

ECTRI TG Freight & Logistics webinar
May 6, 2022

Sustainable city logistics: recent research from the Logistics City Chair

Dr. Laetitia Dablanc

- Warehouses, innovations, new trends in consumption and impacts on city logistics

Results available online:

- Observatory of ecommerce mobilities
- Survey reports on gig workers for instant delivery platforms in Paris 2016, 2018, 2020, 2021, 2022
- Logistics real estate and relationships with urban form in 74 large cities around the world

<https://www.lvmt.fr/en/chaieres/logistics-city/>



Outline

- General trends in city logistics
- Environmental emissions and methodological issues: data!
- Warehousing and impacts
- Clean vehicles and low/zero emission zones

Since Covid, city logistics closely scrutinized

Le Monde

ECONOMIE

Covid-19 : la logistique, un secteur devenu incontournable

La pandémie a mis en exergue le rôle des chauffeurs et livreurs dans la bonne marche de l'économie,

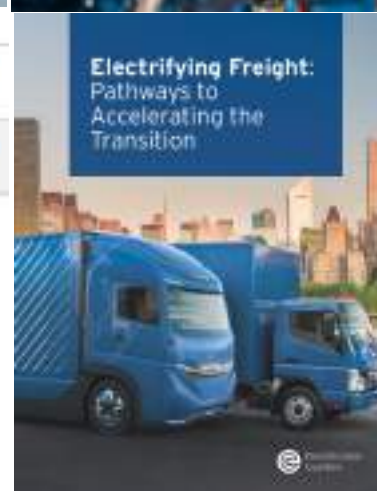
Par Eric Bédard et Julien Boussieu

Favoris



accenture

**THE
SUSTAINABLE
LAST MILE.**
FASTER. CHEAPER. GREENER.



Pandemic impact on e-commerce

- **Visibility** of last mile issues (politicians, media, anyone)
- **Volumes**: France 2020: +32% B2C products sold (growth rate twice as high as usual) however France 2021: +7%
- **Omni-channel**: traditional retail has changed into omni-channel commerce
- **Curb**: increased number of deliveries and use of curb

Beijin April 2020



Arte

Paris Dec 2021



H. Buldeo Rai

NYC March 2022



M. Schorung

Convergence: similar changes and innovations worldwide

- Consumer and societal **demands** increasing
- Innovative supply of logistics **services**, converging processes: DHL, Ifood, Prologis... catering for all metropolitan areas
- Start-ups, **urban freight tech** everywhere, often with food tech
- Local **policies** remain quite different?





Presentations and Panel Discussions Include:

- ✧ Algorithms and Analytics
- ✧ Delivery Drones
- ✧ Delivery Robots
- ✧ Autonomous Cars
- ✧ Autonomous Delivery Vehicle (ADV)
- ✧ Autonomous Ground Vehicles (AGVs)
- ✧ Autonomous Pods
- ✧ Robotics
- ✧ Droid
- ✧ Robot Delivery Technologies
- ✧ Van/Drone/Robot Integrated System
- ✧ System of Systems
- ✧ Smart Door Lock
- ✧ Trunk Delivery
- ✧ Parcel Box
- ✧ Parcel Locker
- ✧ Mobile lockers
- ✧ Required Support Structure
- ✧ Warehouse Locations
- ✧ Unmanned Warehouses
- ✧ Platooning
- ✧ Tracking Technologies
- ✧ Low-Density Cities
- ✧ High-Density Cities
- ✧ Medium-Density Cities
- ✧ Same-day, Instant Delivery or Sunday delivery
- ✧ Same-Day delivery
- ✧ On-demand delivery
- ✧ Drones, Remote locations
- ✧ Self-Driving cars, Remote locations
- ✧ Robots, Gated communities and closed campuses
- ✧ Storing packages for buyers to pick up
- ✧ Maximizing Delivery
- ✧ Not-at-Home & Failed Deliveries
- ✧ Gated Communities, Residential Buildings and Office Buildings
- ✧ Hospital Campuses, Corporate Campuses, and Universities

Quick-commerce for grocery

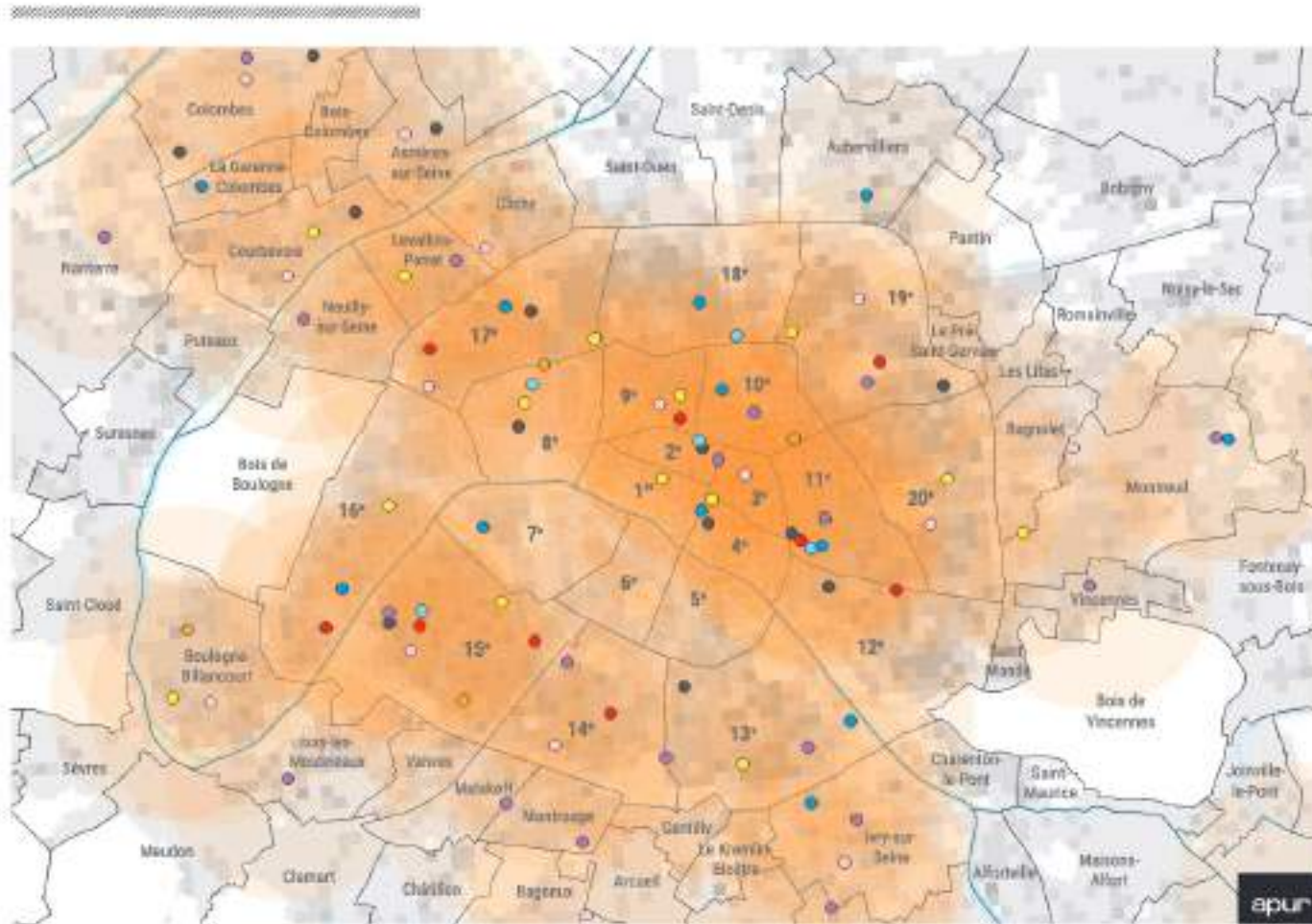
- Cajoo promises to deliver in 15 minutes
- Gorillas promises to deliver in 10 minutes
- Alibaba promises to deliver in 5 minutes



- "Dark stores": use of vacant stores or underground parking facilities
- In China, with longer experience of q-commerce: 5% market share of all online grocery shopping

Dark stores in Paris

IMPLANTATION ET ZONE DE LIVRAISON DES DARK STORES



- 80 to 100 by January 2022 (APUR)
- Half of them could be closed by the municipality (March 2022)

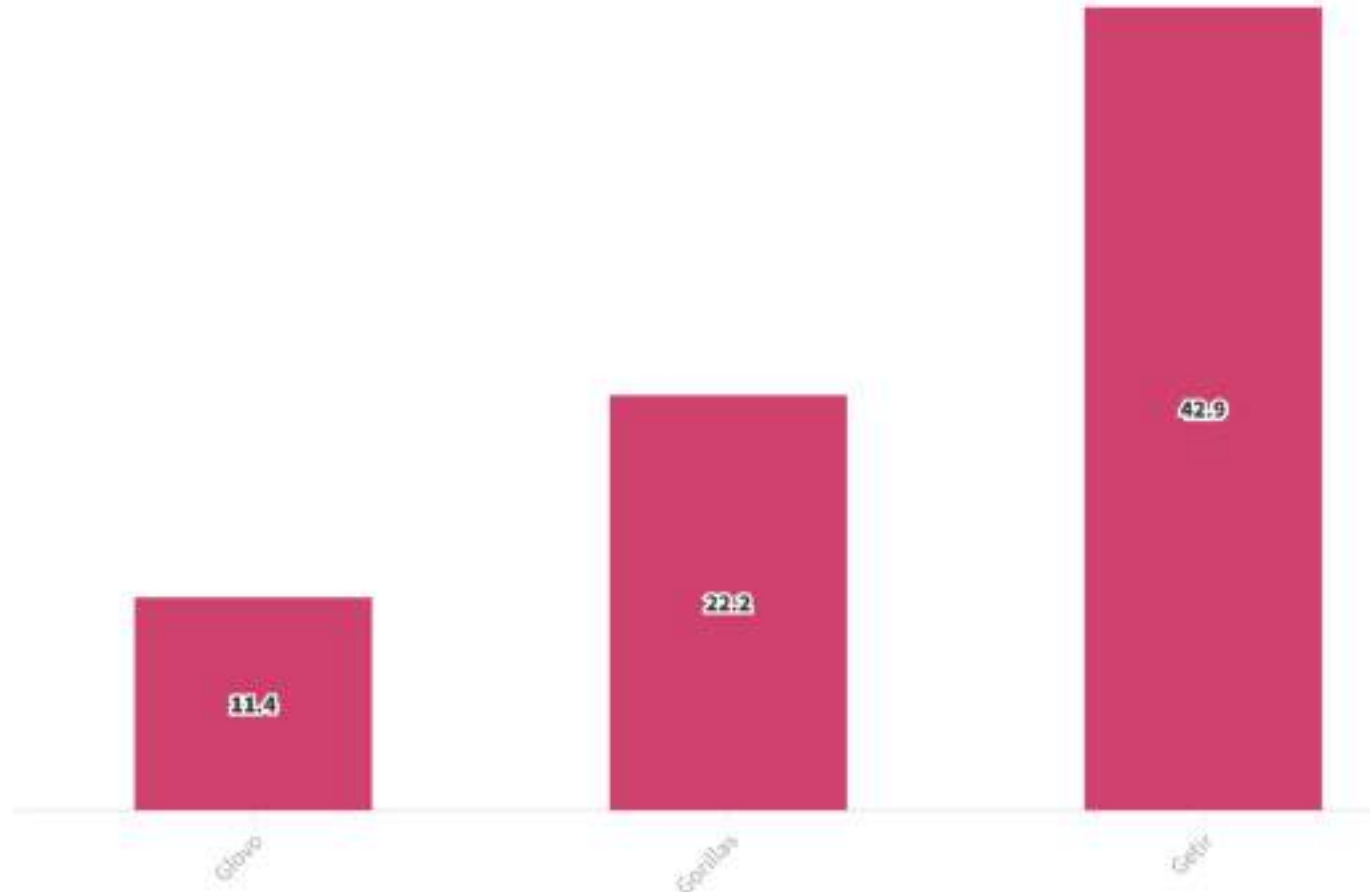
Enseigne

- Cajoo
- Flink
- Frichti
- Getir
- Gopuff / Godija
- Gorillas
- Yango Deli
- Zapp

Dark stores from Getir, Gorillas, Glovo in Europe as of March 2022

Average number of dark stores per European country

\sifted/

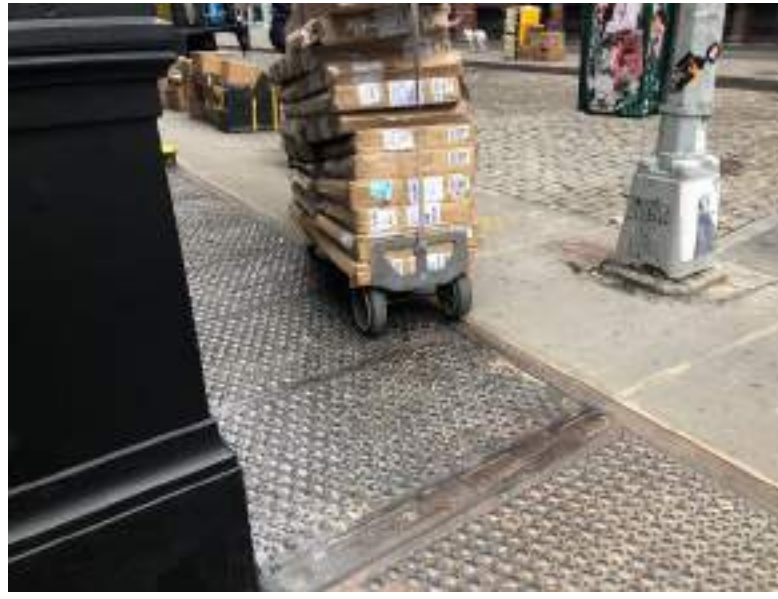


Diversification of vehicles for urban deliveries

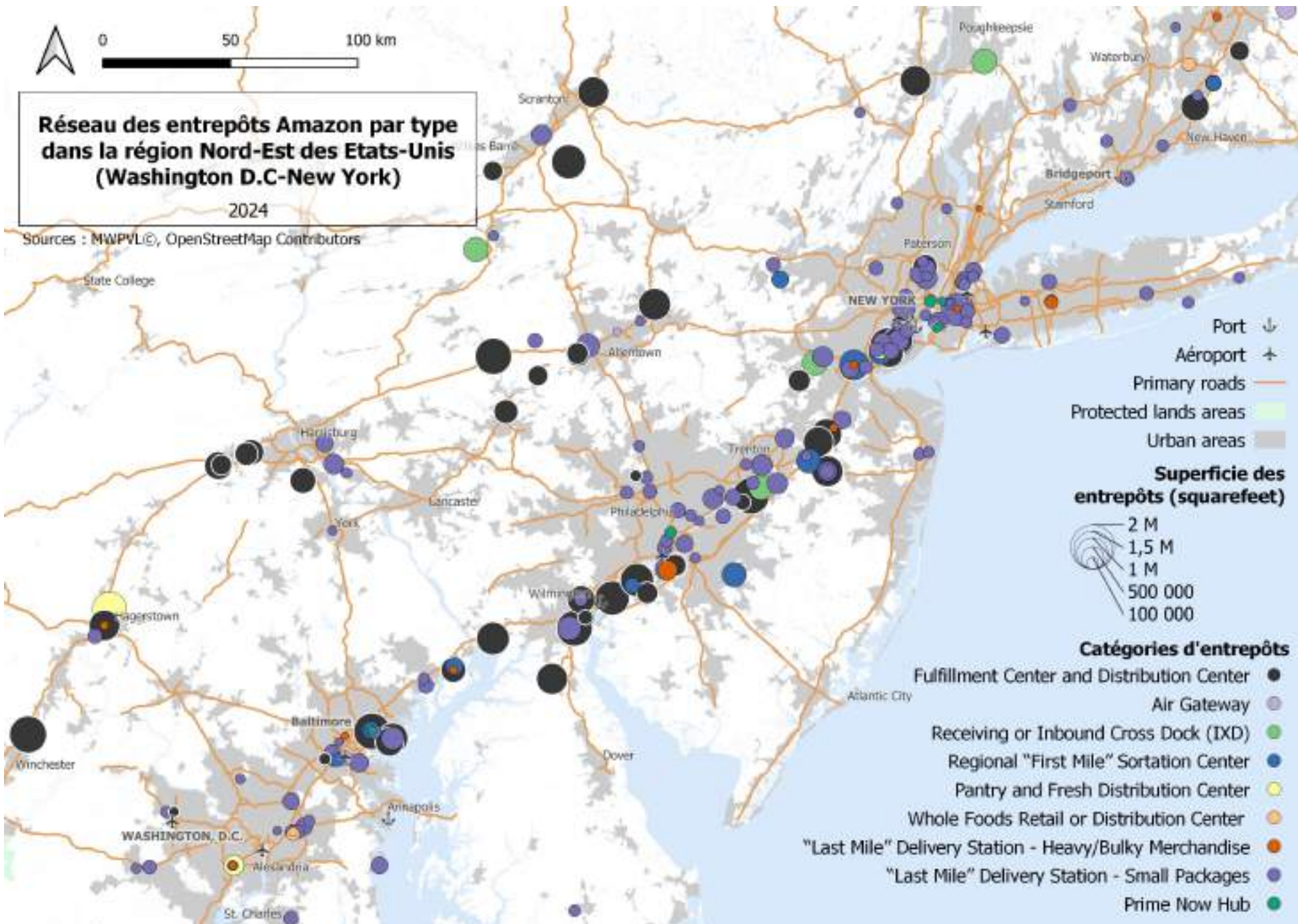
- Trucks and vans in French cities: 75% of last-mile drivers
- Cars, mopeds, cargo-bikes, bicycles, walking/transit: 25% of last-mile drivers already (much less in volume of deliveries)
- Amazon Flex in US cities
- Labor issues and labor legislation



Many delivery workers on foot, the return of portering



Dablang, Schorung, March 2022



Every day from a 20,000 sq m last mile delivery station:

- 45 lorries
- 250 vans
- 795 private cars

(Jaller, 2019)

Schorung, Lecourt,
Chaire Logistics City,
2021

Today's trend: a reduction in logistics facilities' land footprint



- 2021 Amazon fulfillment center in Delaware, US
- 350,000 sq m of operations on 70,000 sq m land area



On-demand 'instant deliveries'

- Deliveries in less than two hours, smartphones and apps
- Gig workers, self-contractors
- Labor laws, legal complexities
- European Commission Directive project, Dec 2021

Buenos
Aires



Stockholm



Lagos



Lima



Mumbai



Giant companies, a moving market

- Meituan market valuation in May 2022: \$120 bn
- Frichi sold to Gorillas in March 2022
- Postmates sold to Uber for \$2.65 bn in 2021
- JustEatTakeaway may sell GrubHub after just one year acquisition
- Deliveroo IPO in March 2021



Reduction in use of bicycles in Paris (2016-2022)

Restrictions to the use of bike-sharing (2022)

2016

87% on
bike

2020

60% on
bike

2022

47% on
bike

Surveys City Logistics Chair



- “Any use for freight transport is forbidden”
- “Forbidden to do more than 300 km per week”
- “Forbidden to do more than 70 trips per week”

Autonomous deliveries emerging in specific markets



JD deploys 100 autonomous delivery vehicles to aid Shanghai residents under lockdown



Nuro in Texas



Starship in the UK



Flytrex in Iceland and the US

Paris region, freight share of transportation related emissions

	Total region	Paris	Dense suburbs	Far suburbs
CO ₂	19%	34%	18%	7%
PM10	30%	46%	28%	11%
NOx	29%	51%	26%	9%

(B2B only) (% of total transport emissions) Coulombel, Dablang, Koning, 2018

E-commerce mobilities: poorly quantified

- *New York Times* March 4, 2021 “Roughly 2.4 million packages are delivered in the city every day, nearly half a million more than before the pandemic, and city data shows that 80 percent of deliveries are to residential customers, compared with 40 percent before the outbreak”
= 0.23 parcel per day per person
- *Le Monde* January 21, 2021: “According to head of Colissimo, there were one billion B2C parcels delivered in France in 2020”
= 0.04 parcel per day per person (six times less)

E-commerce carbon assessment

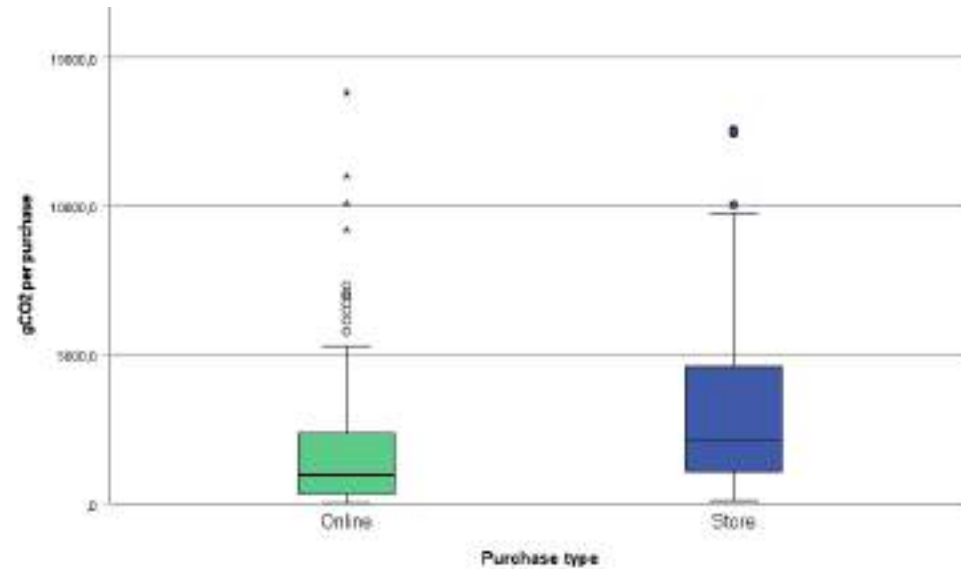
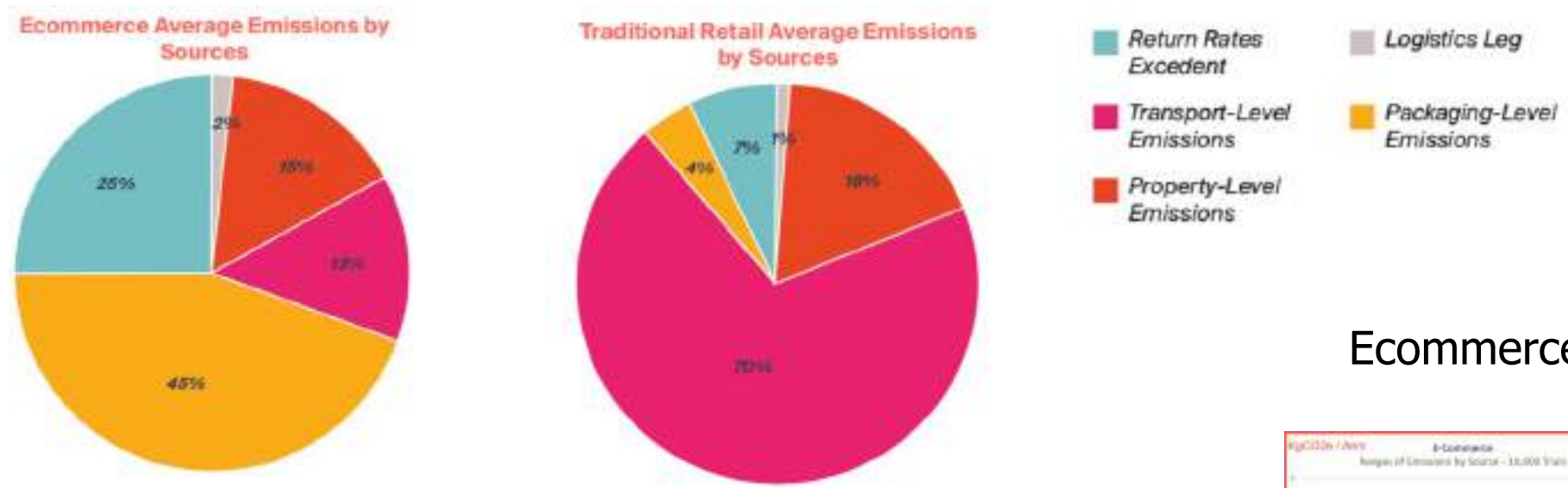


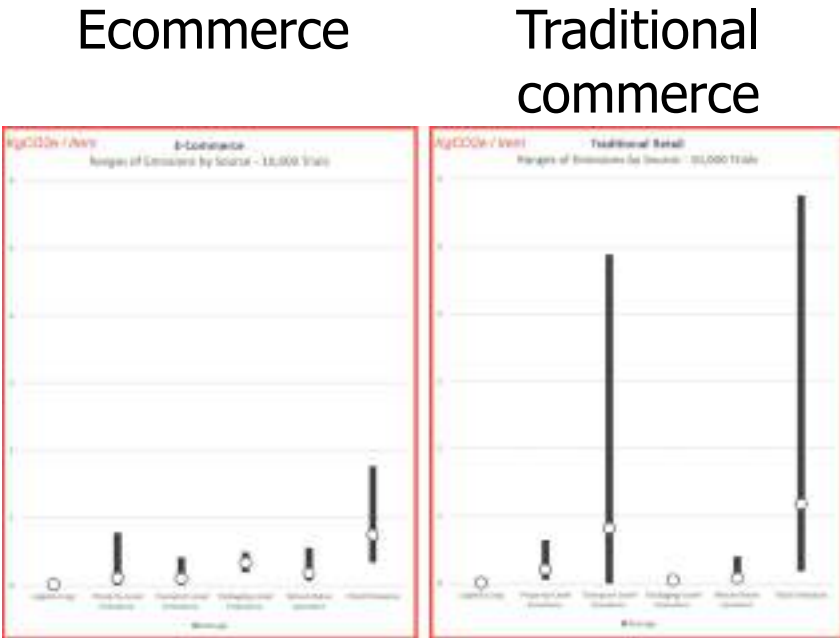
Figure 1. Carbon footprint of online and store purchases ($p < .001$).

- Meta-analysis of case studies around the world (Buldeo Rai, Touami, Dablanc, submitted 2022)

CO₂ emission sources, Ecommerce v commerce in store (MIT Real Estate Lab, 2021)



A huge share of packaging



Carbon footprint of freight for city of Paris (2020, with 2018 data)



- **Global CO₂** emissions from freight in 2018 (including imports by Parisians): **5 Mt** (21% of all carbon footprint of Paris)
- **Local CO₂** emissions from freight in 2018: **1.2 Mt**

Comparing 2004-2014

- CO₂ emissions from urban freight “decreased by 18% between 2004 and 2014”
- Vans underestimated
- Motorized two-wheelers not included



Barcelona: data from areaDUM

- Since 2015 all delivery drivers must register on AreaDUM app when stopping for delivery
- 30 minute window allowed
- Provides live data to municipality as well as *open access* data to research

- Delivery Area ID
- Plate Number
- User ID
- Vehicle Type
- Activity Type
- District ID
- Neighborhood ID
- Coordinate, Weekday, Date, Time

Analyzing Last Mile Delivery Operations in Barcelona's Urban Freight Transport Network

Burcu Kolbayı, Petar Mrazovic¹, and Josep Llus Larriba-Pey¹

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mrazovic@kth.se
<http://www.kth.se>



ANPR camera data

- Cameras in 40 Dutch cities soon (zero emission zones by 2025)
 - Data available but restricted by GDPR since 2019, processed by a trusted third party
 - Type, Euro standard, brand, size of vehicles
 - No data for foreign vehicles
 - No information on when where vehicles get out
 - Security cameras not included in data access
- *Source: interview with TNO and HAN univ, June 2021, on-going study by Logistics City Chair*
- “It is really a pity to not be able to use data that is actually there” (City of Gothenburg, March 2021)



ANPR: Automatic number plate ...

Privacy statement from Transport for London on use of CCTV data

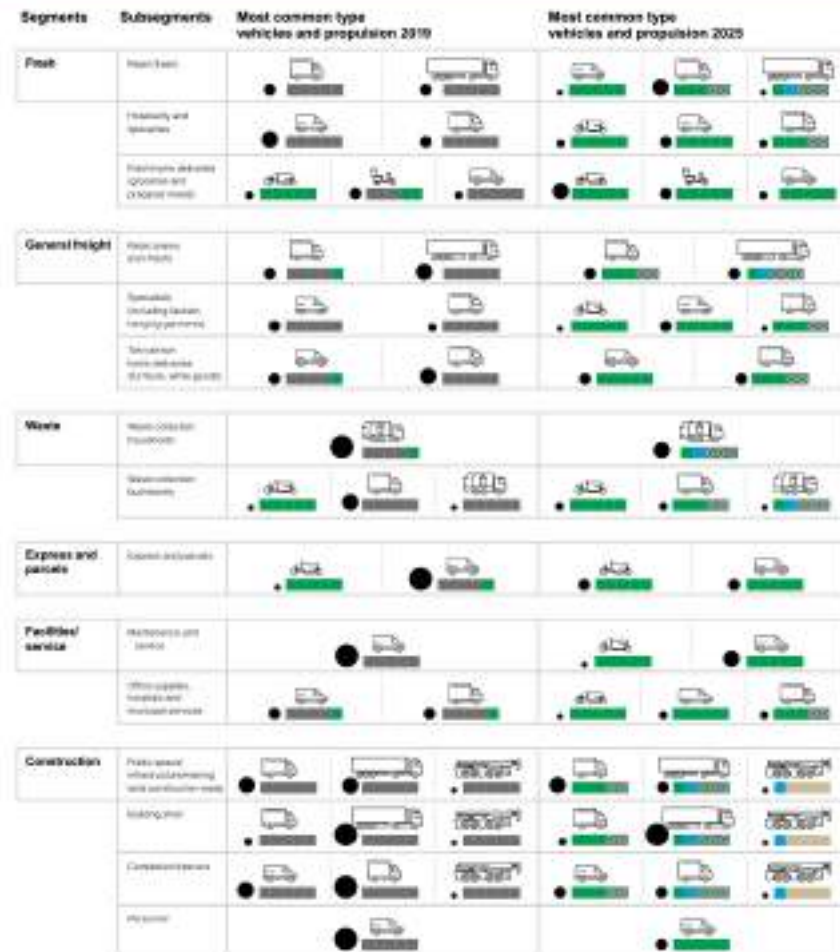
On a case by case basis we may use and share CCTV images for research and analysis purposes. For example these may be used to improve the management of health and safety incidents, or travel demand management.

CCTV images from London Underground are to be analysed by Newcastle University in the fight against covid-19 under an agreement with TfL, which is part of a wider research programme led by the Department for Transport and the SAGE subgroup on Environmental and Modelling. The research will analyse images to quantify the proximity of people and their surface contact whilst using public transport, as part of wider research to understand the transmission of covid-19. The CCTV data is encrypted and steps are taken to anonymise the footage. This research is subject to a Data Protection Impact Assessment as well as a confidentiality agreement between the University and TfL.

Similar research is being undertaken by University College London to understand how infection risk would vary according to different levels of crowding using encrypted CCTV data alongside data from surface and air sampling. Anonymisation techniques are applied to prevent identification of individuals and this research is also subject to a Data Protection Impact Assessment as well as a confidentiality agreement between the University and TfL.

Zero emission city logistics roadmap, Rotterdam: an opportunity for data sharing

Expected transition to zero emission city logistics by 2025 Rotterdam city centre



Information on the shift vehicles 2019 + 2025

Shift to smaller vehicles
Significant potential to reduce the volume of the city

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Vehicle type



Proportion of vehicles per subsegment



Drive type



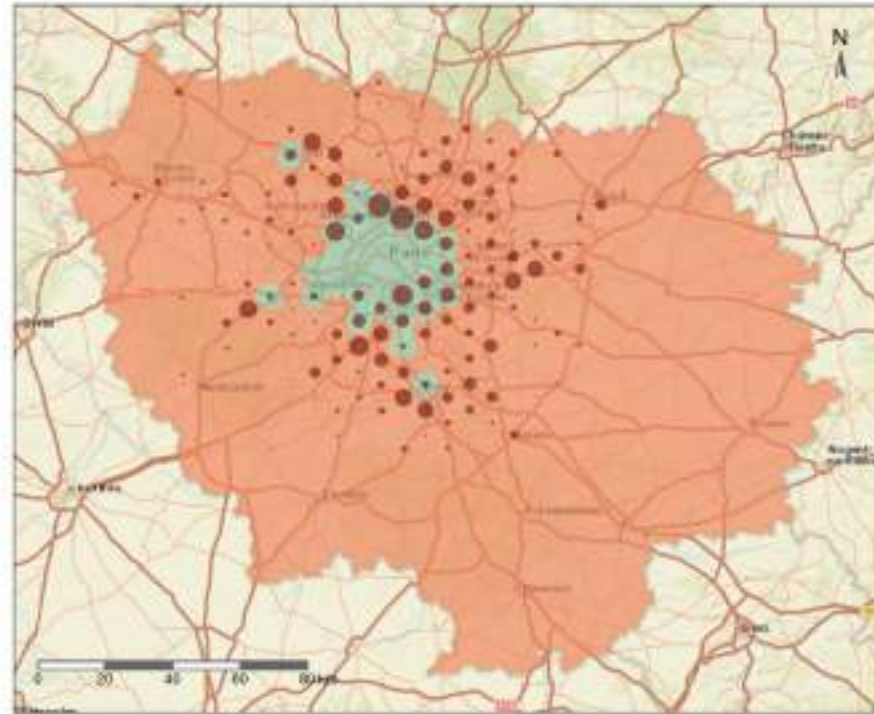
What does this table show?

Rotterdam is focusing on 'zero emissions' (no greenhouse gases) vehicles (powered electric battery and hydrogen). This infographic illustrates the expected transition to zero-emission vehicles by 2025 in Rotterdam's city centre.

The table shows the type of vehicle and the drive type indicated for each subsegment.

Exploratory automated data collection (Oliveira, Schorung, Dablanc, 2022)

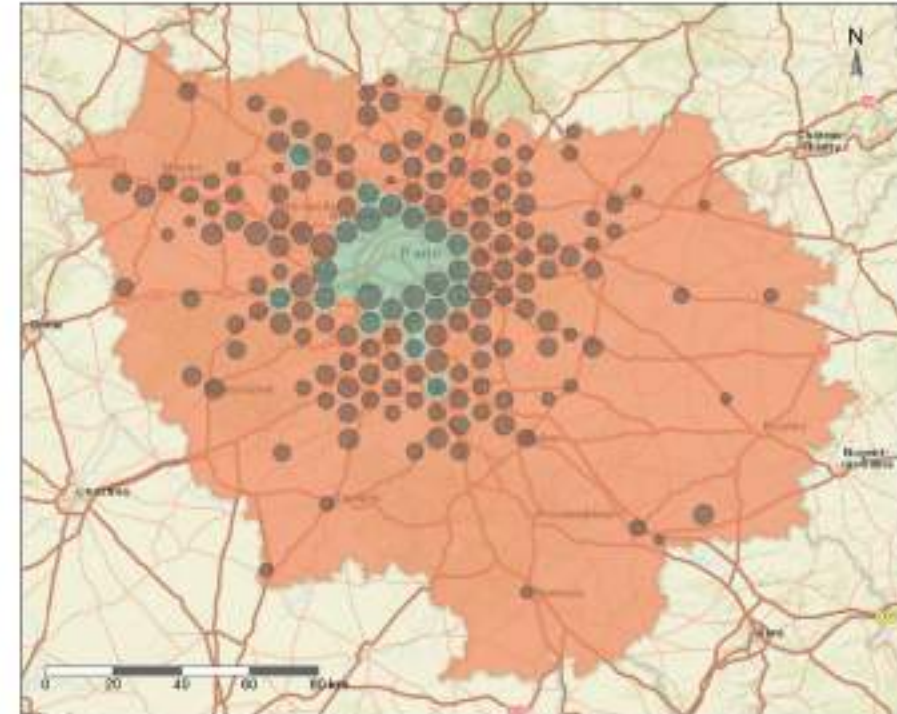
- *Points of interest* from OpenStreetMap to identify urban v suburban areas
- Warehouse rental prices from real estate market sites



Number of warehouses

suburban
central

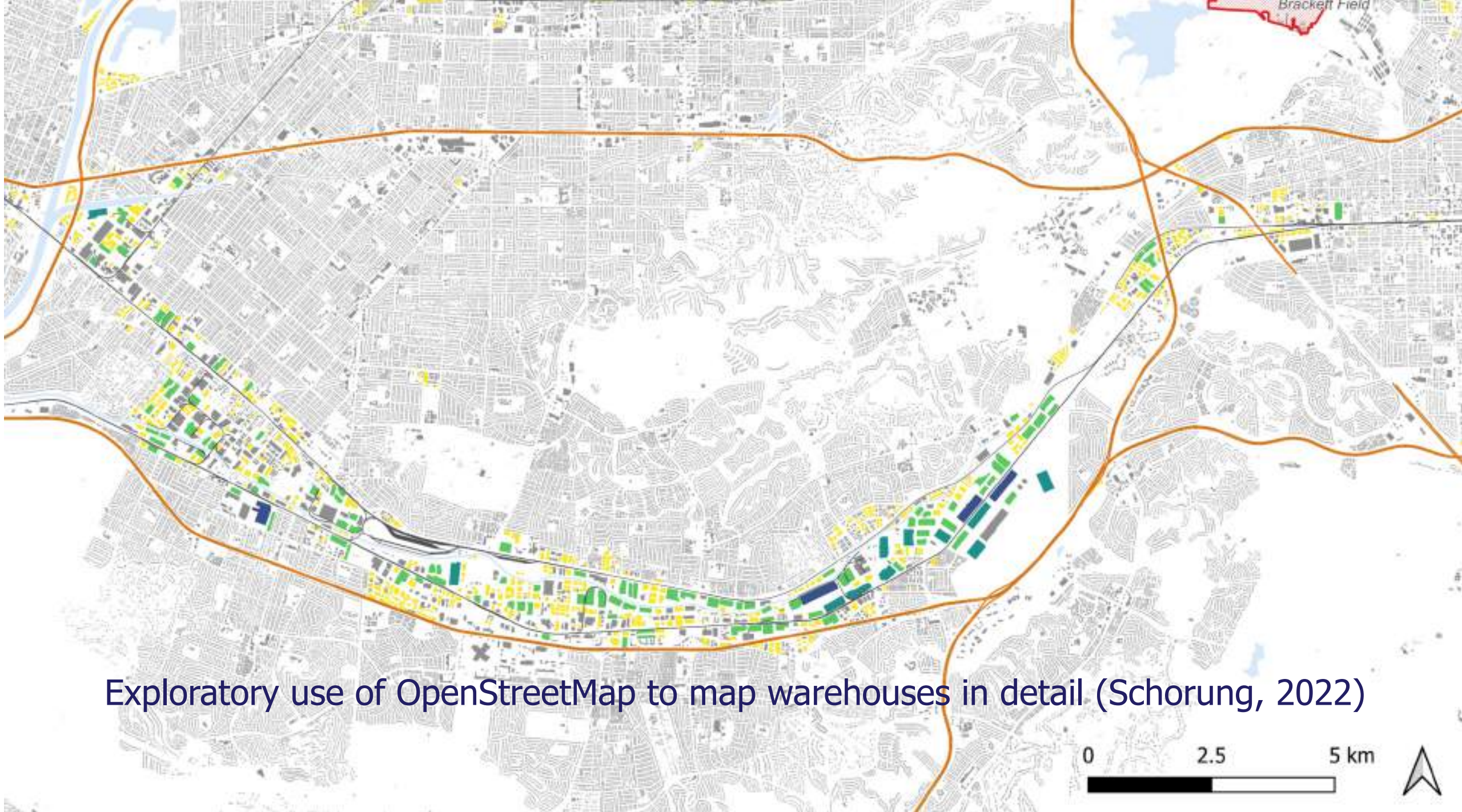
1 32 64 96 127



Warehouse average price

suburban
central

23.0 67.3 111.5 155.8 200.1



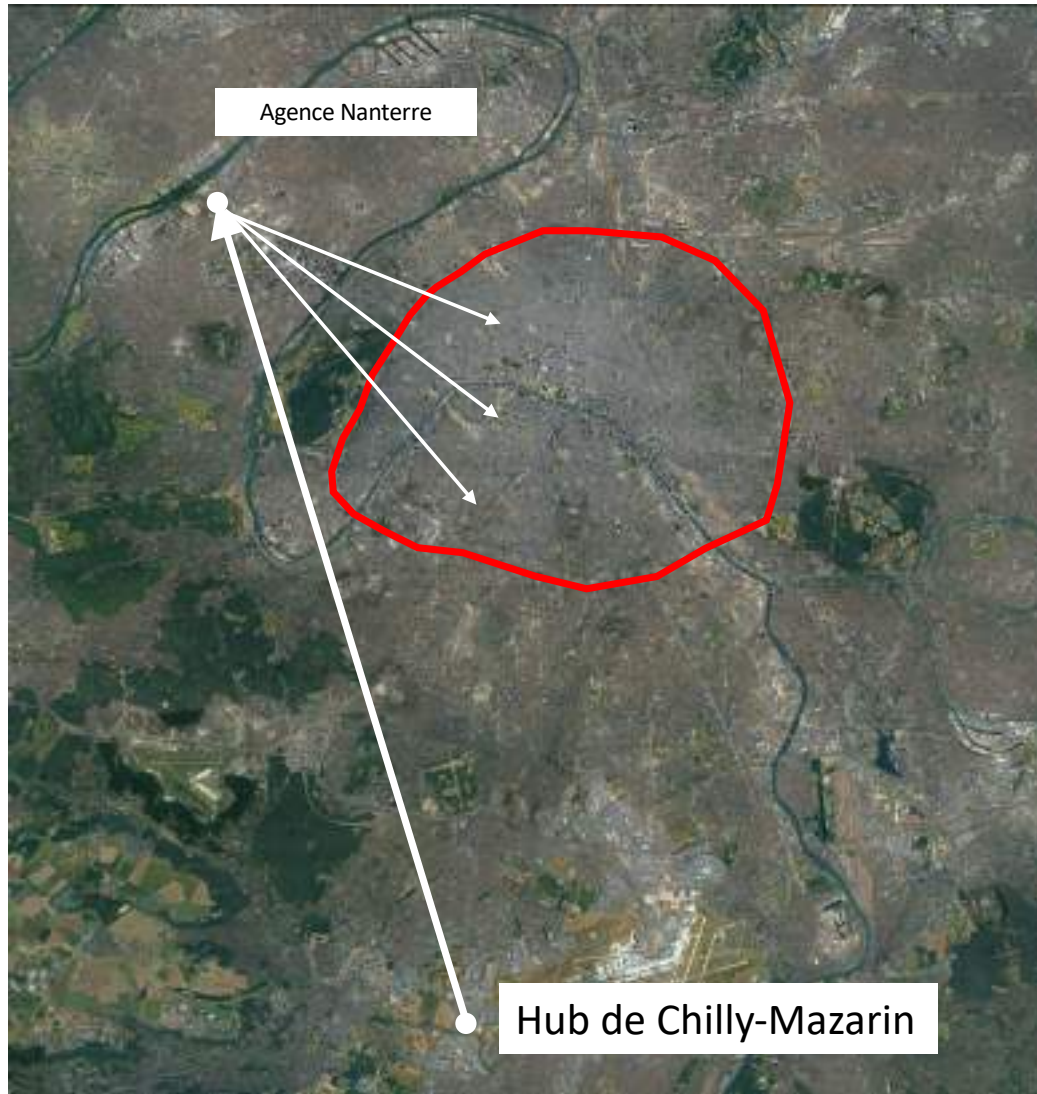
Exploratory use of OpenStreetMap to map warehouses in detail (Schorung, 2022)

Warehouses: disruption of transport 'logic'



Consolidating, going as close as possible to final destination saves vehicle-km

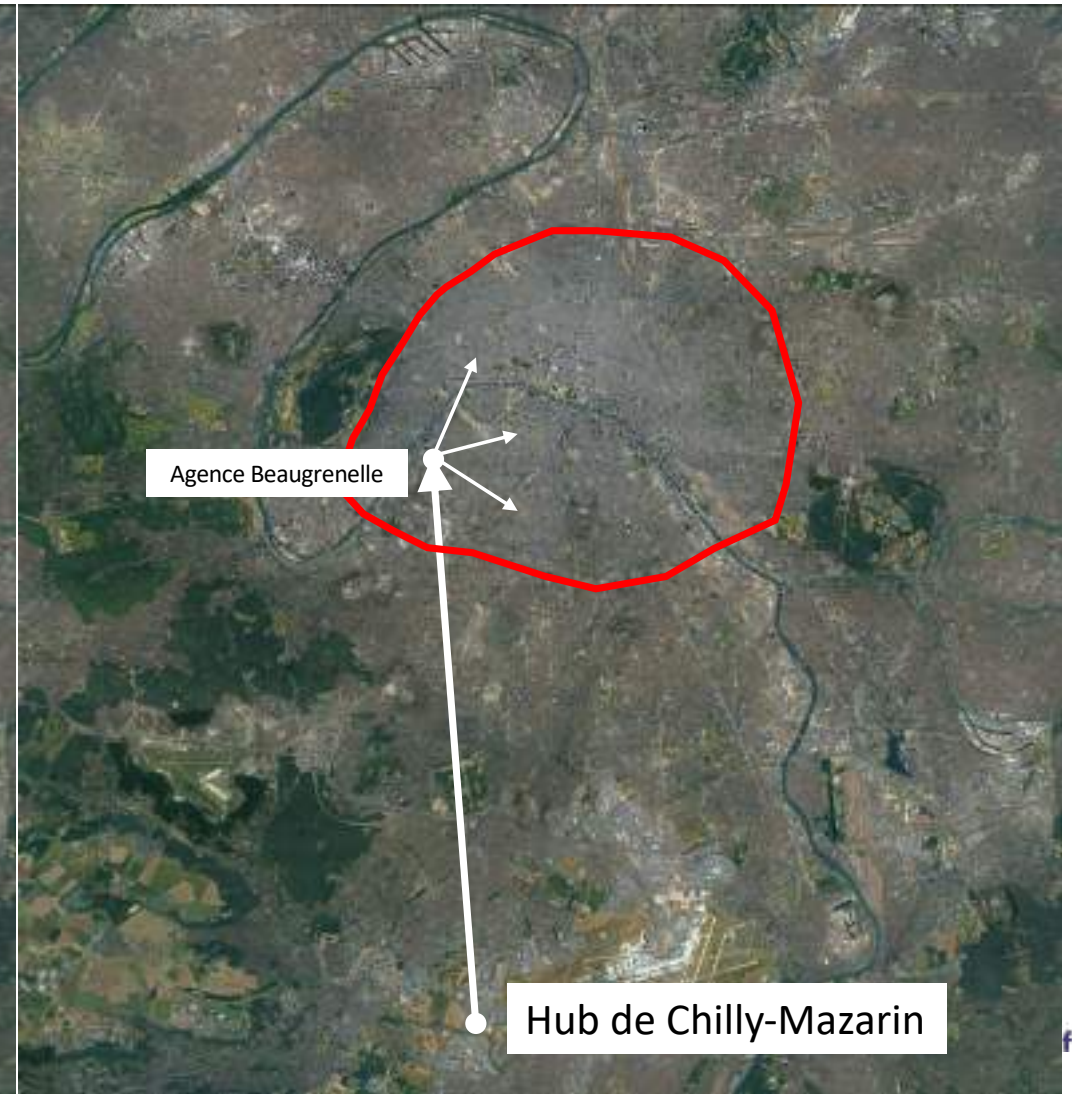
WITHOUT an urban hub



-51% CO₂
emissions

Jonction and
Dabanc, 2017

WITH an urban hub



New urban warehouses are based on goods flow consolidation ... and use of trucks

Tokyo



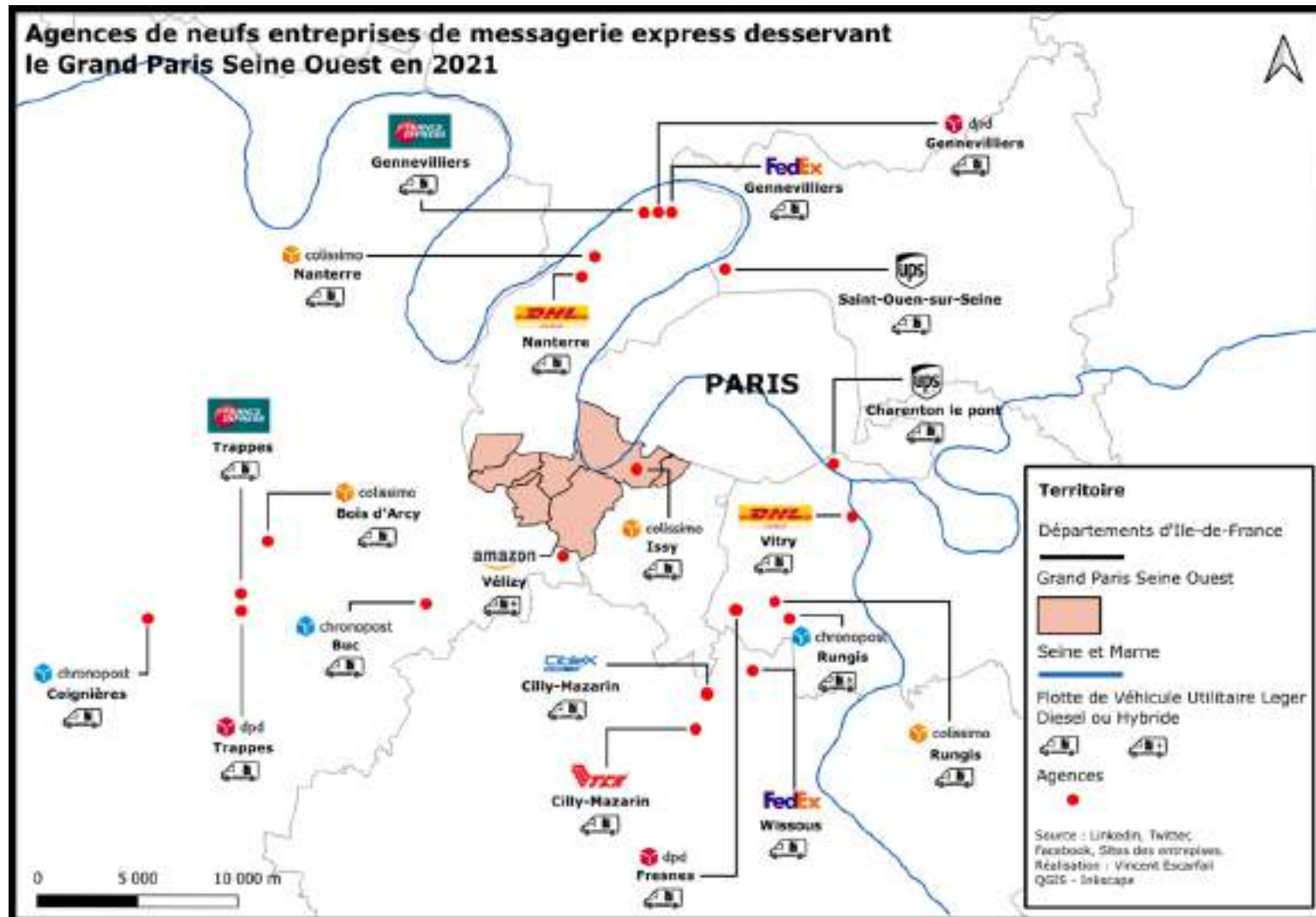
Brooklyn



Paris



Wealthy areas served by warehouses located elsewhere: example of Issy/Boulogne in the Paris metro area



Innovation in urban warehouses

- A dynamic (niche) market
 - Innovative architecture on former industrial areas
 - Multi-levels (vertical warehouses, underground warehouses)
 - Temporary and flexible contracts
 - Mixed-use
- => Innovative, useful and... expensive and very regulated

Hubs in underground municipal car parks

Under the Louvre, Paris



Under Plaza Mayor, Madrid (FM Logistic Ibérica)



News

CITYLogin opens micro-hub under Madrid's Plaza Mayor

CITYLogin and Madrid's Municipal Transport Company (EMT) have inaugurated a micro-fulfilment centre under Plaza Mayor, the Spanish capital's famous main square. The 200-sqm...

10 October 2019

Opera



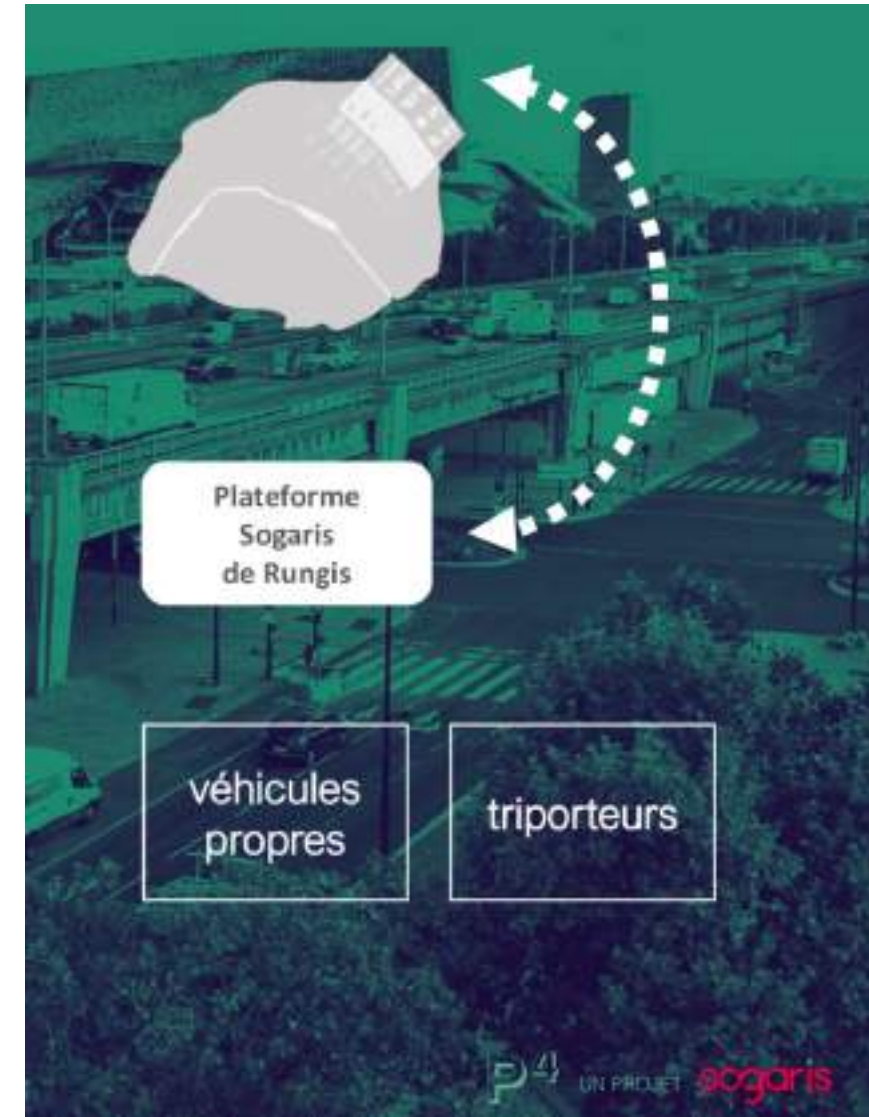
Beaugrenelle



Concorde



Urban logistics hub under Paris ring-road



Chapelle logistics hotel (45,000 sq m)

- Recycling of a former freight rail area
- Four levels
- Multi-use: logistics, offices, data center, sports, urban farm
- Rail infrastructure (unused yet)





Foncier: 1 ha de toiture
Programme: env. 6 200 m² DEVE et 3 800 m² DJS
Permis de construire à déposer

A very discreet Amazon warehouse in Brooklyn/Red Hook



- Amazon Flex delivery workers
- Street parking and difficult handling of cart

Dablanc, March 2022

New urban formats and architecture for warehouses from mainstream developers



Le projet Size à étages de Prologis sur la Zac des Batignolles marque une nouvelle illustration de sa stratégie en matière de logistique urbaine.

© Prologis / DTACC

Prologis, project 'Size' Paris 17th



Segro, project 'Centre Paris 19', Paris 19th

'Neighborhood
uproar against the
future logistics
facility"
Le Parisien, Sept
2021



Electric vans: large and small companies

- According to sources:
 - TCO is OK after 4 or 5 years
 - TCO remains +10%
- 4% new vans are electric in March 2022 (AVERE)
- Commitment from large companies, support to small last mile providers



Sustained interest for cargo-bikes in Europe



International Cargo Bike Festival October 2022

Main advantage: access to bike lanes





Docks are returned to promenade after transloading



UPS trial of waterway transport of trailers between Brooklyn to New Jersey



April 2022

Zero emission trucks are still too expensive



Tesla Semi : PepsiCo annonce les dates de livraison du camion électrique

Emmanuel Toussot / 9 Nov 2021 15:38

Lorries represent a third of deliveries in French cities

Methane, bio-methane or battery electric?



INSIDER



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Biden officials are trying to stop the Postal Service from spending \$11.3 billion on gas-powered trucks, citing pollution and climate change

Kelsey Viamis Feb 3, 2022, 8:28 AM



Amazon: CNG and electric

Order of 1 064 CNG trucks for European market in 2021



Amazon UK adds five DAF CF Electric HGVs to fleet in European first

© March 28, 2022 Carol Millett



Many regional operations by large lorries could fit electric batteries



Maersk orders 110 Volvo VNR Electric trucks for North America

29 March 2022

North America

USA

Sustainability

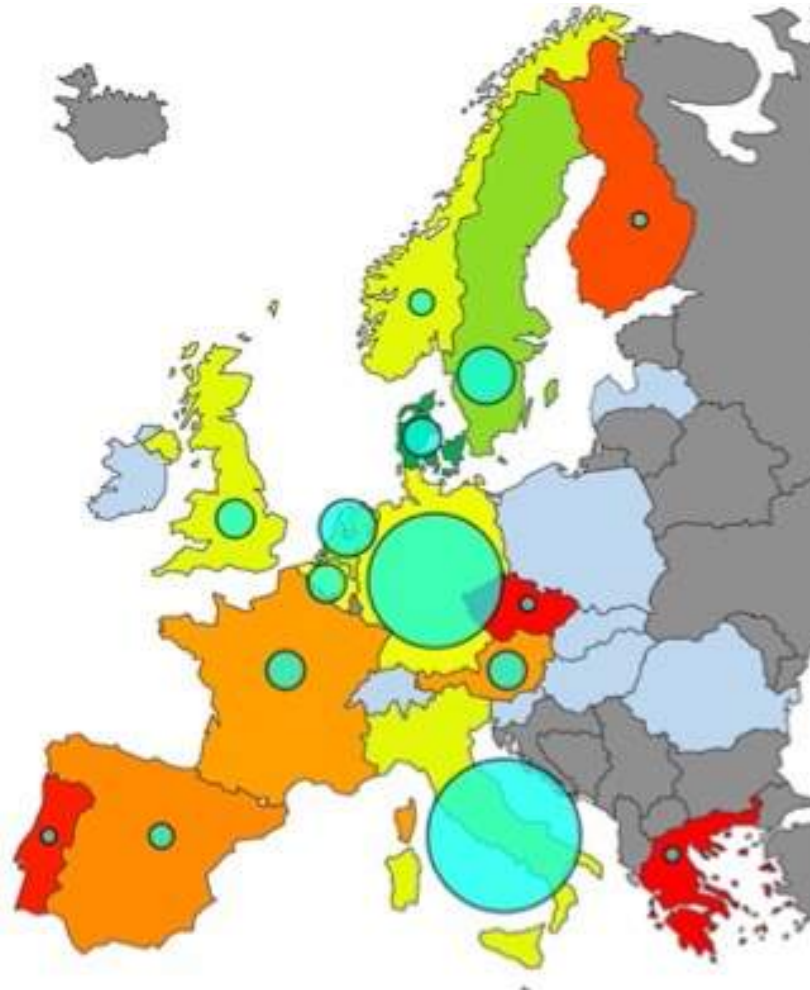
Inland Services



Low and zero emission zones in Europe



Pays	Indice d'efficacité des ZFE
Grèce	0.9
Tchéquie	0.95
Portugal	1.15
Finlande	1.5
Espagne	2
Autriche	2.15
France	2.15
Belgique	2.9
Allemagne	2.95
Italie	3
Norvège	3
Royaume-Uni	3
Pays-Bas	3.15
Suède	3.3
Danemark	3.8
Sans système de régulation	
Dotés d'autres systèmes de régulation	



- France is 9th among 15th countries for efficiency of low emission zones for city logistics
- Ranking by Belliard, Dablanc, 2021

London Low Emission Zone

- All the metropolitan area
- Lorries and large vans
- Euro VI for lorries
- *Ultra Low Emission Zone* in a large central area (Euro 6) (for all veh including vans but not lorries)
- **Three *Zero Emission Zones* by 2025**
- Automated plate reading cameras (ANPR cameras)



Monitoring CCTV



Low Emission Zone in Grand Paris: progress

2017

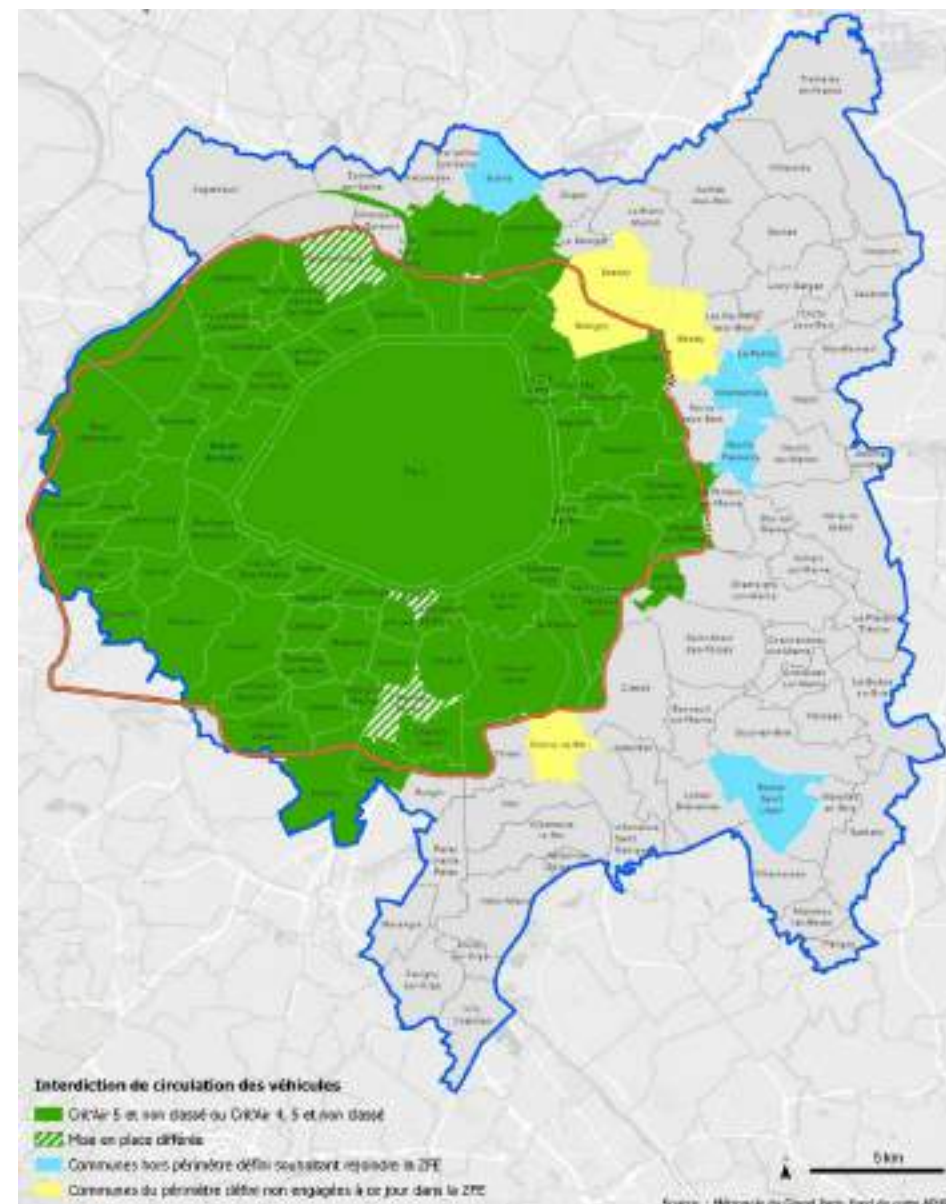
2022

La position des villes concernées par la ZFE



SOURCE : EDITIONS DEPARTEMENTALES DU PARISIEN

LPYINFOGRAPHIE - K. VASSEUR



Ressources

- LOGISTICS CITY CHAIR: www.lvmt.fr/en/chaieres/logistics-city-sogaris/
- METROFREIGHT
www.metrotrans.org/metrofreight
- Browne, M., Behrends, S., Woxenius, J., Giuliano, G., Holguin-Veras, J. *Urban logistics. Management, policy and innovation in a rapidly changing environment.* Kogan Page, London
- Urban Freight Lab: <https://depts.washington.edu/sctlctr/urban-freight-lab-0>
- Urban freight platform:
<https://www.chalmers.se/en/centres/lead/urbanfreightplatform/Pages/default.aspx>

