Chaire LOGISTICS CITY

Pembina Institue Workshop: Using Data to Decarbonize Urban Freight in Canadian Cities
March 24, 2021

Urban freight data and decarbonization, some elements from Paris and France

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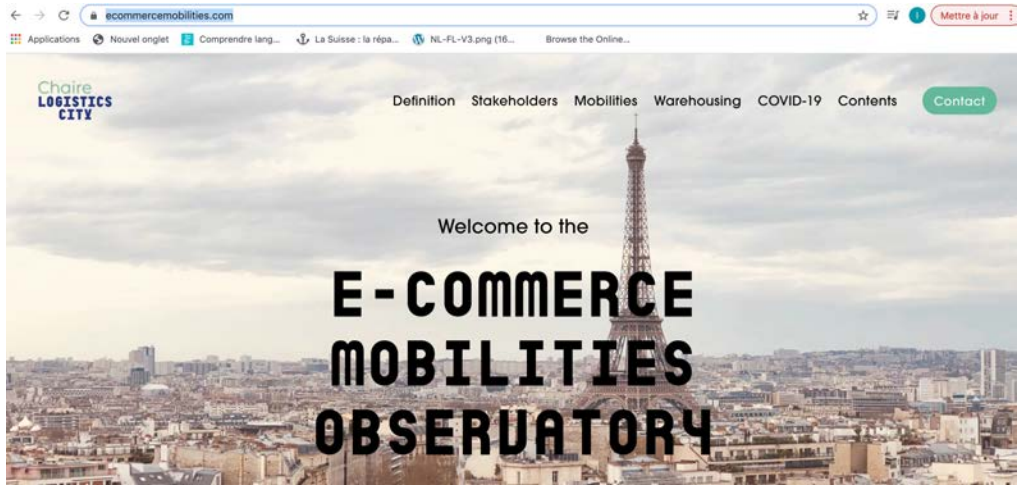
Université Gustave Eiffel

- Urban freight
- Warehouses, innovations, new trends in e-commerce and impacts on city logistics and urban warehousing

Results available online:

- Observatory of ecommerce mobilities (https://www.ecommercemobilities.com/)
- Survey reports on gig workers for instant delivery platforms in Paris 2016, 2018, 2020, 2021
- Urban logistics and covid
- Logistics real estate in 74 large cities around the world



https://www.lvmt.fr/en/chaires/logistics-city/

Understanding the drivers of urban goods movements

20 deliveries/day

one delivery/day

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A comprehensive urban freight survey in the Paris region in 2010 (LAET)

- Cost of one million euros
- Only B2B
- Every day (metro area): one million deliveries/pickups to businesses
- 0.7 deliveries/pickups per week per job

Vehicles used for deliveries

4% 26% 31% 31% 8%

Generation of B2B deliveries in French cities

- Urban freight surveys (LAET):
  - Bordeaux metro 1994
  - Bordeaux metro 2013
  - Paris region 2010

- Indicator: number of delivery per week per job

2 – NOMBRE DE LIVRAISONS/ENLÈVEMENTS HEBDOMADAIRES PAR EMPLOI ET SELON L'ACTIVITÉ

Activité en 8 catégories	Bordeaux (1994)	Bordeaux (2013)	Ile-de-France (2010)
Agriculture	0.6	0.5	0.8
Artisanat-Services	1.1	1.2	0.7
Industrie	0.7	0.9	1.0
Commerce de gros	3.7	2.8	2.8
Grands magasins	0.8	0.7	0.5
Petit commerce	2.4	2.2	1.7
Bureaux	0.2	0.3	0.2
Entrepôts-Transport	6.3	3.8	5.0
Total	0.9	0.8	0.7

Source : Toilier et al., 2019

For B2B, ‘delivery intensity’ has not increased nor decreased

- **B2B: ‘’delivery intensity’’** of Bordeaux businesses has slightly decreased (from 0.9 to 0.8 /week/job)
- Total number of deliveries in the metro area has increased by 12% (same as local GDP)
  - Office activities: from 10 to 18%
  - Small retail: remained at 25-26%

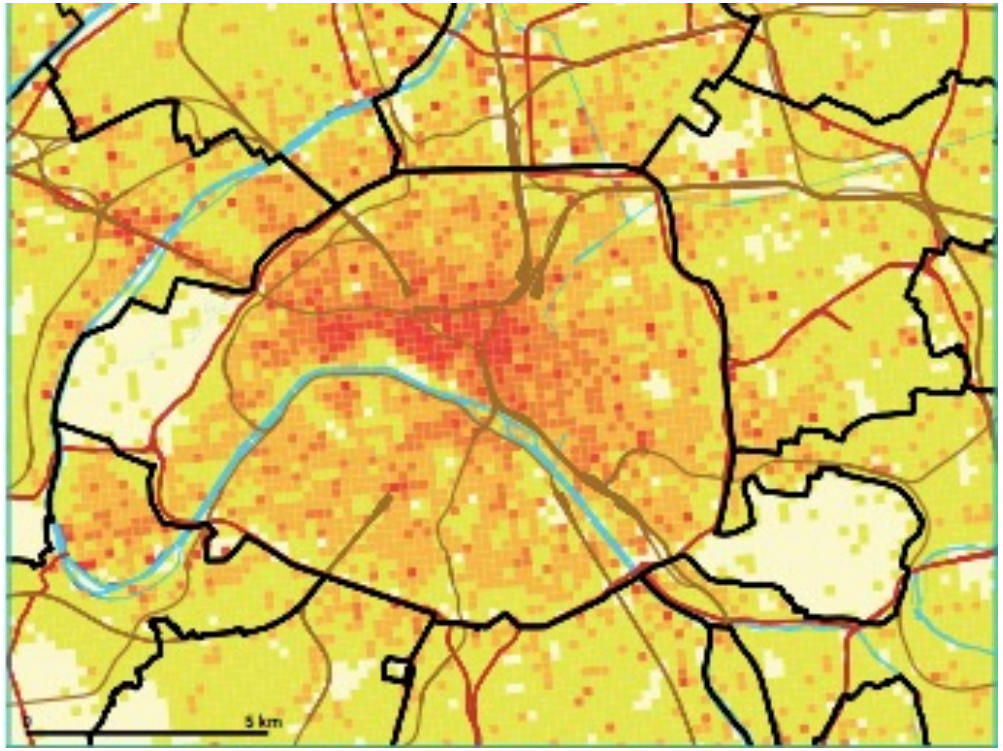
Paris region, freight share of transportation related emissions

	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 et al., 2018

Concentration of deliveries and pick-ups generated in daily average in Paris

B2B



B2C

Coulombel et al., 2018, data from 2010 (LAET)

E-commerce mobilities: the great unknown

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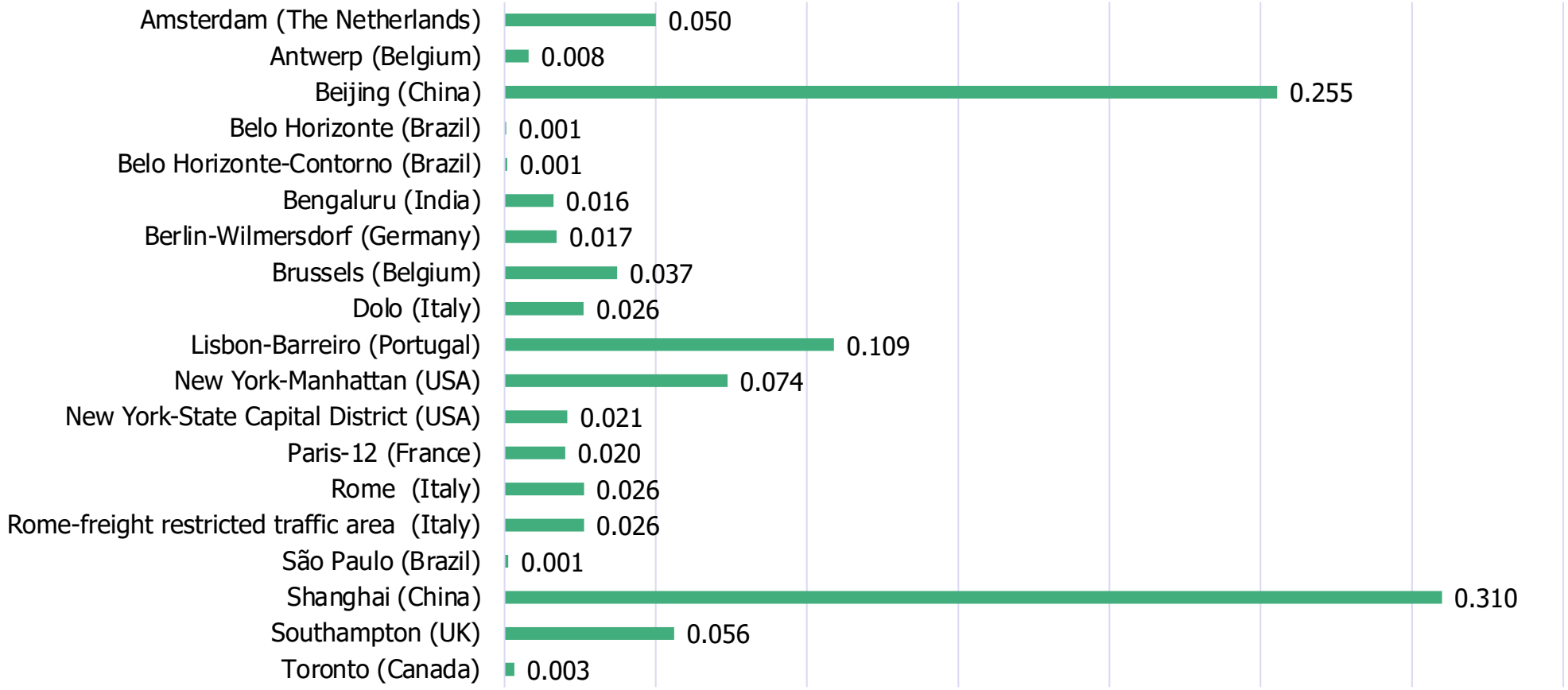
B2C deliveries per capita per day (Buildeo Rai & Dablanc from meta-analysis of literature and various business sources)



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Rough estimates?

- *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"

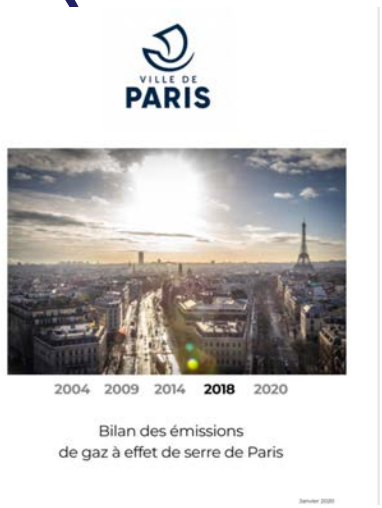
  = 0.04 parcel per day per person (six times less)

- A major survey made in Lyon in 2016 (LAET) = 0.02 parcel per day per person
- A future survey from a large research project ANR MOBS

Why get better data for urban freight?

- Support traffic management and city planning through better modeling of freight
- Monitor progress of an urban freight strategy
- Support decarbonization of freight through better impact assessments
- Provide tools for cost–benefit analysis of traffic regulations such as low/zero emission zones including positive and negative impacts on businesses
- Support better design of low/zero emission zones such as optimum size
- Stakeholder involvement:
  - Benchmark for freight companies
  - Freight joint strategy between all relevant local stakeholders, based on actual diagnostic and good data (build trust)
- Modeling/simulation of alternative city logistics models

Carbon footprint of freight for city of Paris (2020, with 2018 da` `



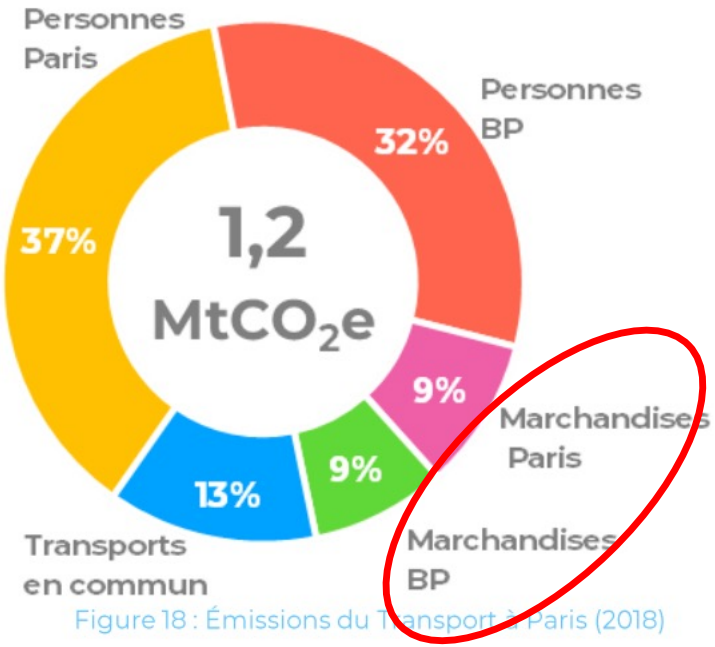


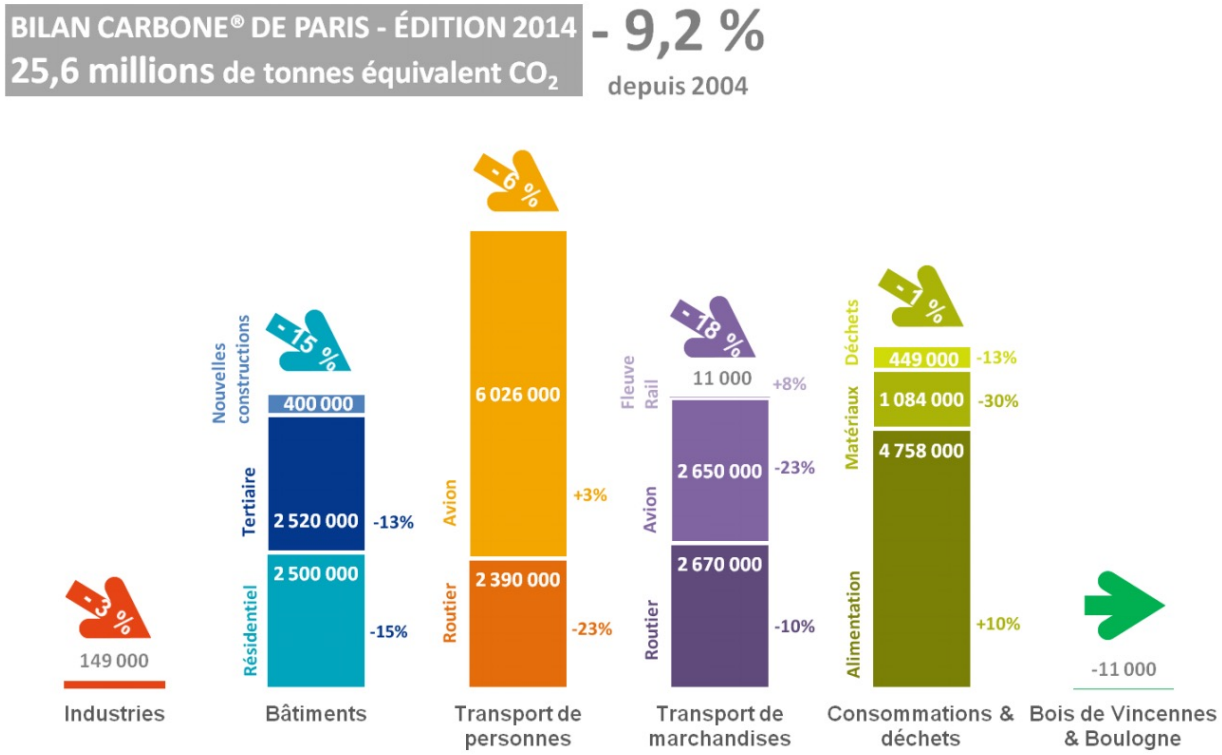
Figure 18 : Émissions du Transport à Paris (2018)

- **Global CO_2** emissions from freight in 2018 (including what is imported to be consumed by Parisians): 5 Mt (21% of all carbon footprint of Paris)

- **Local CO_2** emissions from freight in 2018: 1.2 Mt
- 18% of total traffic CO_2 emissions

Comparing 2004-2014

- CO_2 emissions from urban freight ‘’decreased by 18% between 2004 and 2014” (official 2017 Carbon Footprint Assessment, City of Paris)



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Local emissions from freight transport were underestimated mostly because delivery vans were under-estimated

Data came from:

- the LAET B2B urban freight survey which dates from 2010 and does not take into account B2C deliveries
- the national “Light Commercial Vehicle use survey”
  - latest is from 2010 with much less B2C traffic
  - represents data for whole of France thus overestimating LCVs used by private individuals
- Local "plate surveys," which do not make it possible to distinguish between the different types of LCVs (many used by craftsmen or private individuals)

Motorized two-wheelers for delivery not taken into account in Paris carbon footprint assessment

- In Paris, 36% UberEats and Deliveroo couriers use a moped (Feb 2021)

New methods for urban freight data collection: a key issue for local planning

- Urban freight surveys are comprehensive but too expensive
- New ways of collecting data: a major area of progress for research and modeling of goods flows
- Data from telecom operators
- Data from logistics operators, e-retailers, delivery apps
- Data from municipal agencies
  - Automatic number plate recognition cameras for traffic enforcement
  - Open-access data such as a local bike-sharing service

Data from telecom operators

Les Echos

CONNEXION

À la une | Idées | Économie | Politique | Monde | Tech-Médias | Entreprises | Bourse | Finance - Marchés | Régions | Patrimoine

Les vrais chiffres du périphérique parisien

Une étude de Roland Berger invite les élus à définir les politiques de mobilité en Ile-de-France en fonction de la demande et non plus de l'offre. Elle suggère la création d'une nouvelle autorité régulatrice et des voies dédiées au covoiturage et aux transports collectifs.

Lire plus tard | Tourisme - Transport | Commenter

- A study by Roland Berger and Kisio in March 2020 using data from Orange (French main telecommunication operator)
- Huge misinterpretations due to lack of truck identification in telecom data
- Efforts to recognize 'freight behaviors' in mobility data

Open-access data from municipal services

- Bike-sharing public service in French cities
  - Many electric bikes now used for instant deliveries
  - Mobility pattern of delivery couriers on Velib ‘’should be quite easy to single out” (E. Côme, GRETTIA)
  - Trip routes, places of pickup and delivery, volume of activity can be identified via AI

ANPR data

- ANPR: Automatic Number Plate Recognition
- ANPR cameras to enforce low emission zones: UK, Italian, Spanish, Dutch, Scandinavian cities
- France just authorized them (2021) but under very strict conditions, no data can be used
- Transport for London: "The cameras used to enforce our Road User Charging schemes (Congestion Charge, Low Emission Zone and Ultra Low Emission Zone) capture number plate data in the form of text rather than images - a still photographic image is also captured and used for evidential purposes if a Penalty Charge Notice (PCN) is issued"
- City of Amsterdam: once a year, one month of ANPR data is studied for research/modeling purpose
- Privacy issues prevent the use of more (or of ''live") data
- Swedish cities: use of ANPR data for research has not yet been authorized "it is really a pity to not be able to use data that is actually there" (representative of City of Gothenburg DOT, March 23, 2021)

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.

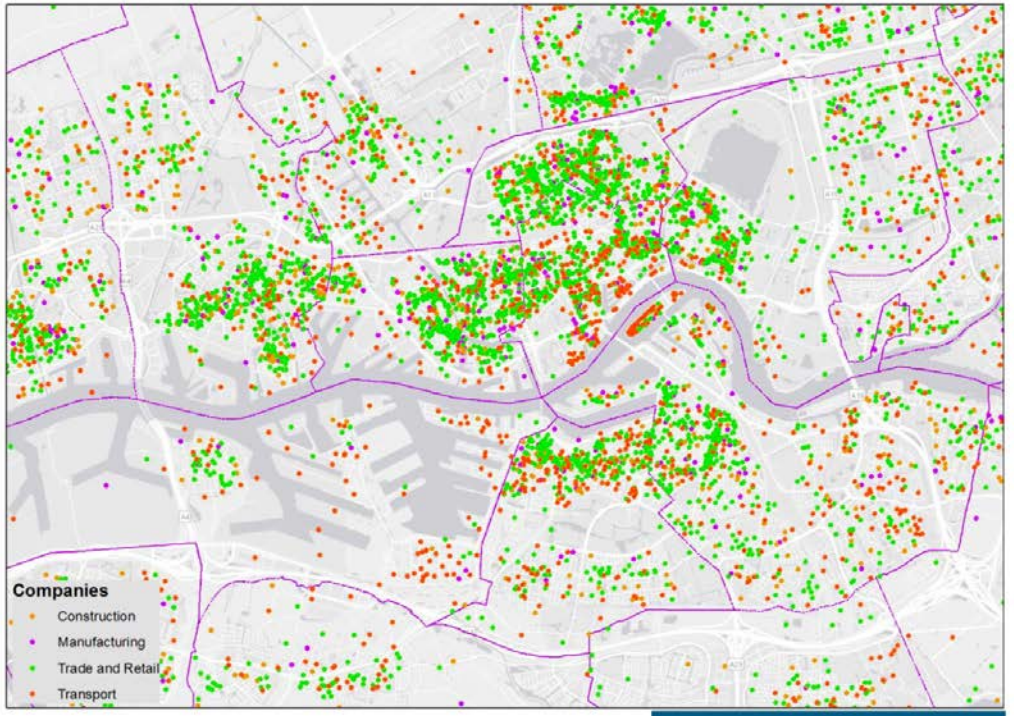
Similar research is being undertaken by University College London to understand how infection risk would vary according to different levels of crowding using encrypted CCTV data alongside data from surface and air sampling. Anonymisation techniques are applied to prevent identification of individuals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

Data sharing, partnerships with freight operators

- French legislation imposes data sharing from operators or new mobility services but freight data is not mentioned
- Universities go operator per operator (DB Schenker with us recently)
- Rotterdam: 80 largest freight companies must provide their delivery location data every week to the city

Allocation of deliveries to companies (Rotterdam)

CBS representation of the 80 biggest transport companies



significance
quantitative research

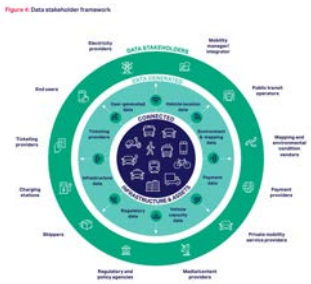
ROTTERDAM UNIVERSITY
UNIVERSITY OF APPLIED SCIENCES

KENNISCENTRUM DUURZAME HAVENSTAD

- Dutch cities must implement zero emission zones that include freight by 2025
- They include a plan for a shared data model with potential benefits and incentives for companies sharing data such as prioritised access
- In 2019 Rotterdam established the Roadmap Zero-Emission City Logistics strategy

World Business Council for Sustainable Development recent report on mobility data sharing

"The movement of goods is increasing in importance, as the rapid growth of e-commerce and to-your door delivery has led to more carrier fleets in city streets. The combined impact is staggering – in China for example, daily parcel deliveries are on track to hit 145 million by the end of 2020, nearly tripling from 57 million in 2015.46 All of those delivery vehicles have a significant impact on congestion and emissions."



On the microeconomic side, some solutions to decarbonize urban freight transport

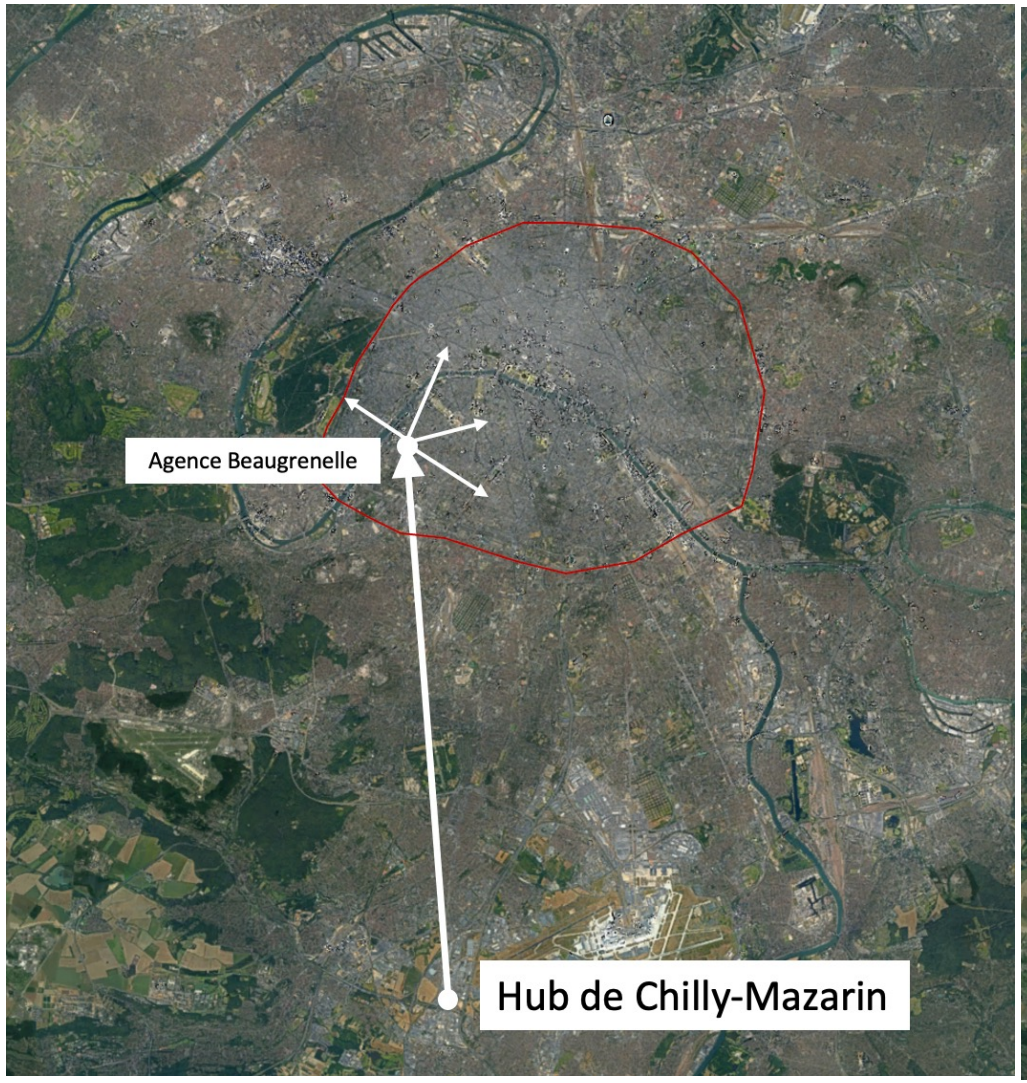
- Solution 1: consolidation
- Solution 2: change of fleet
- Solution 3: regulation and pricing
- Solution 4: CSR, corporate strategies

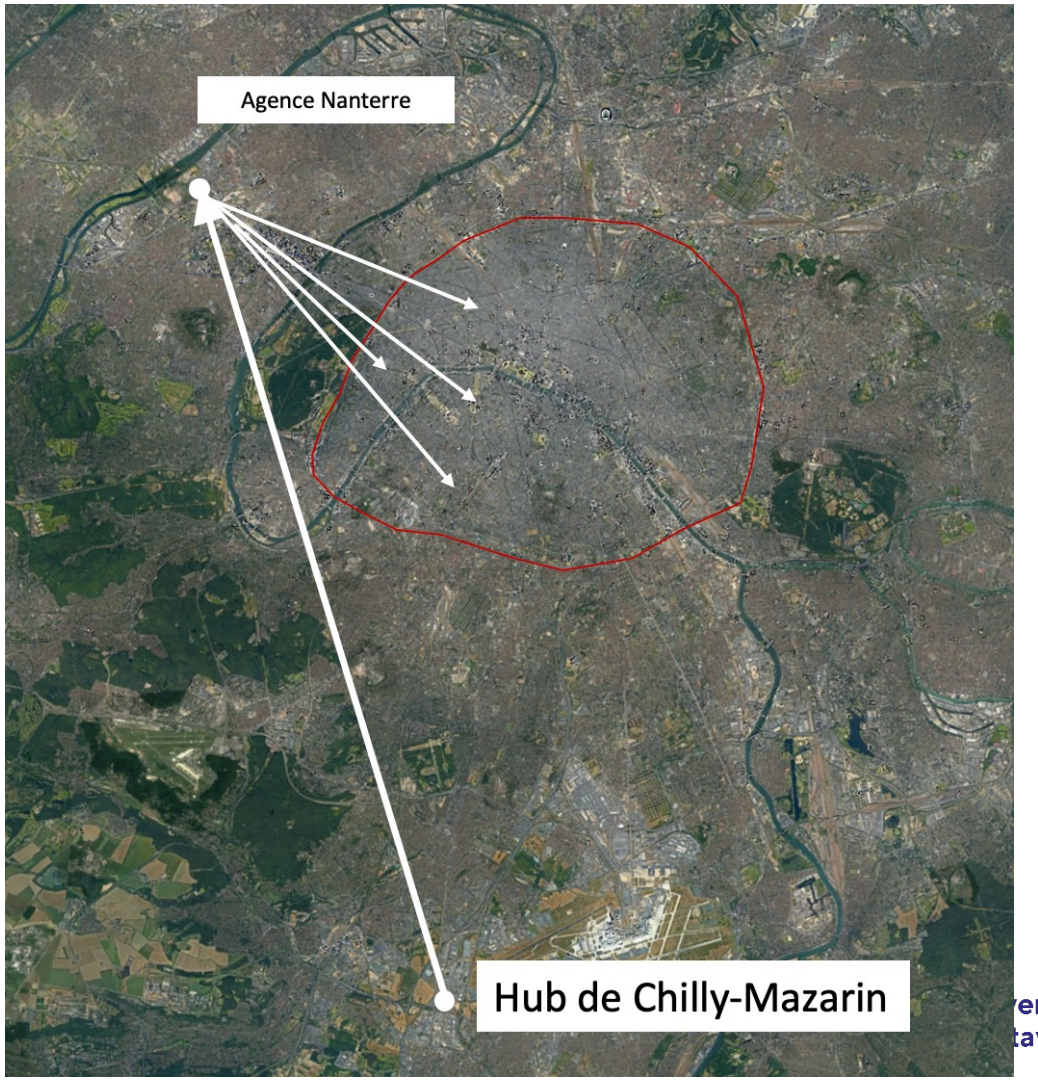
1: Consolidating, going as close as possible to final destination

WITH an urban hub

WITHOUT an urban hub

-51% CO_2 emissions





Jonction 2017

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

Tokyo

Brooklyn

Paris

Hôtel logistique de Chapelle international (18e arr.) inauguré en juin 2018. © JGP

2. Change of fleet: a huge increase in cycle-logistics in Paris

International Cargo Bike Festival Groningen

June 14-16th 2019

One of the main advantages: access to bike lanes (and 'corona-lanes')

Average carbon footprint (life cycle) of vans and trucks, France

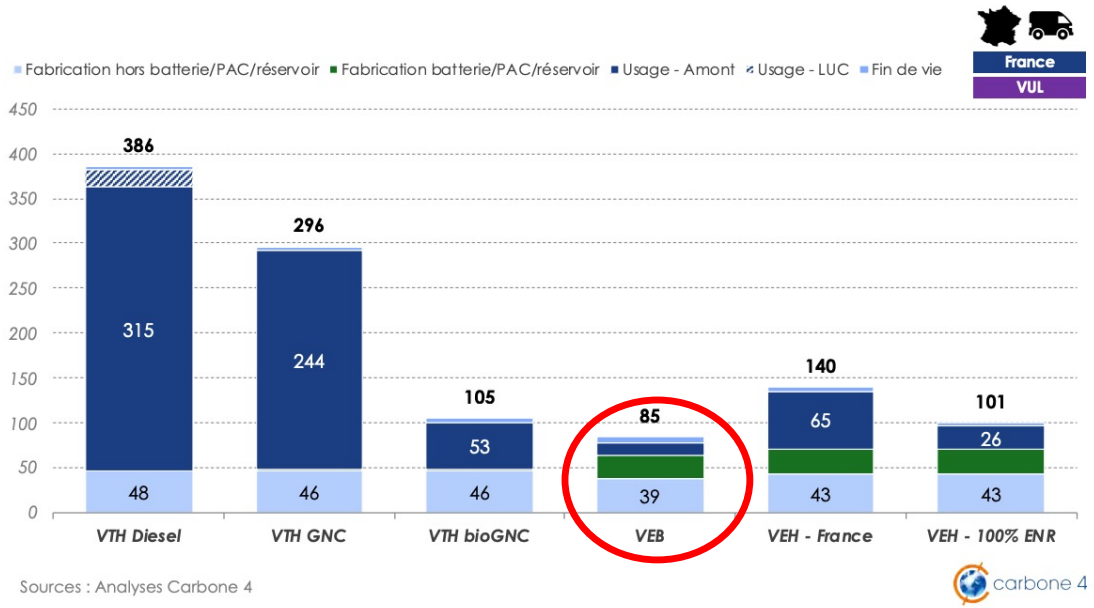

Figure 9 – Empreinte carbone moyenne sur la durée de vie d'un VUL vendu en 2020 France | gCO2e/km

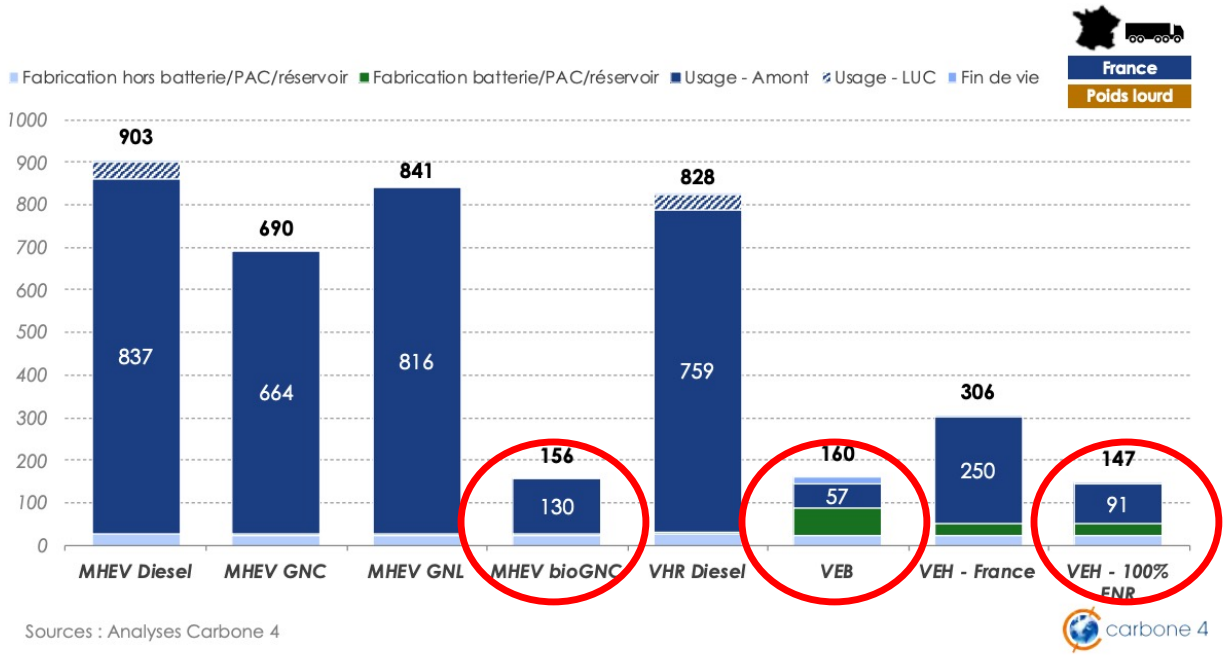

Figure 15 – Empreinte carbone moyenne sur la durée de vie d'un tracteur routier vendu en 2030 en France | gCO_2e/km

Carbone 4, December 2020

Abréviation	Signification
FE	Facteur d'Émissions
GES	Gaz à Effet de Serre
EnR	Énergies Renouvelables
VTH	Véhicule Thermique
VHR	Véhicule Hybride Rechargeable
VEB	Véhicule Électrique à Batteries
VEH	Véhicule à Hydrogène (Pile à Combustible)
GNV	Gaz Naturel Véhicule
GNC	Gaz Naturel Comprimé
GNL	Gaz Naturel Liquéfié

Electric vans: help small companies acquire them

In 2020 in France :

+ 159% new electric cars

+ 10% new electric vans

(AVERE)

According to sources:

- TCO is OK after 5 years
- TCO remains +10%

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Zero emission trucks are still too expensive

First customer of full-electric Volta Zero signs multi-million pound deal

October 2, 2020 Chris Tindall

Tesla Semi : le camion électrique livré à partir de 2021

Lorries represent a third of deliveries in French cities

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3. Regulate and price

- Euro standards: Euro 1 to Euro 6
- Euro 7 expected by 2025 (could end Diesel for some vehicle types?)

Vans

Lorries

Euro standards and certificates on air quality in France

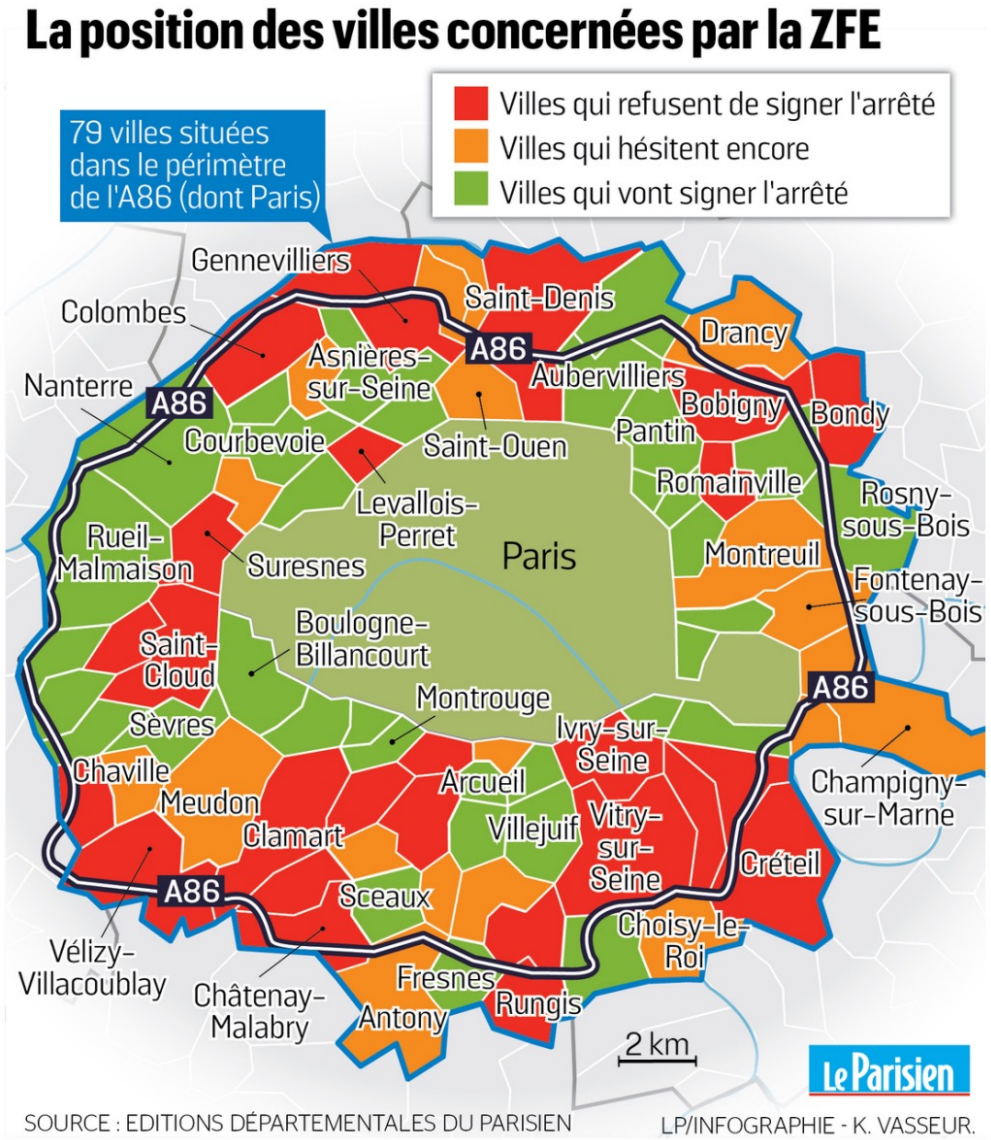
London Low Emission Zone

- All the metropolitan area, Euro IV and Euro VI (different fines)
- *Ultra Low Emission Zone* in the centre (Euro 6) extended in October 2021
- Three *Zero Emission Zones* by 2025
- Very well enforced by ANPR cameras

Monitoring CCTV

Low emission zone in Greater Paris

- Fragmented
- Poorly enforced



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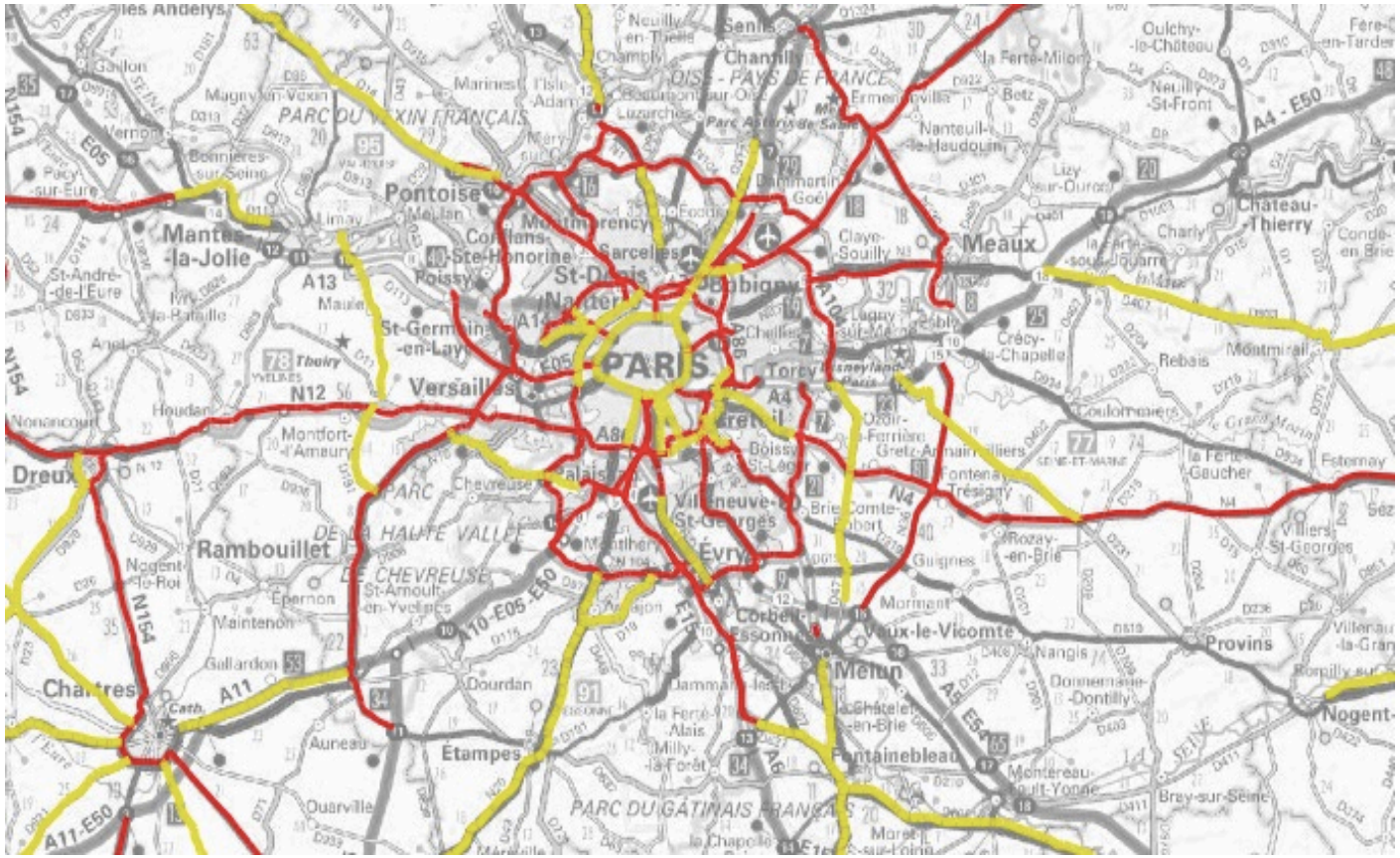
Not many urban truck pricing systems

- In urban areas: Oslo, London, Stockholm, Milan
- Heavy Vehicle Fee in Switzerland is also for urban roads
- Abandoned 'ecotaxe poids lourds' in France in 2014



'Ecotaxe poids lourds': roads that were targetted in the Paris region (all yellow and red roads)

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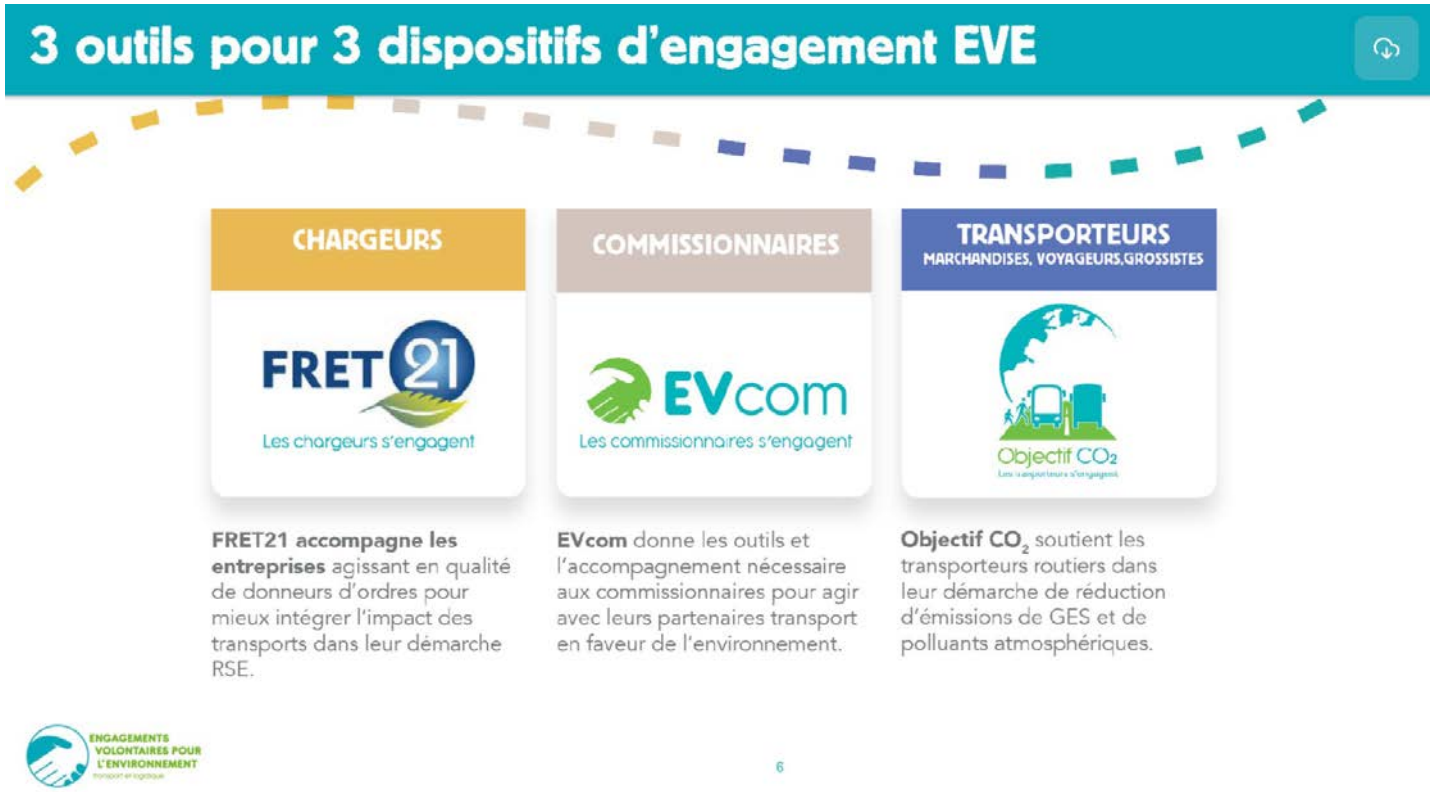
4. CSR (Corporate Social Responsibility)

Three programmes in France to support freight companies in decarbonizing



- However only 1200 trucking companies have adopted a charter and only 35 have obtained a label, over 35,000 trucking companies in France

GLEC: an international method for large companies

- GLEC : Global Logistics Emissions Council
- https://www.smartfreightcentre.org/en/

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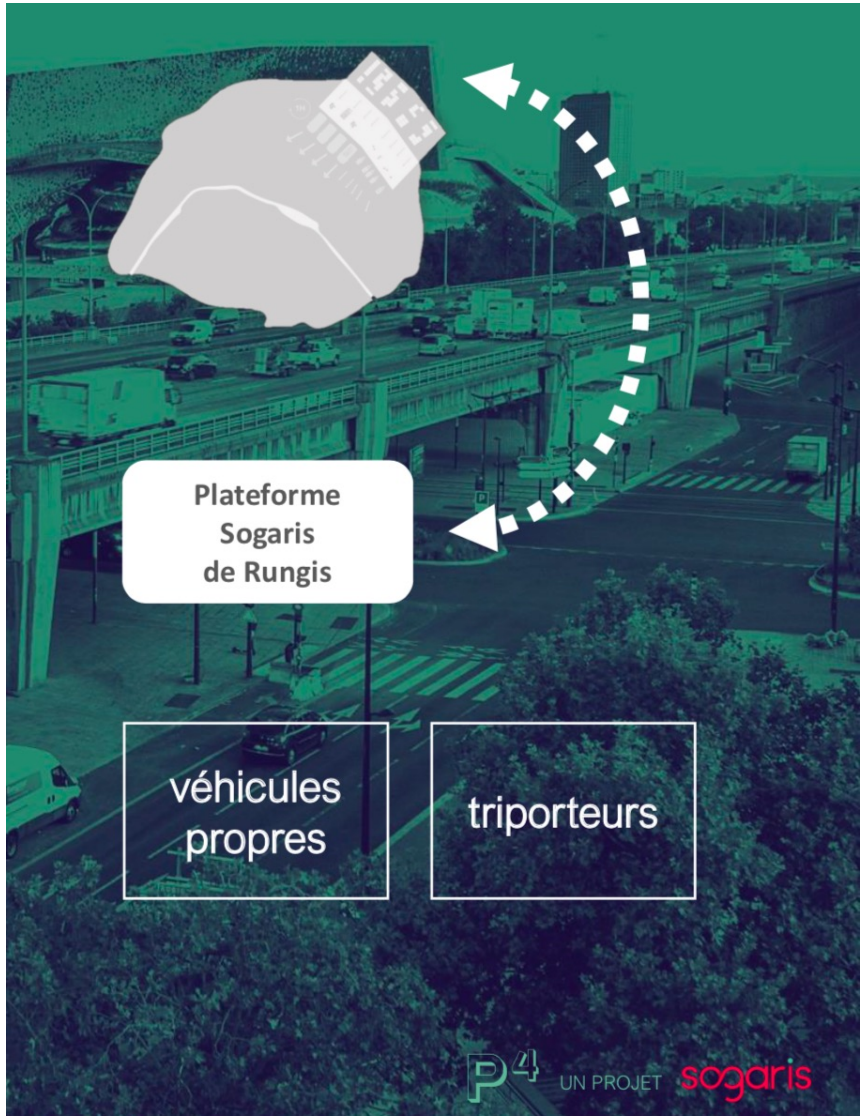
Urban logistics hub under Paris ring-road
Opened in December 2020 to client Ecolotrans



Corporate data management can also lead to *more* deliveries

Q commerce (quick commerce)

- Ocado in the UK uses a warehouse technology through which a thousand robots can process 65,000 online food orders per week
- Cajoo.eu in Paris: delivery in 15 minutes
- Gorillas.io In Germany: delivery in 10 minutes
- Alibaba: deliveries in 5 minutes with *lead warehouses*, small proximity warehouses that store goods most likely to be in demand
  - Managed by AI and by pre-delivery of most popular products
  - Use of Taobao's recommendation system coupled with the use of internet influencers presenting products live

Ressources

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