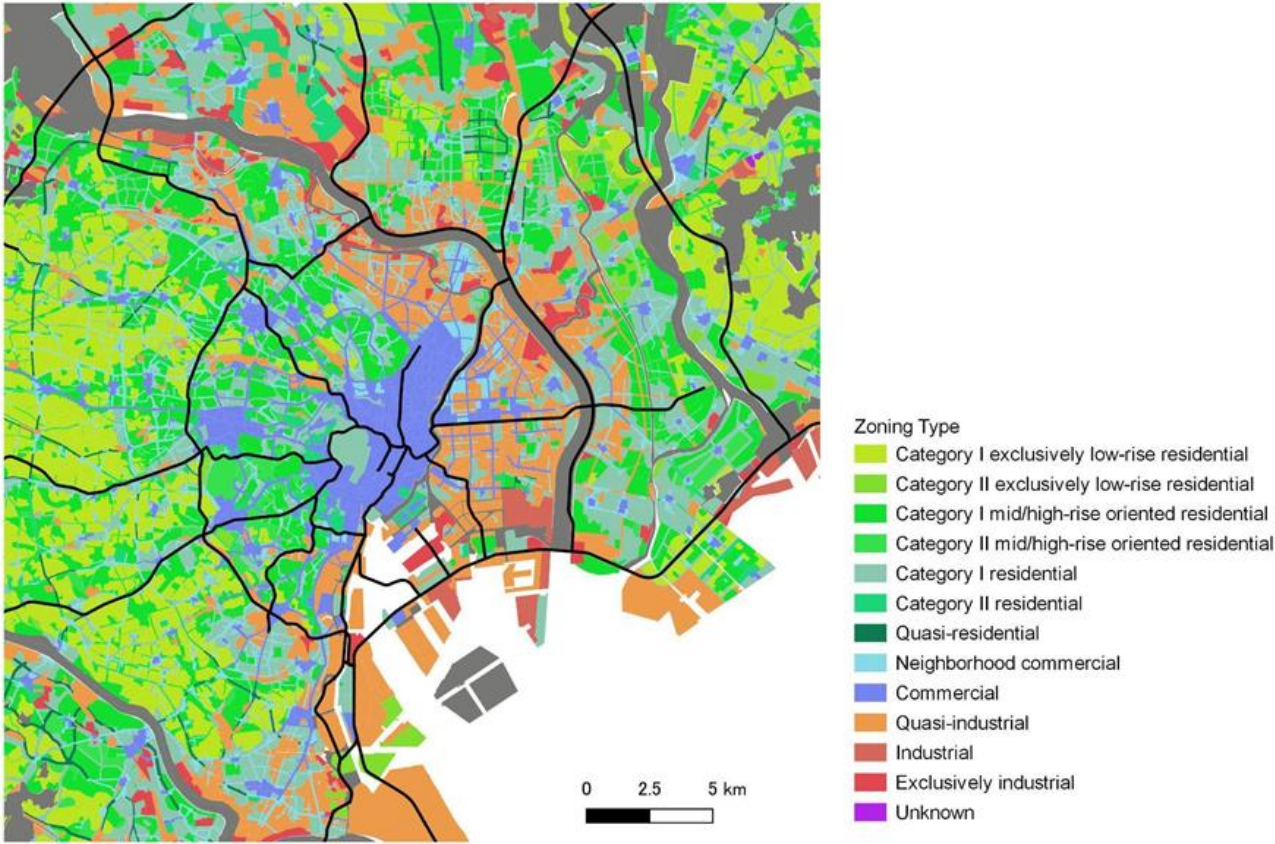
Shanghai (Yuan): limited large urban logistics facilities left (state-owned or foreign), small facilities are either self-operated or shared

Tokyo (Sakai): favorable zoning for urban logistics facilities but governmental programs enacted, especially for large facilities

Zoning Type

- Category I exclusively low-rise residential
- Category II exclusively low-rise residential
- Category I mid/high-rise oriented residential
- Category II mid/high-rise oriented residential
- Category I residential
- Category II residential
- Quasi-residential
- Neighborhood commercial
- Commercial
- Quasi-industrial
- Industrial
- Exclusively industrial
- Unknown

0   2.5   5 km

Tokyo (Sakai): fast-growing development of multi-tenant logistics facilities, often replacing old sites

In conclusion, proximity logistics identified as a trend throughout all cities studied in this research

> Fulfilment centers and delivery stations
> E-commerce is an undeniable, albeit not the only, accelerator
> Prioritization of brownfield developments
> Multi-story, multi-tenant and multi-activity logistics facilities

> Different degrees of automation
> Different degrees of governmental intervention