

ECTRI TG Freight & Logistics webinar
May 6, 2022

Sustainable city logistics: recent research from the Logistics City Chair

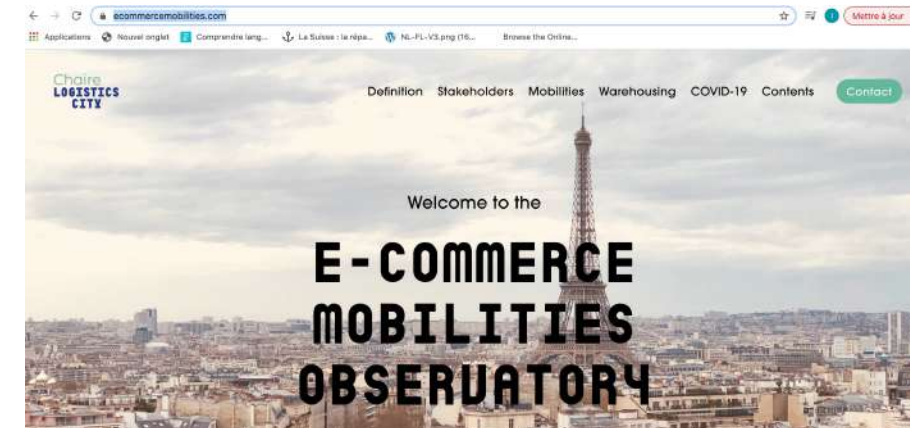
Dr. Laetitia Dabanc

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

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

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



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

ÉCONOMIE

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 Béziat et Julien Bouissou

Favoris

accenture

THE SUSTAINABLE LAST MILE. FASTER. CHEAPER. GREENER.



Deloitte.



Logística de Última Milla
Retos y soluciones en España
Febrero 2020



Deloitte.



Urban fulfillment centers
Helping to deliver on the expectation of same-day delivery

WORLD ECONOMIC FORUM
COMMITTED TO IMPROVING THE STATE OF THE WORLD

The Future of the Last-Mile Ecosystem



How Urban Delivery Vehicles can Boost Electric Mobility



Retail Carbon Footprints: Measuring Impacts from Real Estate and Technology



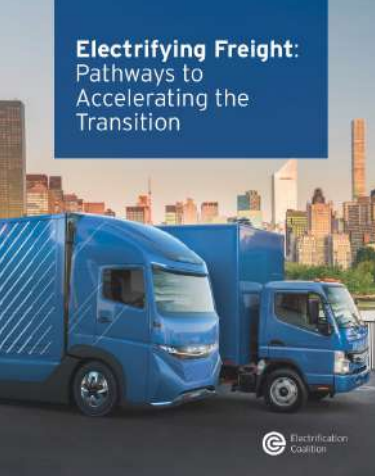
La logistique urbaine face aux défis économiques et environnementaux



xerfi PRECEPTA

Les stratégies dans la logistique urbaine

Comment les acteurs répondent-ils aux enjeux de la logistique demain ?



Electrifying Freight: Pathways to Accelerating the Transition

Logistique urbaine dans le Grand Paris - Vision Roland Berger



Roland Berger

Pandemic impact on e-commerce

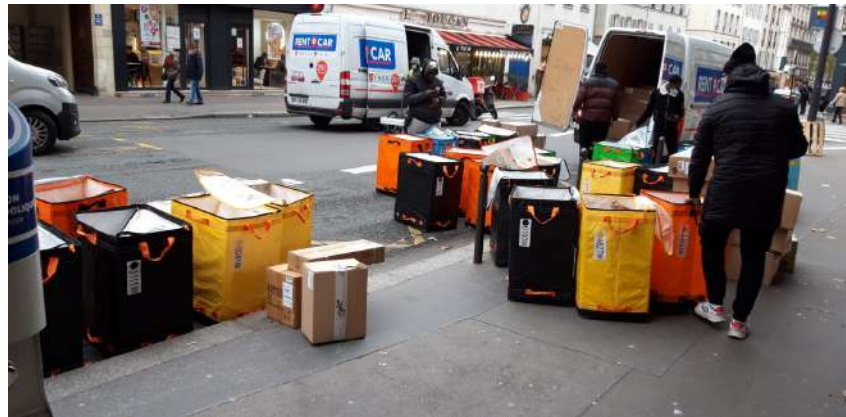
- **Visibility** of last mile issues (politicians, media, anyone)
- **Volumes**: France 2020: +32% B2C products sold (growth rate twice as high as usual) however France 2021: +7%
- **Omni-channel**: traditional retail has changed into omni-channel commerce
- **Curb**: increased number of deliveries and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



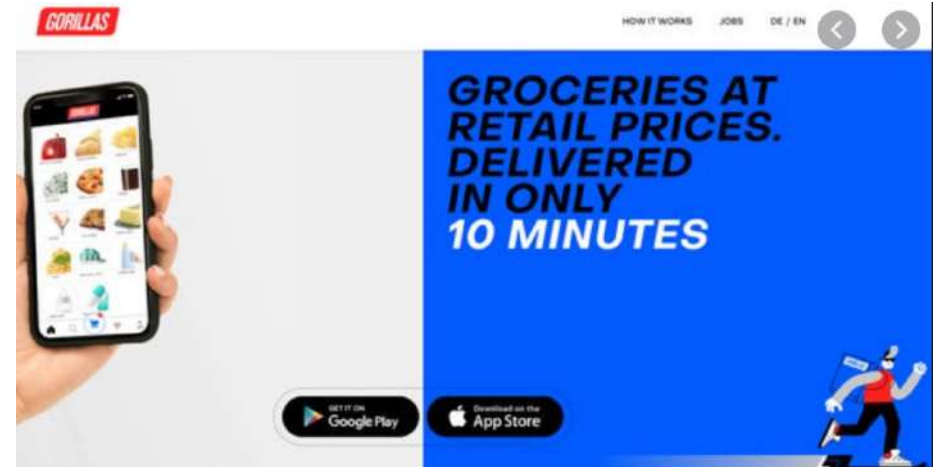


Presentations and Panel Discussions Include:

- 📍 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

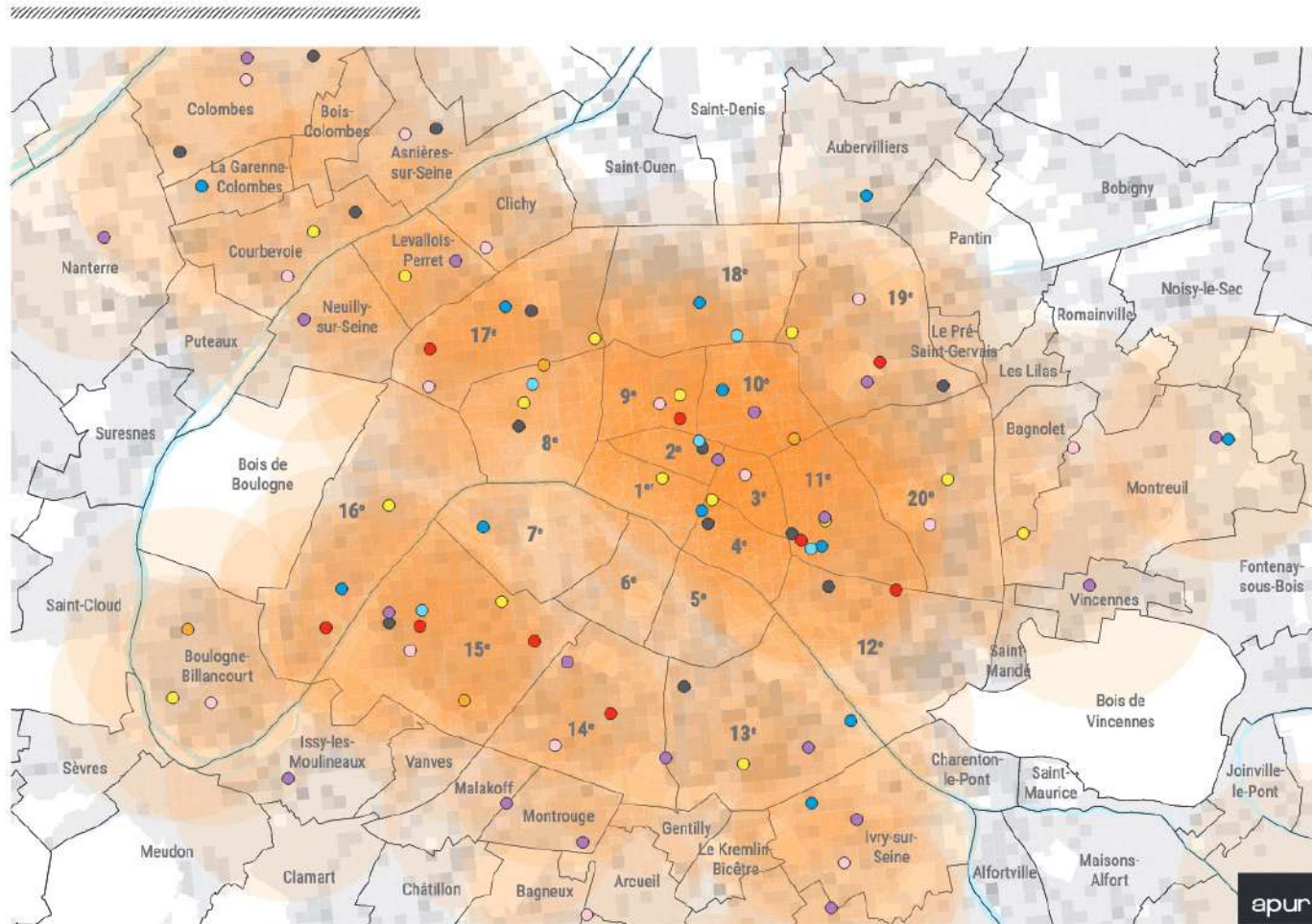
- Cajoo promises to deliver in 15 minutes
- Gorillas promises to deliver in 10 minutes
- Alibaba promises to deliver in 5 minutes



- “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)

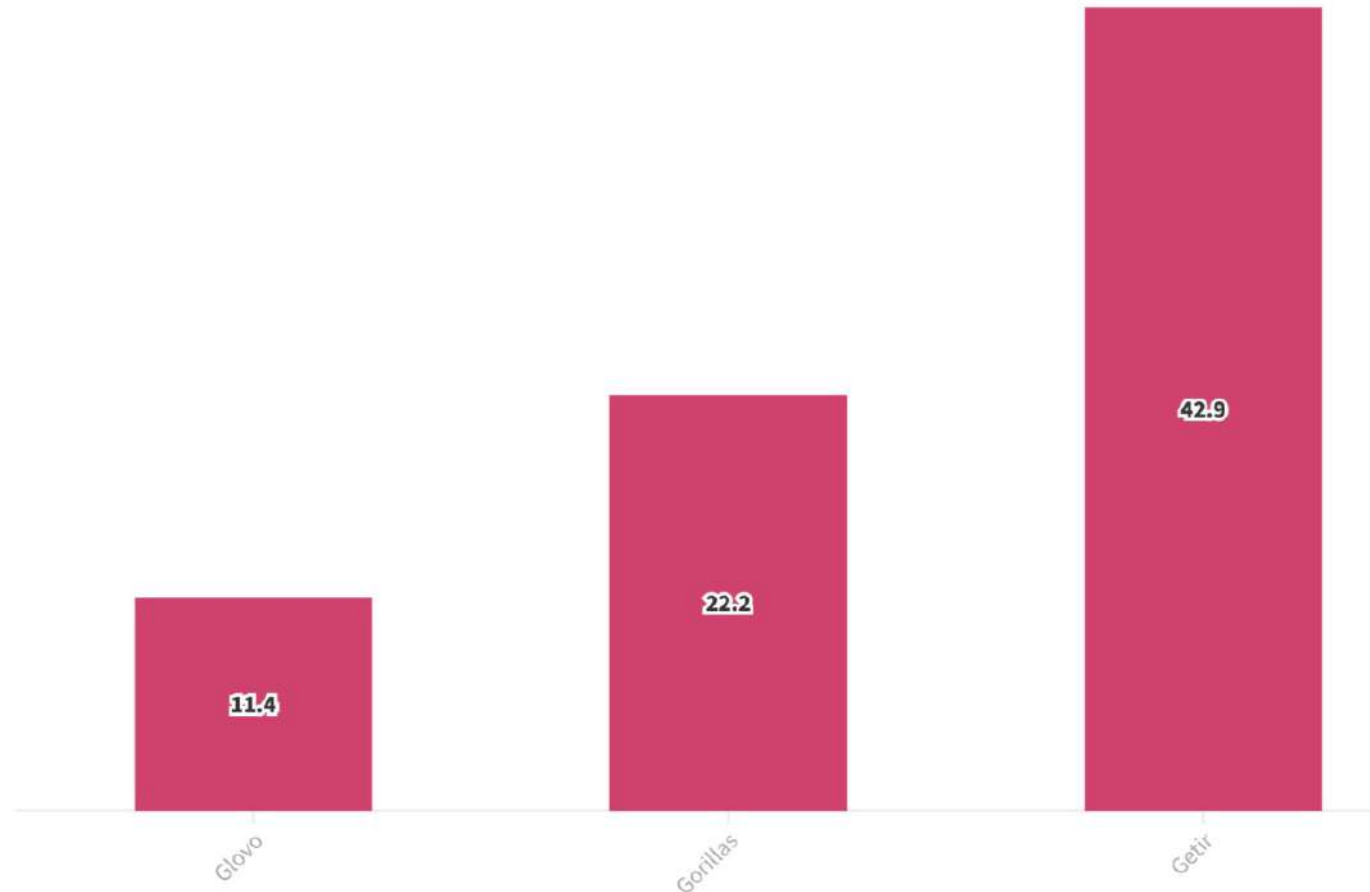
Enseigne

- 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/



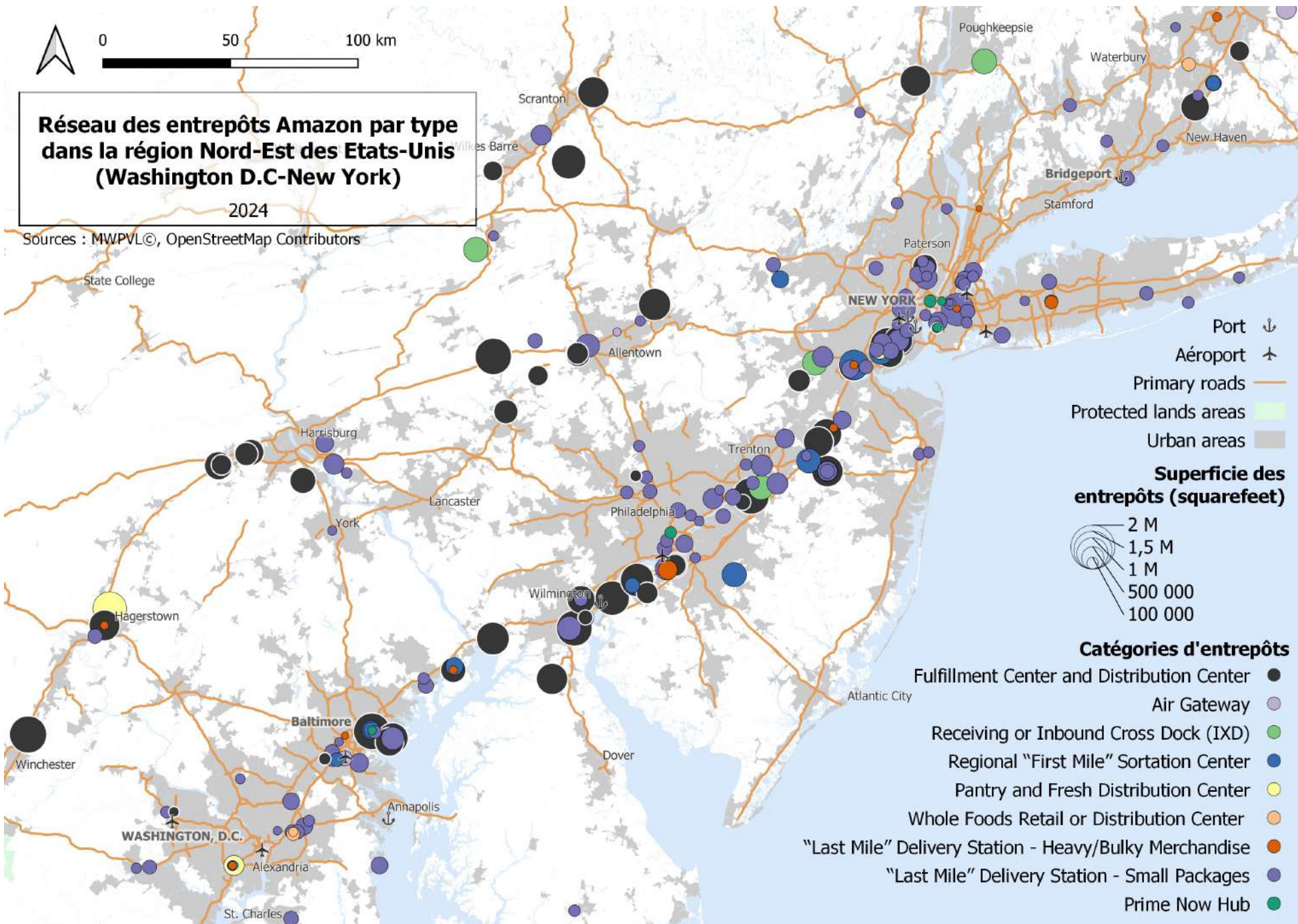
Diversification of vehicles for urban deliveries

- 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





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
- Frichti sold to Gorillas in March 2022
- Postmates sold to Uber for \$2.65 bn in 2021
- JustEatTakeawy may sell GrubHub after just one year acquisition
- Deliveroo IPO in 2021, valuation of \$11bn in May 2022



GO SEND
KINI **KIRIM BARANG**
TANPA **BATAS JARAK***
UPDATE APLIKASI GO-JEK ANDA UNTUK
MENGUNAKAN LAYANAN GO-SEND TERBARU

*Untuk pengiriman dalam satu area

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



Véligo
Location

îledeFrance
mobilités



- “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



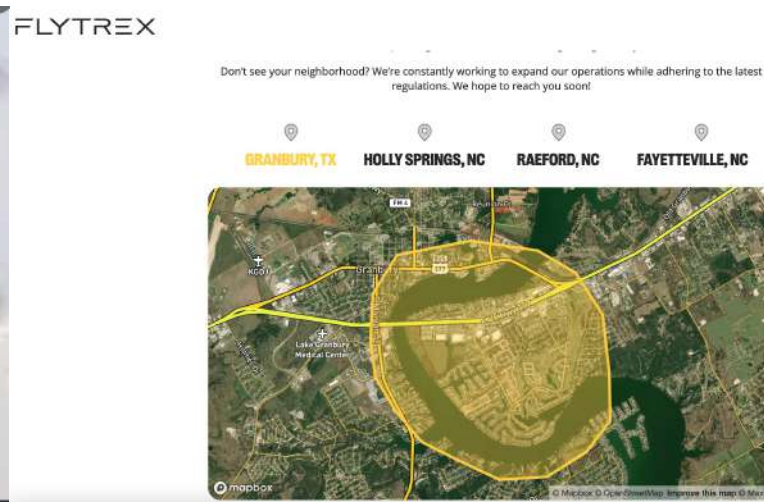
JD deploys 100 autonomous delivery vehicles to aid Shanghai residents under lockdown



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

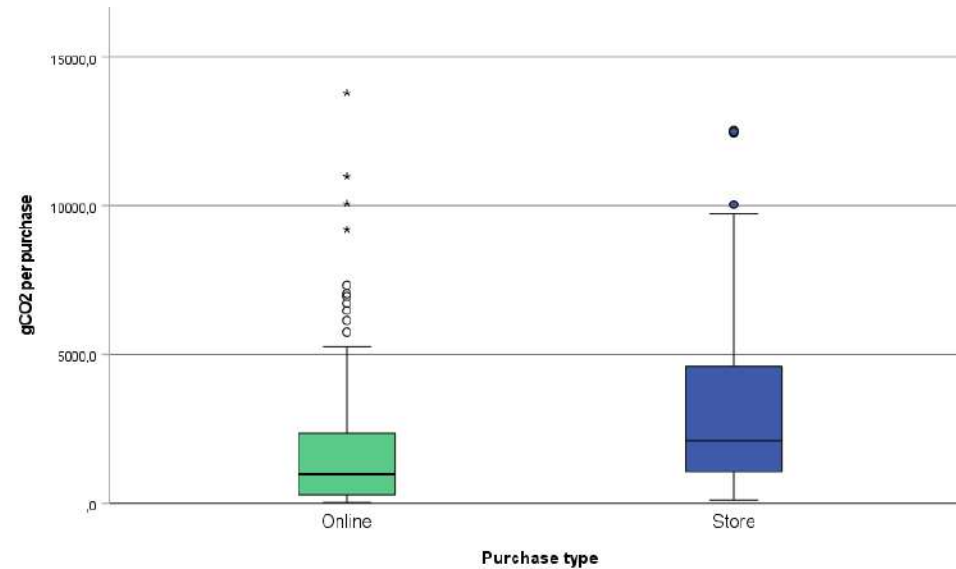
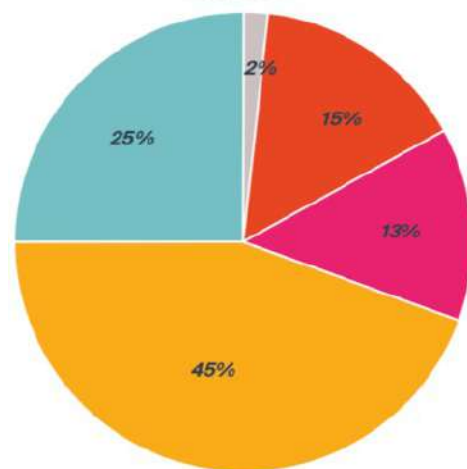


Figure 1. Carbon footprint of online and store purchases ($p < .001$).

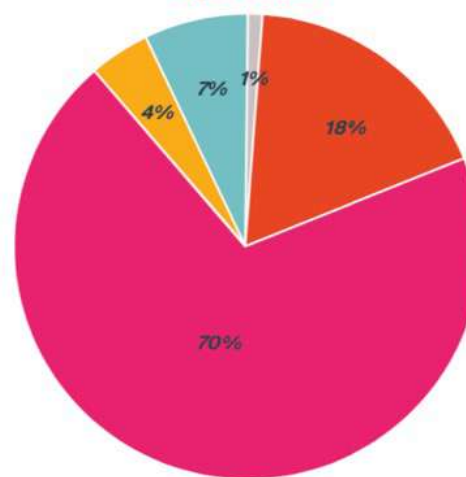
- Meta-analysis of case studies around the world (Buldeo Rai, Touami, Dablanc, submitted 2022)

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

Ecommerce Average Emissions by Sources



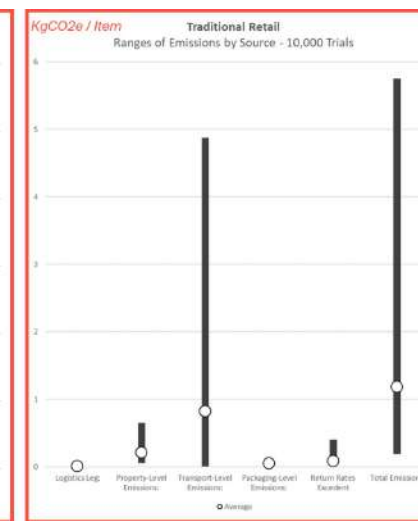
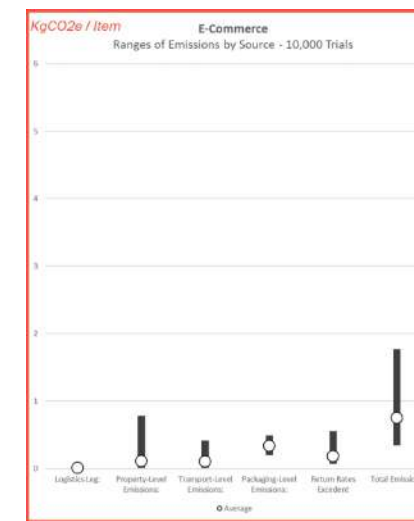
Traditional Retail Average Emissions by Sources



A huge share of packaging

Ecommerce

Traditional commerce



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

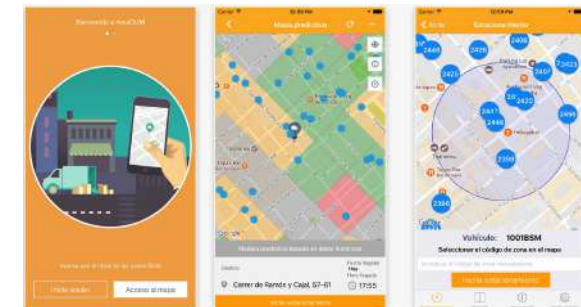
- Delivery Area ID
- Plate Number
- User ID
- Vehicle Type
- Activity Type
- District ID
- Neighborhood ID
- Coordinate, Weekday, Date, Time

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

Burcu Kolbay¹, Petar Mrazovic², and Josep Llus Larriba-Pey¹

¹ DAMA-UPC Data Management, Universitat Politècnica de Catalunya
C/Jordi Girona, 1 3 UPC Campus Nord 08034 Barcelona, Spain
{burcu, larri}@ac.upc.edu
<http://www.dama.upc.edu/en>

² Dept. of Software and Computer Systems, Royal Institute of Technology,
Stockholm, Sweden
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

Segments	Subsegments	Most common type vehicles and propulsion 2019		Most common type vehicles and propulsion 2025	
Fresh	Retail (fresh)				
	Hospitality and specialists				
	Fresh home deliveries (groceries and prepared meals)				
General freight	Retail chains (non-fresh)				
	Specialists (including fashion, hanging garments)				
	Two-person home deliveries (furniture, white goods)				
Waste	Waste collection: households				
	Waste collection: businesses				
Express and parcels	Express and parcels				
Facilities/ service	Maintenance and service				
	Office supplies, hospitals and municipal services				
Construction	Public space/ infrastructure/making land construction-ready				
	Building shell				
	Completion/interiors				
	Personnel				

Information on the shift vehicles 2019 → 2025

- Shift to smaller vehicles.
- Slight consolidation potential with hubs on the outskirts of the city.

- Shift to smaller vehicles.
- Slight consolidation potential with hubs on the outskirts of the city.
- Use of LEVVs.

- Increase in logistical movements.
- Increased use of LEVVs.

- Shift to smaller vehicles.
- Slight consolidation potential with hubs on the outskirts of the city.

- Shift to smaller vehicles.
- Slight consolidation potential with hubs on the outskirts of the city.
- Limited use of LEVVs.

- Slight consolidation potential with hubs on the outskirts of the city.

- More efficient deployment of vehicles through the use of sensors on underground containers. (Only collect full containers).

- More efficient network of pick-up services through the use of LEVVs, combining goods delivery and waste collection.
- Joint collection for each street area (combining waste).
- Arranging pick-ups with recipients (more efficient routes).

- Increase in logistical movements.
- Increased use of LEVVs.
- Significant consolidation potential with hubs on the outskirts of the city.

- Shift to smaller vehicles.
- Limited use of LEVVs.

- Shift to smaller vehicles.
- Consolidation potential with hubs on the outskirts of the city.
- Limited use of LEVVs.
- Push for route reduction/consolidation through municipal procurement and joint procurement (with e.g. Erasmus MC, University of Applied Sciences).

- Shift to smaller vehicles.
- Slight consolidation potential with hubs on the outskirts of the city.
- Push for route reduction/consolidation through municipal procurement.

- Significant consolidation potential thanks to hubs on the outskirts of the city.

- Significant consolidation potential through carpooling or use of public transport/P+R facilities.

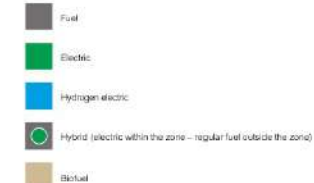
Vehicle type



Proportion of vehicles per subsegment



Driveline type



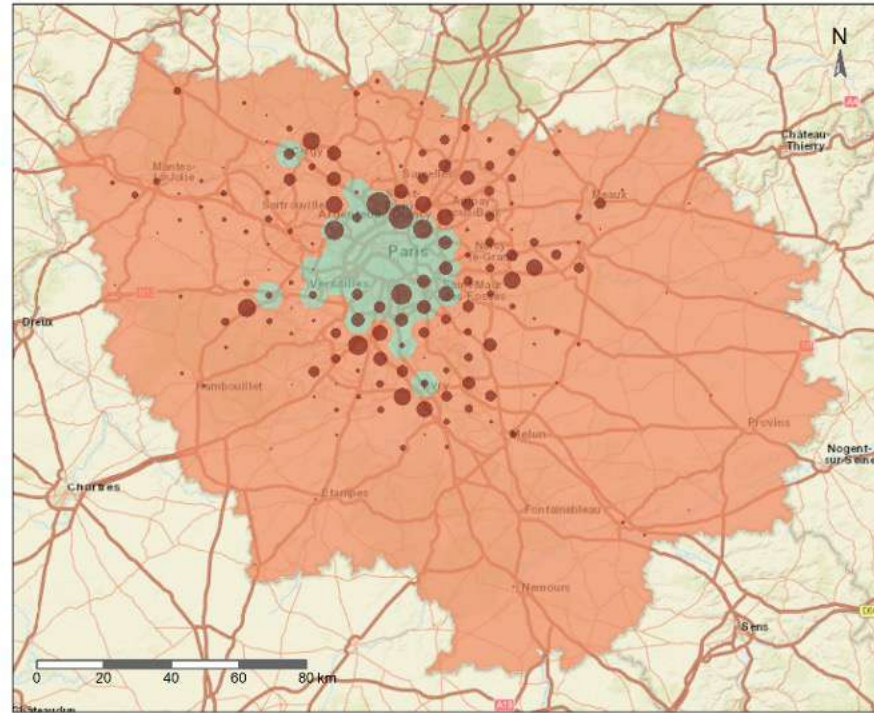
What does this table show?

Rotterdam is focusing on 'zero emissions' by promoting electric vehicles (powered by electric batteries and hydrogen). This infographic visualises the expected transition to zero urban logistics emissions by 2025 in Rotterdam's city centre.

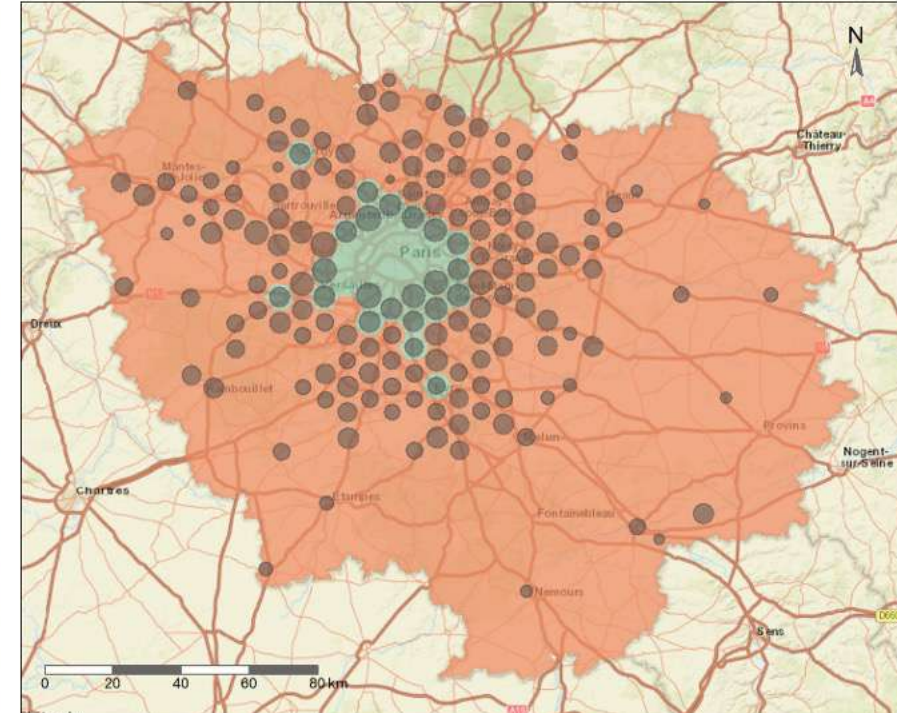
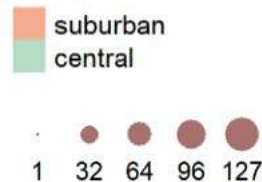
The shift in the type of vehicle and the driveline is indicated for each (sub)segment.

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

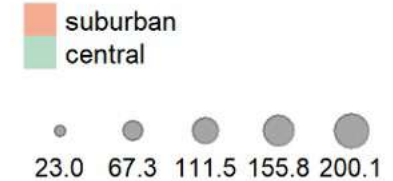
- *Points of interest* from OpenStreetMap to identify urban v suburban areas
- Warehouse rental prices from real estate market sites

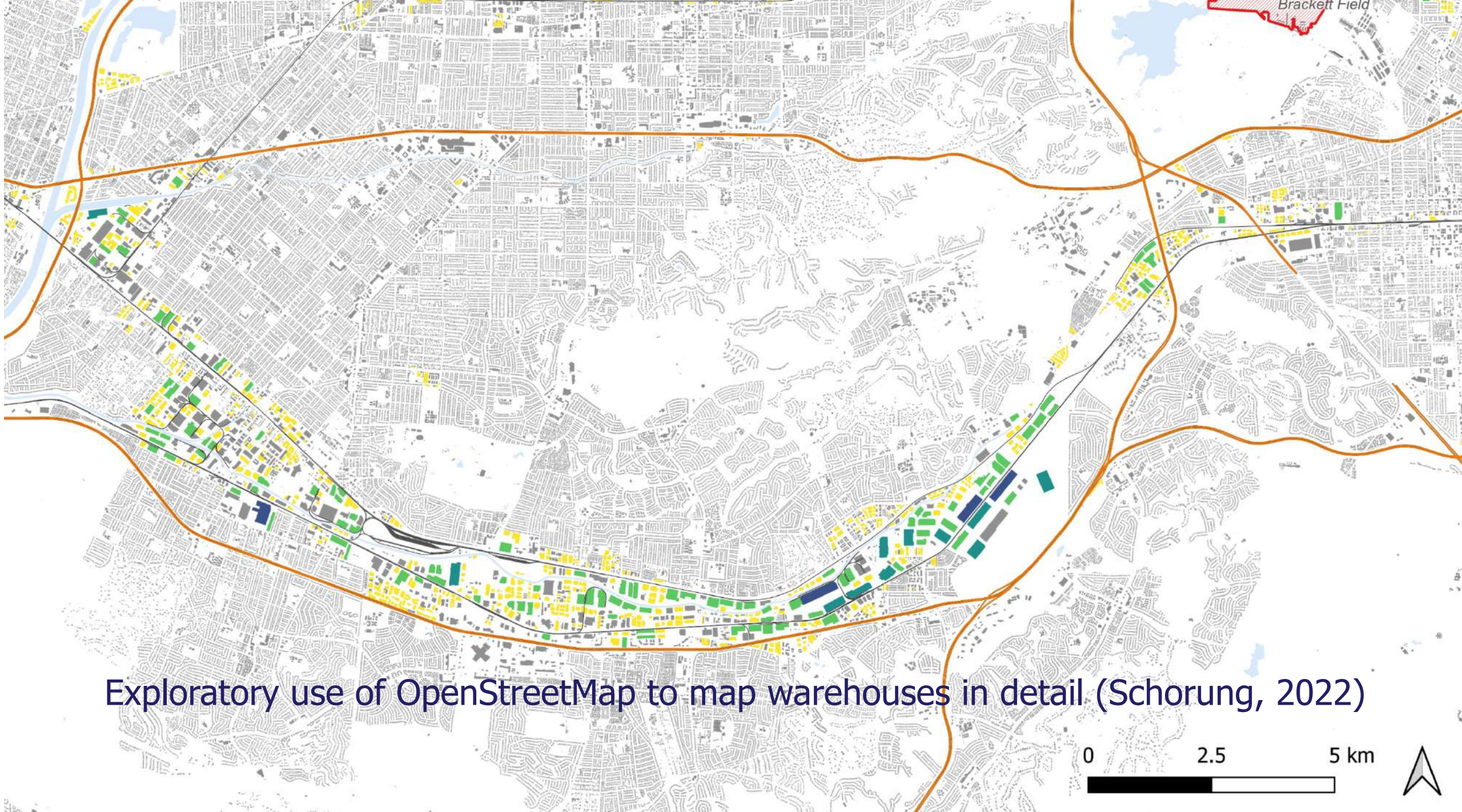


Number of warehouses



Warehouse average price





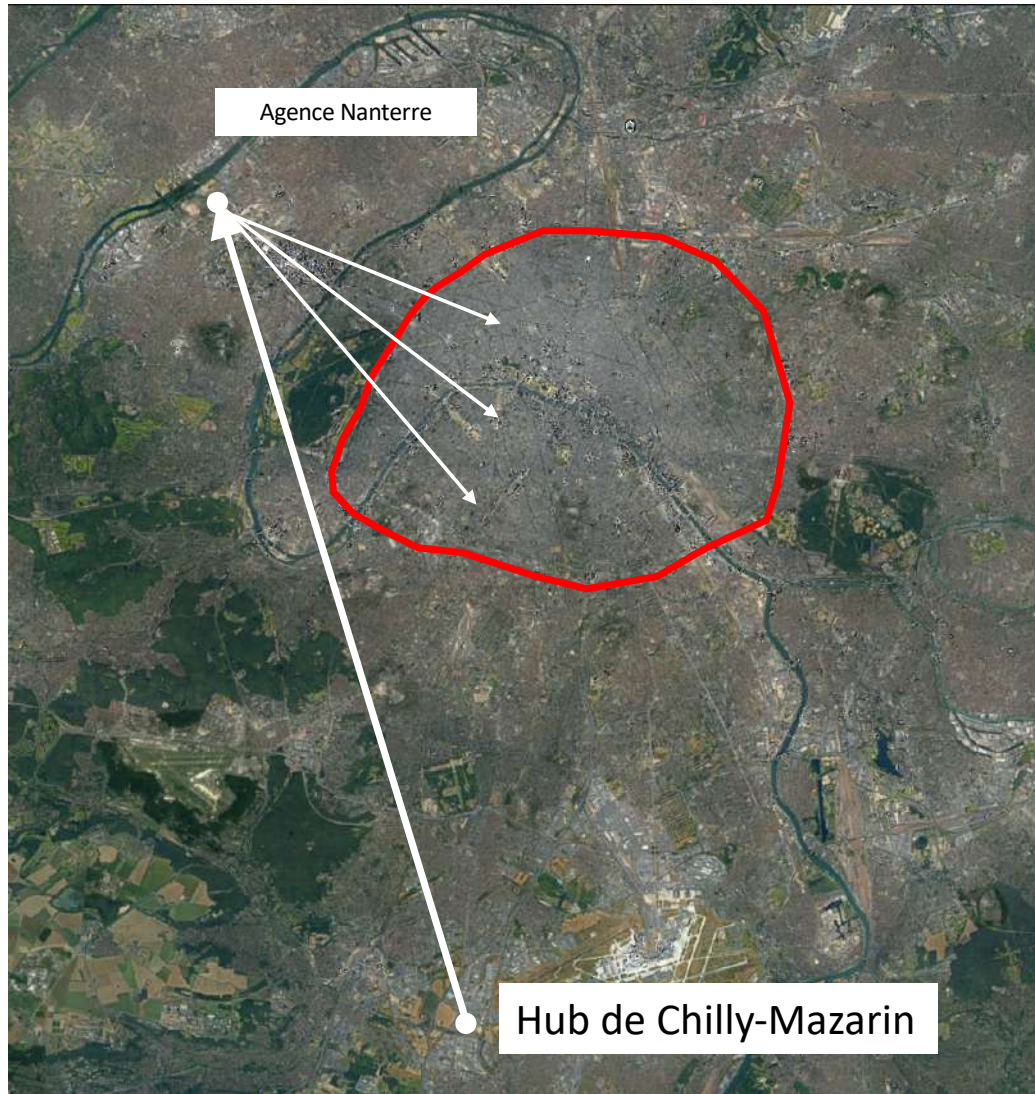
Exploratory use of OpenStreetMap to map warehouses in detail (Schorung, 2022)

Warehouses: disruption of transport 'logic'



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

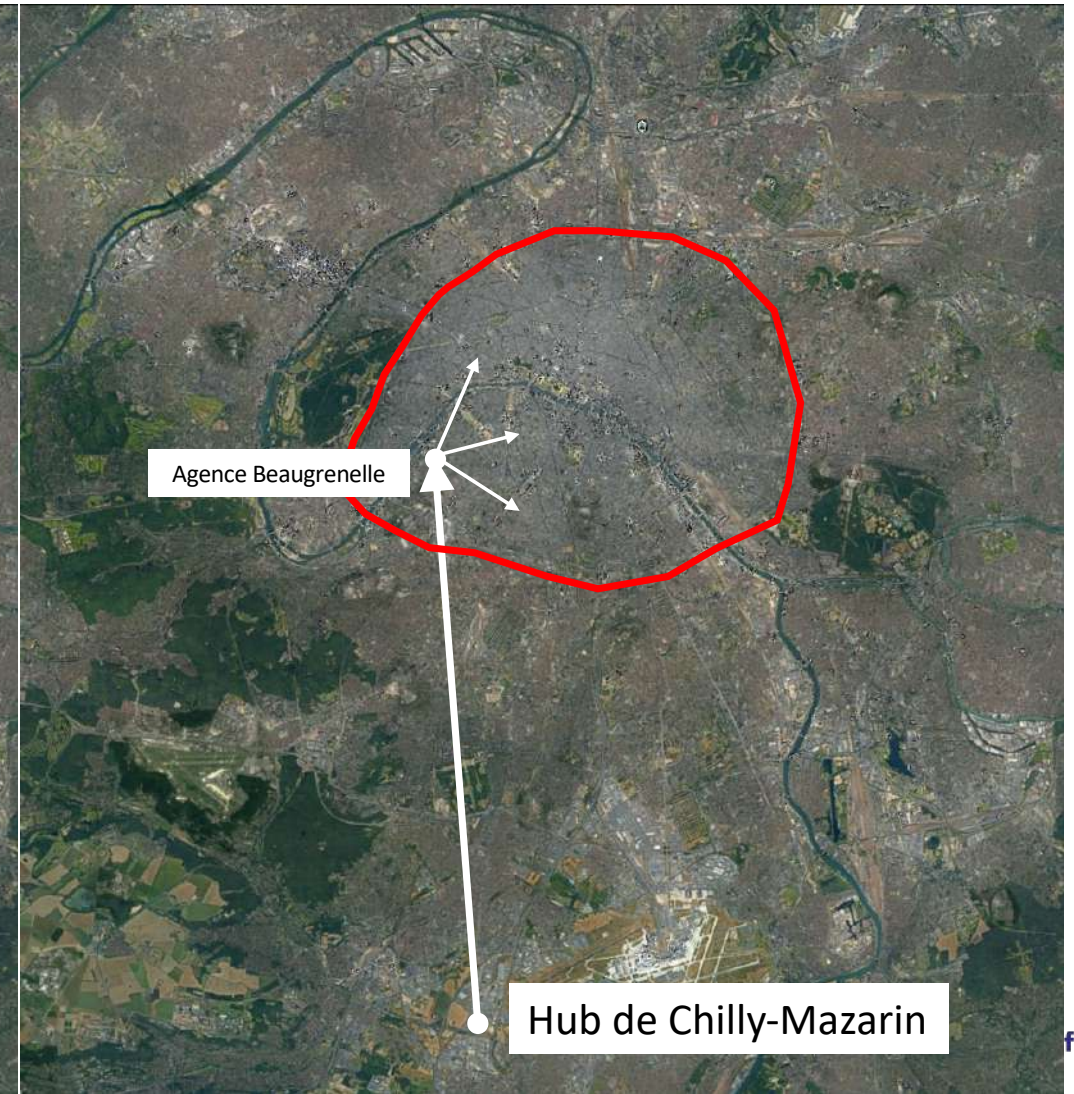
WITHOUT an urban hub



-51% CO₂
emissions

Jonction and
Dablanc, 2017

WITH an urban hub

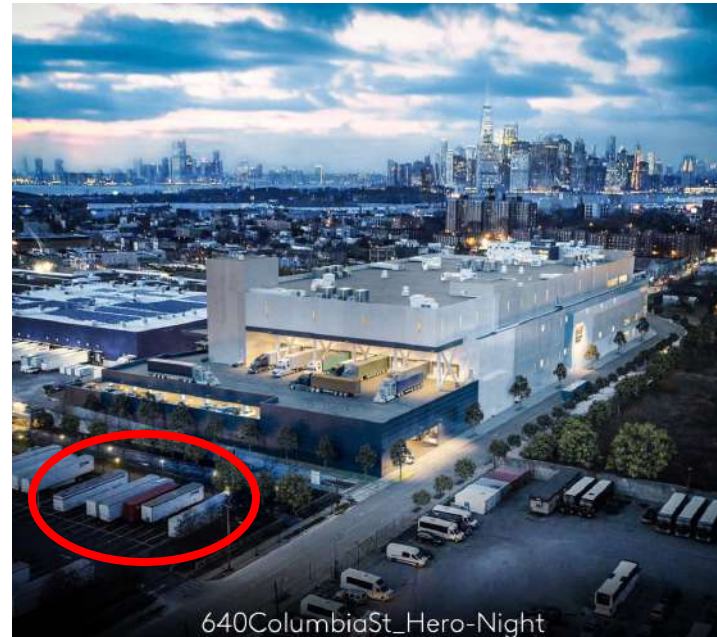


New urban warehouses are based on goods flow consolidation ... and use of trucks

Tokyo



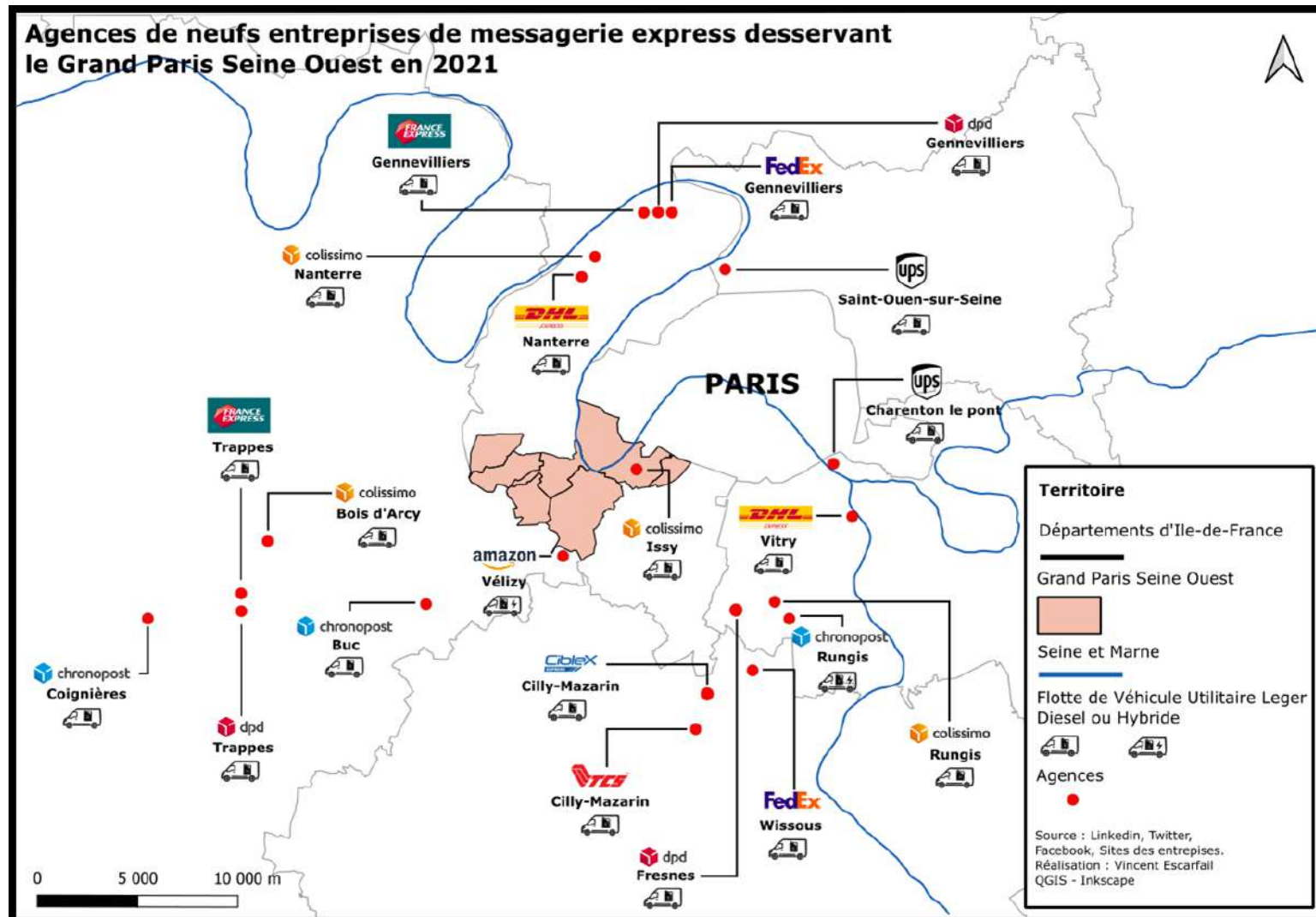
Brooklyn



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...

On October 20, 2021

Opera



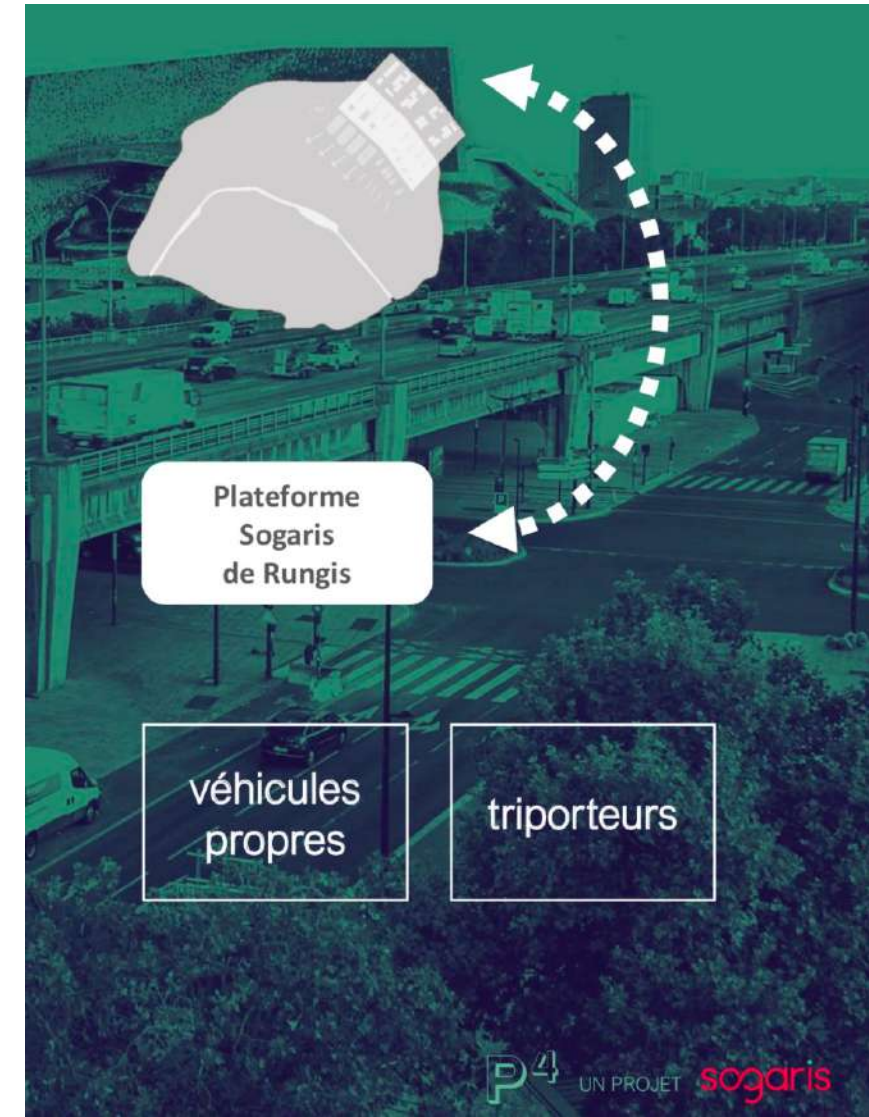
Beaugrenelle



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



Volta Zero



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

Emmanuel Touzot / 9 Nov 2021 15:38 / 5

Lorries represent a third of deliveries in French cities

Methane, bio-methane or battery electric?



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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 Vlamis 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

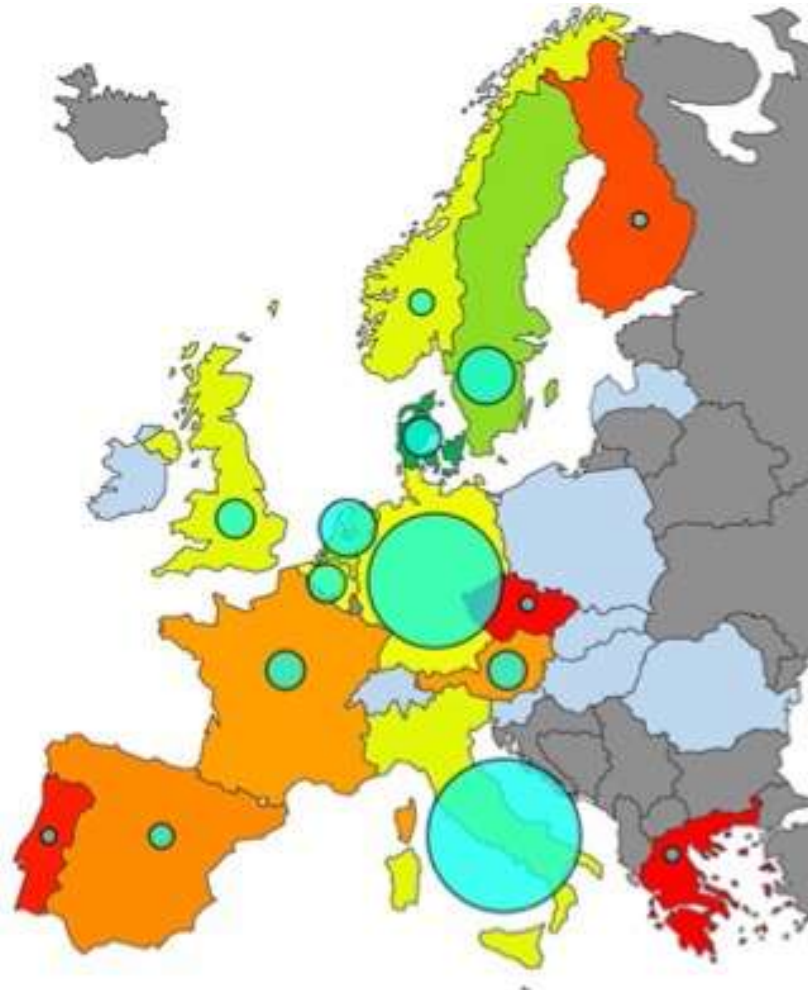
Inland Services



Low and zero emission zones in Europe



Pays	Indice d'efficacité des ZFE
Grèce	0.8
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	



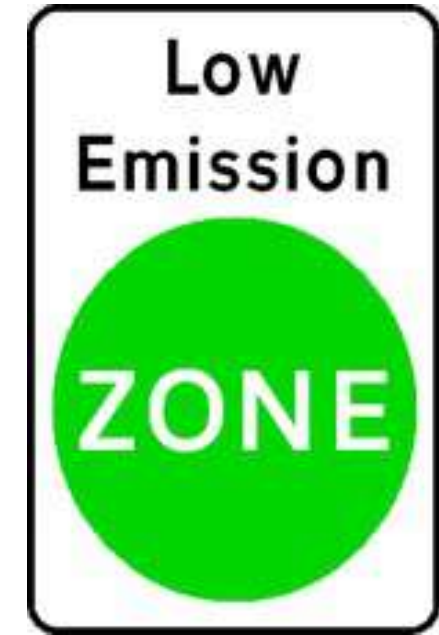
- France is 9th among 15th countries for efficiency of low emission zones for city logistics
- Ranking by Belliard, Dablanc, 2021

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)



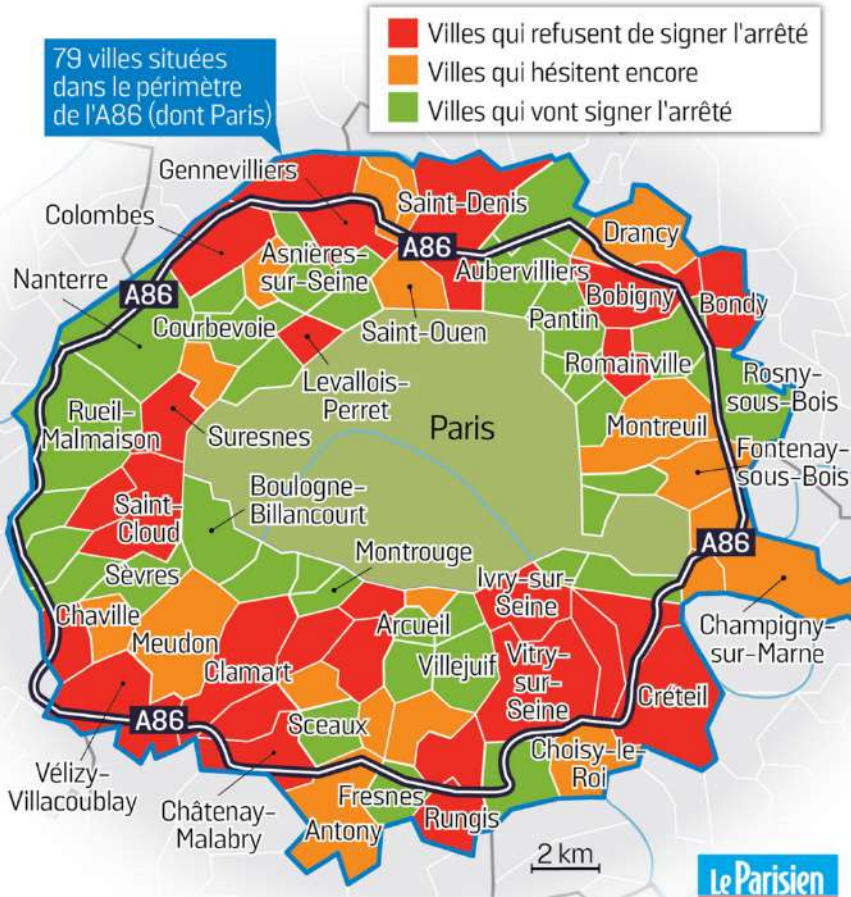
Monitoring CCTV



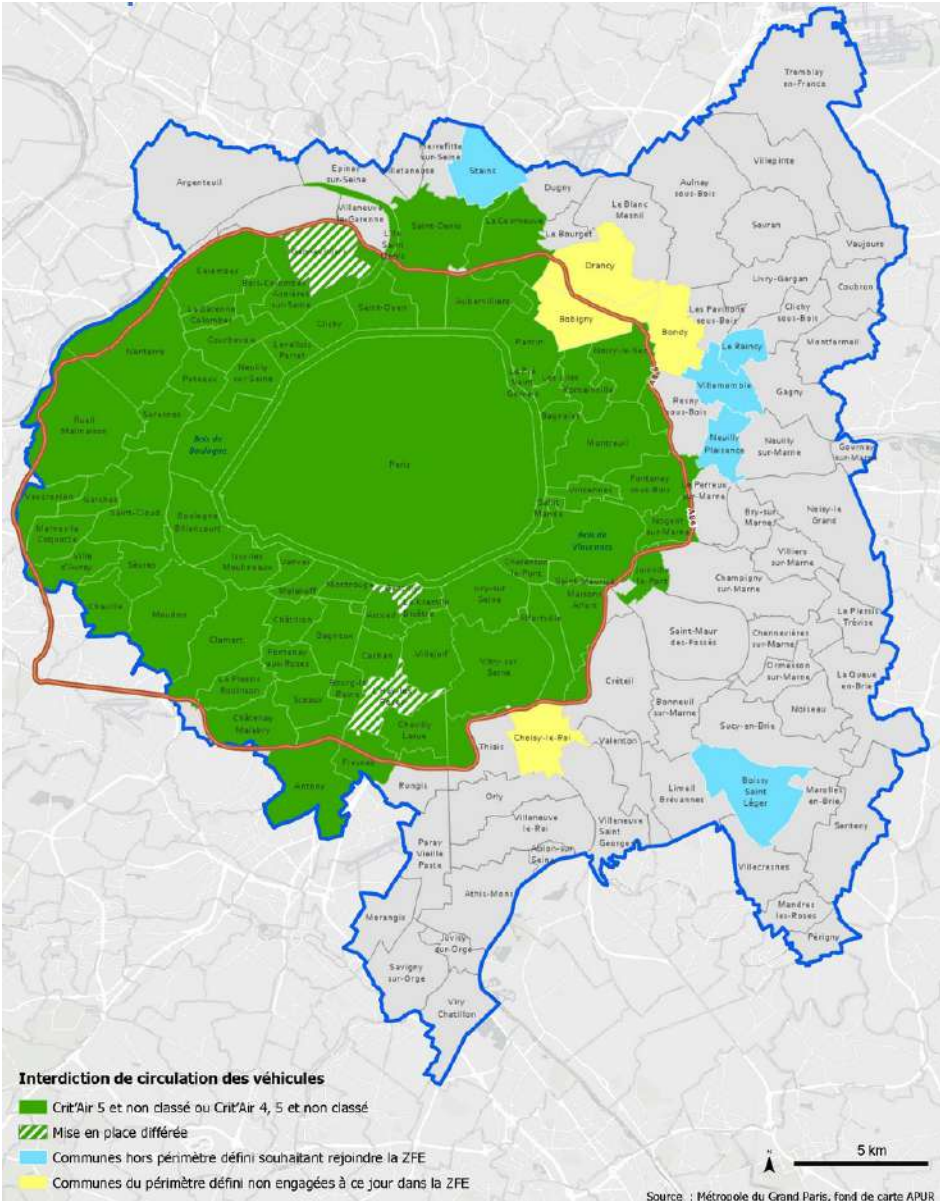
Low Emission Zone in Grand Paris: progress

2017

La position des villes concernées par la ZFE



2022



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>

