

Commercial Goods Transport, Paris, France

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Introduction

Paris as a case study typifies some of the most common characteristics of urban freight in European cities, especially the importance of commercial goods transport's impacts on the urban environment (local air pollutants and CO₂ emissions, noise and congestion), and emerging city logistics initiatives and policies for a sustainable urban goods distribution. Since the early 2000s, the city of Paris has engaged in a freight-oriented transport policy. Today, despite difficulties and some failures, Paris can be considered one of the most active European cities in the field of urban freight management. In the first section of this case study, geographic and economic data are provided showing their relationship with freight flows. The specific experience of French cities in urban freight data collection is presented, including the use of the Freturb model. In the following section, Paris' freight flows and their environmental and social impacts are detailed. A focus is made on 'logistics sprawl', the spatial relocation of logistics facilities to suburban areas. The last section presents urban freight policies and provides information on the difficulties encountered by the city of Paris to implement them, so that other cities benefit from a complete experience.

Background: Country and City Profiles

Country profile: France

A country of 65 million people, France has a GDP that ranks fifth in the world. Like most developed economies, the French economy is mostly based on the tertiary sector (82 per cent of the working population), but it retains important strongholds in specialized manufacturing industries such as car manufacturing, aeronautics, transport, construction, and food-processing. France is the second most attractive country in the world in terms of foreign direct investments.¹ This is partially linked to the country's good infrastructure (including highways and high speed rail). However, France ranked only 17 in the World Bank 2010 *Logistics Performance Index*, which compares 150 countries in the world. This relatively poor performance is mostly due to administrative inefficiencies in activities such as customs clearance and international shipments.

Freight transport in France relies mostly on road, which accounts for 83.5 per cent of tonnes-km (9.5 per cent rail, 2 per cent waterways, 5 per cent pipelines).² Despite successful new rail companies since market deregulation in 2006, the share of rail has decreased rapidly since the 1990s, contrary to other countries such as Germany or Sweden.

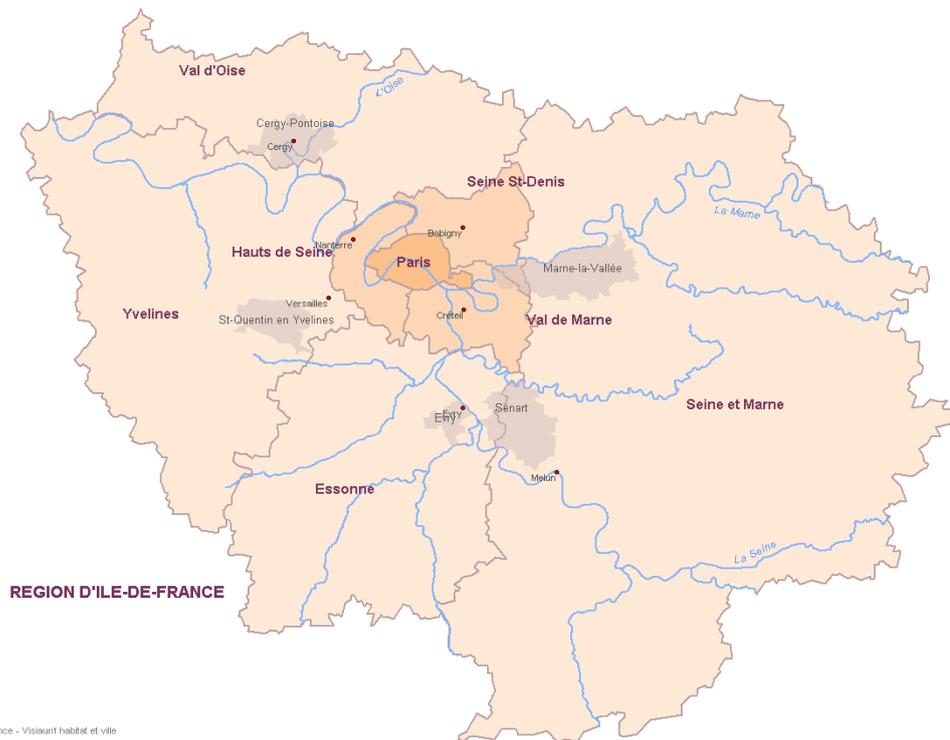
Region's profile: Paris and the Ile-de-France region

The city of Paris lies in the northern central part of France. It has a population of 2.2 million and 1.6 million jobs. Paris is at the core of the *Ile-de-France region*, among the largest and most economically developed metropolitan areas of Europe.

1. AFII, 2010.

2. 2009 data, source: French Ministry of Ecology (www.statistiques.developpement-durable.gouv.fr/fileadmin/documents/Produits_editoriaux/Publications/Reperes/2011/Repères%20Chiffres%20clés%20Transports%202011%20-%20mai%202011.pdf, last accessed 16 June 2011).

Map 1. The Ile-de-France Region



Source: Courtesy of Institut d'aménagement et d'urbanisme d'Ile-de-France.

Ile-de-France is an important logistics hub, concentrating 17 million m² of warehouses (DREIF, 2009) representing a fourth of the French warehousing market. Ile-de-France is by far the first pole of concentration for warehouses over 10,000 m² in France. Freight and logistics activities directly employ 102,700 people in the region.³

Two-thirds of shipments coming in and going out of the metropolitan area of Ile-de-France go through a regional terminal in order to be transhipped and reorganised (Dablanc and Routhier, 2009): this shows the key role played by logistics terminals in large metropolitan areas such as Ile-de-France.

Historically, the city of Paris grew around the river Seine, but today, waterways carry only 6 per cent (22 million tonnes) of the Paris region's freight and 7 per cent (2.5 million tonnes) of the city's freight.

The economic base of the city of Paris is quite specific compared to the rest of France. Paris' GDP is 120 per cent higher than the country's. The city concentrates high-level services to businesses, administration services, research and education. Public jobs in teaching and medical care are important in numbers. A small manufacturing activity still remains, (in printing-publishing, garment and leather industries).

Paris has a very high commercial density. It hosts many independent retailers and food stores, and a high proportion of hotels, cafés and restaurants, following the vocation of Paris as the number one touristic city in the world. More recently, large size specialized stores were introduced in Paris whereas they used to concentrate in suburban environment, such as DIY (Do It Yourself), or sportswear. Many business clusters concentrate trades pursuing a similar

3. Data provided for this report by INSEE in 2009.

activity, such as garment production or furniture retailing. Finally, Paris is famous for its large department stores (Galeries Lafayette).

All these categories are quite specific to Paris compared with the rest of France, or at least are much more concentrated in Paris. They generate specific and sometimes problematic patterns of deliveries (Dablanc et al, 2010), as presented in section 3.

Urban freight data collection in the country and modeling efforts

In 1993, a ‘National Program for Freight in Cities’ was established by the French Ministry of Transport. Urban Goods Movement (UGM) surveys were carried out in different cities by the Laboratoire d’Economie des Transports (LET) in Lyon (Routhier, 2002). The originality of UGM surveys is that (1) They are comprehensive (2) They are based on an analysis of the *urban freight demand*, through an ‘establishments’⁴ survey (see below). The main drawback of these surveys is their cost. To promote cheaper data collection, a simulation model called Freturb was also designed (see below). The first UGM surveys were done in 1995–1997 in three cities. A second phase started in 2010, with a major survey implemented in the Paris region, at a total budget of one million euro. Between 1995 (the first surveys) and 2013 (the planned end of the current UGM surveys), about 30 French cities will have collected freight data substantially, many using the Freturb model.

The Freturb model describes current urban freight demand and simulates future demand based on policy and economic scenarios (Ambrosini et al, 2010). It identifies detailed delivery and pick-up patterns of urban establishments. The model is interesting in that it is not based on freight origin-destination matrices, which are not relevant for estimating delivery tours (which make up 75 per cent of the total pick-ups and deliveries in a city). One key finding of the surveys is that a French city generates approximately one goods’ delivery or pick-up per week per job. The following variables have a strong impact on the generation of freight flows: land uses, the type and location of activities, truck access and parking regulations, and changes in logistics and supply chain management.

Urban Freight Flows and Their Impact upon Paris

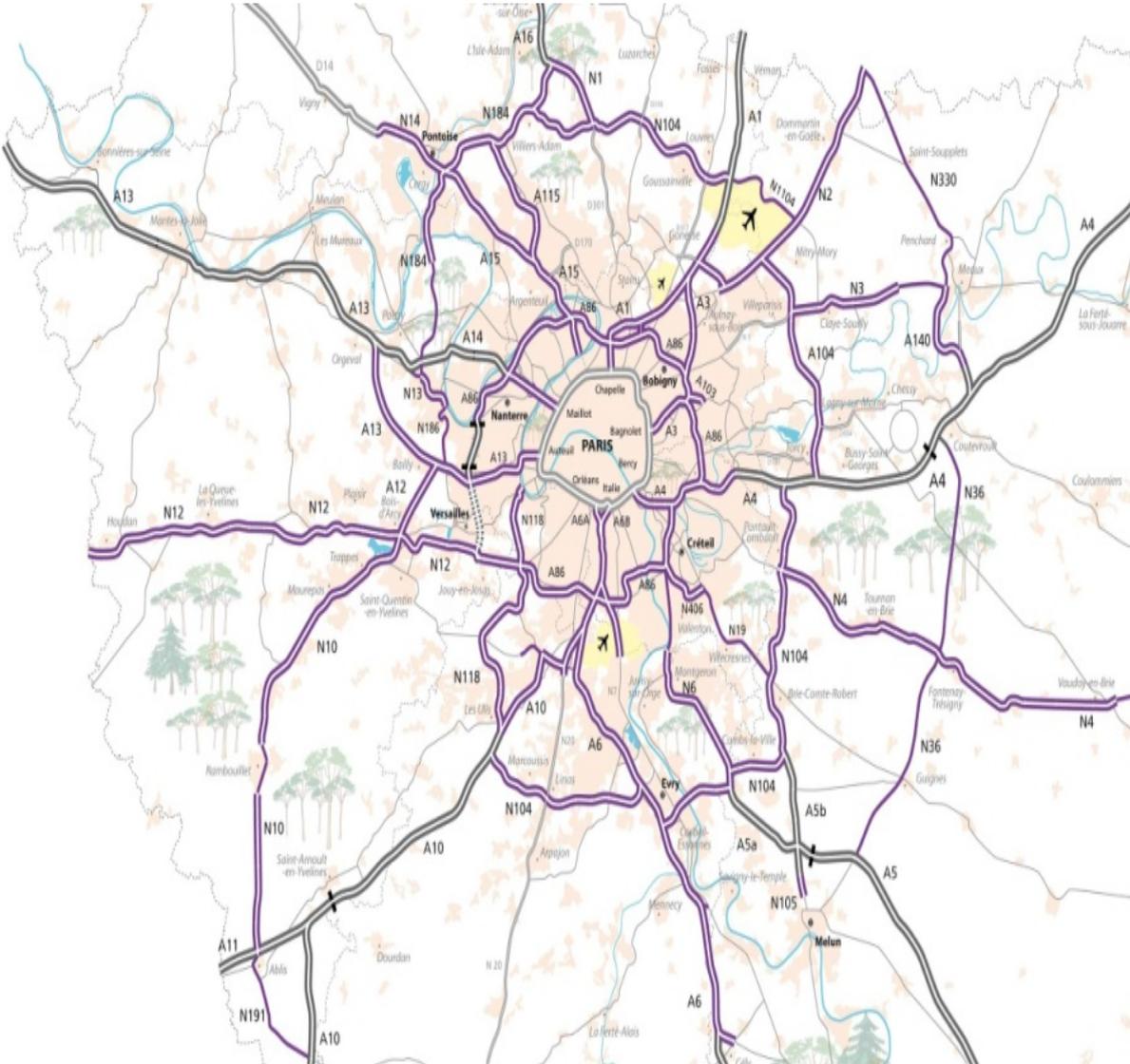
Truck movements, freight flows and logistics sprawl

Each day, more than 80,000 trucks enter or leave one of the 17 highway toll plazas surrounding the dense area of Ile-de-France (DREIF, 2006). Paris is surrounded by three ring roads (Map 2), all of which (including the most central one, called the Peripherique, delimitating the city of Paris) are heavily used by trucks, even international ones that are just crossing the Ile-de-France. Delivery trucks have difficulties accessing the city because of highway congestion. However, once inside the city’s walls, vehicles run more easily in the streets of Paris than a few years ago. This is due to the successful municipal policy of car use reduction (-27 per cent vehicles-km/hour on average between 1999 and 2008, according to the city of Paris’ data). The share of commercial vehicles increased as a consequence: from 9 per cent to 14 per cent of all vehicles on average.

Another important feature of urban and regional freight transportation is what can be called ‘logistics sprawl’, the relocation of freight facilities and distribution centers in far away suburban areas (Dablanc and Rakotonarivo, 2010). Logistics sprawl has been quite important

4. An ‘establishment’ is a single business location of a company: it can be a shop, an office building, a factory for example.

Map 2: Main radial highways and ring-roads surrounding Paris

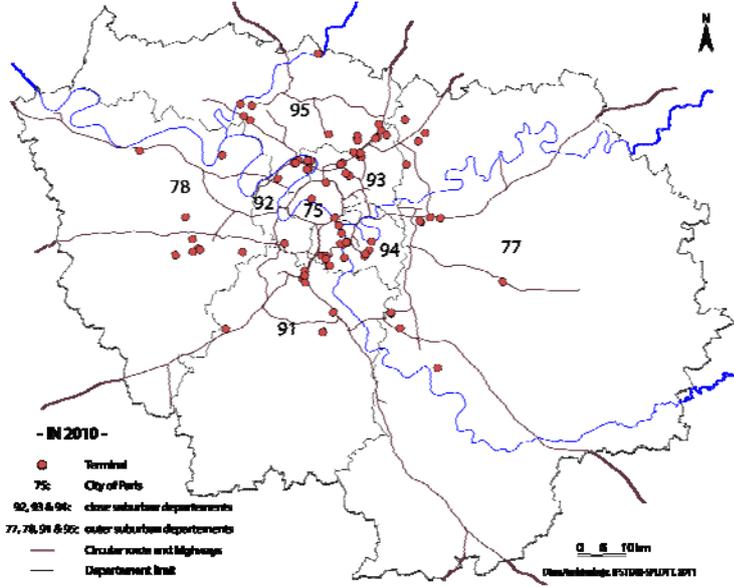
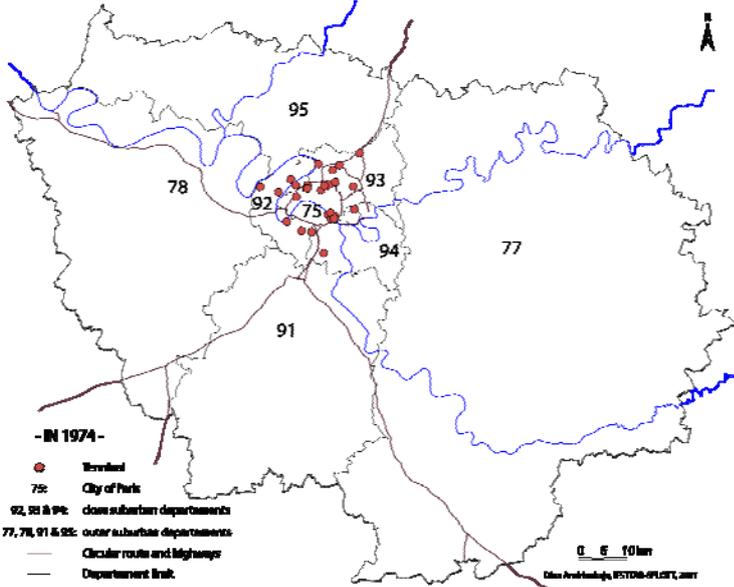


Source: courtesy of Direction des routes IDF, 2006.

in the last thirty years. Terminals that were used for freight transport and logistics activities in the 1970s and 1980s have disappeared from Paris and close-by municipalities (Maps 3 and 4). Economic activities in general have not dispersed as much as logistics facilities. This has increased distances for delivery trucks to reach destinations, adding a lot of vehicle-kms to the regional traffic. For the case of less-than-truck-load and parcel transport services, it was calculated that more than 16,000 tonnes of CO₂ every year are directly generated by logistics sprawl (Dablanc and Rakotonarivo, 2010).

Using the FRETURB model (see above), and taking into account industrial and commercial densities in Paris and the Paris region, it can be calculated that every day, about one million deliveries and pick-ups are made in the Ile-de-France region. More than one third of these occur in the city of Paris, i.e. there are about 350,000 deliveries or pick-ups occurring every day in the Paris streets. A more detailed perspective about these flows will be available when the Urban Goods Movement surveys for Paris and the Paris region are completed (2012–2013).

Maps 3 and 4 – Logistics sprawl: location of LTL and parcel transport terminals between 1974 and 2010 in Paris



Source: Dablanc and Rakotonarivo, 2010.

Independent retailing, including local convenience stores, are still very important in Paris. These local stores are supplied three to ten times a week. Suppliers are diverse, with a predominant use of own-account vans (or private cars), many of them going to suburban wholesale stores or the Rungis wholesale market for fresh food close to the Orly airport (eight kilometer south of Paris, see Map 2). As opposed to independent stores, chain retailers and commercial centers tend to have less frequent deliveries, a larger share of consolidated shipments, with larger and better-loaded vehicles.

Less than truck load (LTL) operations and parcel and express transport services have a very important share of Paris freight- about one fourth of total deliveries and pick-ups. This industry uses large vans or small to medium-sized trucks, and is based on consolidated delivery tours departing from cross-dock terminals in suburban areas. A sub-sector of the

parcel transport business is home deliveries. The on-line shopping market represented 6 per cent of all retailing in Paris in 2009.⁵ La Poste, the French national postal operator, and express carriers such as DHL, dominate this market, but new players are emerging: Morin, Ciblex, Star's services (see below). Paris is especially dynamic relative to 'cybermarkets', or on-line grocery retailing (CROCIS, 2010).

Deliveries to building sites are a key segment of urban freight because of the tonnage they generate (up to 30 per cent of all tonnes carried), and subsequent road damages. Building sites' supply is notoriously inefficient. Multiple suppliers and poorly planned delivery schedules lead to a high number of deliveries, queuing, and general disorder on the sites.

Open-air food markets (on squares and boulevards' sidewalks) are very active in Paris. No data exist on the actual volume of freight flows generated but these markets require specific efforts by municipal officers to clear on-street parking spaces the night before, so vendors' vehicles can park. Local markets are quite efficient in decreasing the environmental impact of shoppers' trips (as shoppers usually walk). However, local and regional truck traffic to serve these markets can be quite significant, and these trips are generally poorly consolidated.

Environmental impacts of commercial transport in Paris and Ile-de-France

A detailed impact study made for the Ile-de-France region (LET and Aria Technologies and Systems Consult, 2006) showed that freight transport generates between 20 per cent and 60 per cent (according to the pollutants) of local transport-based pollution in Ile-de-France (Table 1).

Table 1. Percentage of trucks' emissions in total transport related emissions* in Ile-de-France

	CO ₂	SO ₂	NO _x	PM ₁₀
Trucks	26%	43%	38%	59%

Note: Transport related emissions vary according to the pollutants. For CO₂: 33%; for SO₂: 3%; for NO_x: 58%; for PM₁₀: 13% (CITEPA, 2010, data are for France for year 2008)

Source: LET et al, 2006.

Nitrogen oxides (NO_x) and particulate matter (PM) are pollutants for which urban freight has an important responsibility, because urban commercial fleets are quite old (Dablanc, 2008). Both pollutants are very harmful to the health of Paris residents, and their concentration tends to be stable or even increase: in 2009, the air in Paris exceeded the limit values⁶ set by the European Union for NO₂ and PM₁₀. According to Airparif, the agency in charge of monitoring air quality in Ile-de-France, among the five most worrisome pollutants, four are strongly related to commercial traffic: NO₂, PM₁₀, PM_{2.5} and ozone (Airparif, 2010). In 2011, the city of Paris was designated one of the six future experimental French 'zones for priority action for air' by the French agency for the environment. This will encourage city officials to restrict access of old commercial vehicles.

5. My own estimates according to data for France provided by FEVAD and Center for Retail Research (www.retailresearch.org/onlineretailing.php, last accessed 20 January 2011).

6. Limit values are limits for pollutants set by the European Union and generally expressed in micrograms/m³.

Congestion caused by vans and trucks, especially due to double parking, can be important although specific data is missing for Paris. Noise also represents a severe environmental impact of freight transportation in cities. There are no available data for Paris but studies on other French cities showed that during the morning rush hour, the circulation of freight transport vehicles added five decibels to the noise from the circulation of private cars (LET Aria Technologies and Systems Consult, 2006).

Another important issue is road safety. Trucks have a low share of accidents in cities but the accidents involving them tend to be serious. The conciliation of truck traffic with a rapidly increasing bicycle use has been a recent cause of concerns in Paris, following much publicized fatal collisions.

Social and labour issues in freight transport

Subcontracting is a key pattern of the organisation of urban deliveries. It means that last mile transport and the actual delivery of a shipment are made by a different operator from the one formally hired by the shipper. Subcontractors are cheaper and more flexible in complex urban environments, and the rate of subcontracting increases with the size of cities. In Paris, up to 60 to 100 per cent of urban freight operations in express parcel transport are subcontracted to small operators, even for very integrated companies such as United Parcel Service.⁷ Illegal practices such as the hiring of undeclared workers are not an uncommon feature of urban transport outsourcing. An unverifiable figure, but the discussion of which among freight organizations reveals the amount of concern within the industry, is the following: out of 12,000 small operators delivering goods in Paris, half do not have a valid transportation business license, therefore operate illegally.

Small operators' activities are often associated with the use of old (thus more polluting and noisy) vehicles, and with drivers who exceed the authorized driving time (leading to tiredness and a greater frequency of accidents). Urban delivery workers are often the least regarded workers in the trucking industry. Wages are low, while the work is stressful. Staff turnover rates can be high, leading to difficulties in providing a good service and employees' poor compliance with traffic and parking rules. This generates a high level of violation fines for companies. The share of urban deliveries done without a proper employment contract is high, leading to poor working conditions and social insurance problems in case of accidents.

The development of courier services or fast food home deliveries on motorbikes has also led to more difficult working conditions. Drivers are often paid on the number of deliveries they perform each day, leading to risky behaviours such as fast driving and the neglect of basic safety rules in order to perform as many deliveries as possible in one day. They can face financial penalties if the delivery is not made within a specified amount of time to the customer.

Policies Towards a More Efficient Freight Transport in Paris

Objectives and goals

Since 2001, urban goods transport, long neglected in Paris mobility policies, has been brought to the municipal agenda as part of a new approach in transport planning. The main objective is to alleviate the environmental impacts of freight traffic, mainly related to atmospheric emissions (local air pollutants and CO₂). A second key element is a focus on innovations in

7. This figure was mentioned by the head of UPS France during an interview with the author in October 2009.

city logistics, so as to provide businesses with a choice of efficient and sustainable solutions for their urban supply chain.

To pursue these objectives, the city of Paris uses different types of tools, including conventional measures, i.e. measures focused on long-established targets of municipal policy such as traffic and parking ordinances; and more experimental measures, belonging to fields unknown to municipal decision-makers. A consultation process dedicated to freight transportation provided the ground for all subsequent policy initiatives.

Promoting consultation with private stakeholders: the Freight Charter

Two major institutions are active in consulting with the city of Paris on freight issues. The chamber of commerce of Paris has one freight expert, who is in constant contact with the municipality. The GATMARIF⁸ groups together the two rather antagonistic national carriers organisations, FNTR and TLF. GATMARIF also includes the SNTL, the representative body for transport companies that use vans.

A consultation in 2002 brought together the Deputy Mayor in charge of transport with freight transport stakeholders: those who generate flows (represented by the chamber of commerce and shippers' associations), carriers organizations (represented by the GATMARIF), rail stakeholders, energy providers, and public institutions. In June 2006, all the participants signed a Freight Charter,⁹ a document not legally binding but identifying commitments for each party. In 2009, a follow-up committee made an assessment of the Freight Charter's achievements. The most salient conclusions were the following (Dablanc et al, 2010). (1) Consultation helps defuse conflicts before they break out between parties (the city and carriers organizations) that usually never meet. (2) Enforcement of truck access and delivery regulations is quite insufficient, making it difficult to distinguish 'virtuous' transport companies from their less scrupulous competitors. (3) Land scarcity for logistics activities remains a major issue in Paris as well as in the inner suburbs. (4) Experimenting with new forms of city logistics organisation is effective in spreading ideas that promote changes in behaviour. (5) The relevant jurisdiction for policies is regional rather than local, as the organisation of freight flows ignores local municipal boundaries.

These conclusions constitute, as of today, the basis for the current reformulation of the Paris freight policy.

Regulating commercial vehicles' traffic and parking

The city of Paris has been regulating commercial vehicles for fifty years, as the first local ordinance on truck traffic was passed in 1961. Paris has always had quite complex truck traffic regulations, linking the trucks' characteristics, such as their surface, to specific time-windows. Today, the regulation is organised by two ordinances of 13 December 2006. The main rules that apply are the following:

- Vehicles that are 29m² or less in surface can circulate from 22:00 till 17:00.
- Vehicles that are more than 29m² in surface (with a maximum limit of 43m²) can circulate from 22:00 till 7:00.

8. GATMARIF: groupement des activités de transport et de manutention de la région Ile-de-France – groupment of transport and warehousing activities in the Ile-de-France region.

9. www.paris.fr/portail/pratique/Portal.lut?page_id=376&document_type_id=5&document_id=21016&portlet_id=1187, last accessed 2 January 2011.

- ‘Clean’ vehicles that are 29m² or less in surface can circulate 24/24. Clean vehicles are defined as the following: Euro V¹⁰ vehicles, electric and CNG vehicles.
- A vehicle can stay at a delivery area for 30 minutes only.

The city of Paris, therefore, promotes night deliveries (contrary to many other French and European cities) for large vehicles, and it reserves a specific delivery time-window in the late afternoon and evening for recent (built after 2009) and clean delivery vehicles.

Region-wide, there is a considerable lack of uniformity in truck access and delivery regulations. The Paris region is composed of 1280 municipalities, among them the city of Paris. All of these municipalities, some of which are extremely small, have the legal power to establish traffic and parking rules in their jurisdiction. This created a ‘patchwork’ of local rules for truck access based on vehicles’ size, weight, or surface, as well as diverging delivery time windows. There is no regional harmonisation of local rules, and it is difficult for truck companies to comply with them all.

The city of Paris undertook a major effort in reorganising the provision of on-street delivery bays and improving the use of the 10,000 existing bays, which were more often used for car parking than for delivery operations. A method was set up to quantify the needed number of delivery bays depending on the type and quantity of stores. The stopping time for delivery was limited to a maximum of 30 minutes. The time limit is controlled using a ‘parking time disc’ on which delivery drivers must indicate their arrival time.

Additionally, since September 2010, general parking has been allowed on delivery bays during the night (from 8:00 pm to 7:00 am) on 80 per cent of the delivery bays. The remaining 20 per cent have been identified as spaces commonly used by delivery trucks early in the morning (before 7:00 am).

A 2008 survey showed that the new strategy resulted in a better availability of delivery bays during the day. Long term parking on the bays decreased. Enforcement has increased considerably, with 13 per cent of illegal stops fined in 2008 versus only 1 per cent in 2004.

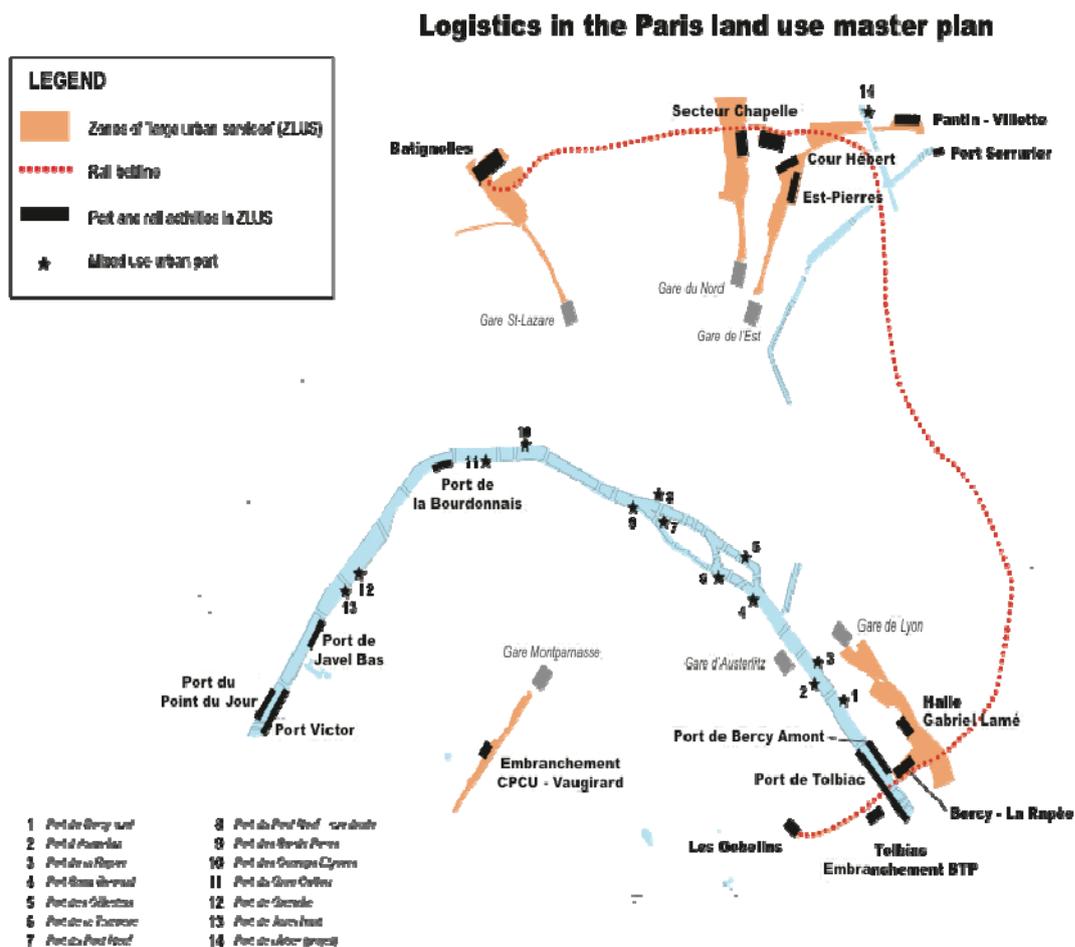
Paris urban land use master plan

Willing to experiment with new types of policies on freight, the city of Paris has taken new initiatives. One of them was to reincorporate some of its urban logistics facilities within the city’s walls, through the city’s land use master plan (*plan local d’urbanisme* or PLU).

There is now an obligation to set aside a delivery area on private land when constructing shops with a floor area of over 500m², hotels with over 150 rooms, and offices with a floor area of over 2500m². Specific zones accessible by rail have been reserved for logistics activities (Map 5). In future developments, these areas with direct access by train are required to accommodate logistics activities. Thirteen ‘part-time transit ports’ have been identified along the river Seine: they may be used at certain times to tranship goods from a boat to a delivery vehicle, then resume normal uses (promenade for example) for the rest of the day.

10. Euro emission standards set the limits for exhaust emissions of new vehicles sold in European countries. For trucks, the current standard is Euro V, the next standard, Euro VI, will be implemented in 2013.

Map 5: The 2006 logistics land use map of the city of Paris



Source: Levifve, 2008.

Experiments in city logistics, emerging concepts

The city of Paris supports innovative urban logistics organizations, by initiating and funding studies and providing space to set up 'urban logistics spaces' from which clean vehicles (electric or non-motorised) are used for the final distribution. The specific scheme is the following: the city organizes a bid for tender for the use of a municipal logistics space (usually an area located in an underground municipal car park). The best bidder is defined as the company providing the most innovative delivery service at the lowest environmental impact. As an example, in 2004, Chronopost, a subsidiary of La Poste group specialised in express parcel transport, won the bid organized by the city, and developed a new organisation based on a main transport link from a hub outside of Paris to the Concorde logistics space, and final deliveries using electric vehicles. The company uses a 1000 square meter facility located in an underground municipal parking lot below the Place de la Concorde, a very expensive location close to one of the busiest office and retail areas of Paris. The rental price of the underground logistics space is low.¹¹

11. The city of Paris decided to rent the Concorde underground facility at the average price of logistics facilities (most of them located in suburban locations). This average price is 60€/m²/year. A further reduced price (15€/m²) was applied by the city during the first three years.

A daily trip of 18 km between the suburban hub and the underground Concorde facility is made with a truck which can access the underground facility, limited in height. Deliveries and pick-ups are done with sixteen clean vehicles (14 small electric vans and two ‘Chronocity’ wheeled containers).

An assessment made by the city of Paris showed that the new organization saves 41,000 km of diesel powered vehicles every year. It also saves 23 tonnes of CO₂ emissions, a decrease of 60 per cent compared to the previous situation. Two thirds of this positive impact result from the use of electric vehicles, and the remaining reduction in CO₂ emissions is due to the decrease in vehicle-km resulting from the optimization of the delivery tours.

Alternatives to road transport: the Monoprix rail project

The city of Paris promotes alternatives to road transport and supports logistics organizations based on the use of railways or waterways. The re-use of a traditional rail freight terminal in Paris by Monoprix is a successful example (so far the only one) of this policy.

Monoprix is a French retail group with more than 300 urban supermarkets in France. In November 2007, the first Monoprix train ran from Monoprix's suburban warehouses to Paris Bercy rail station, within the city’s limits (in the Bercy neighborhood). This represents a 30 km rail link (Map 6). The Monoprix train uses passenger trains’ tracks at off-peak hours. From the Bercy terminal, CNG (compressed natural gas) trucks deliver pallets to 65 Paris supermarkets and 25 supermarkets in adjacent suburbs.

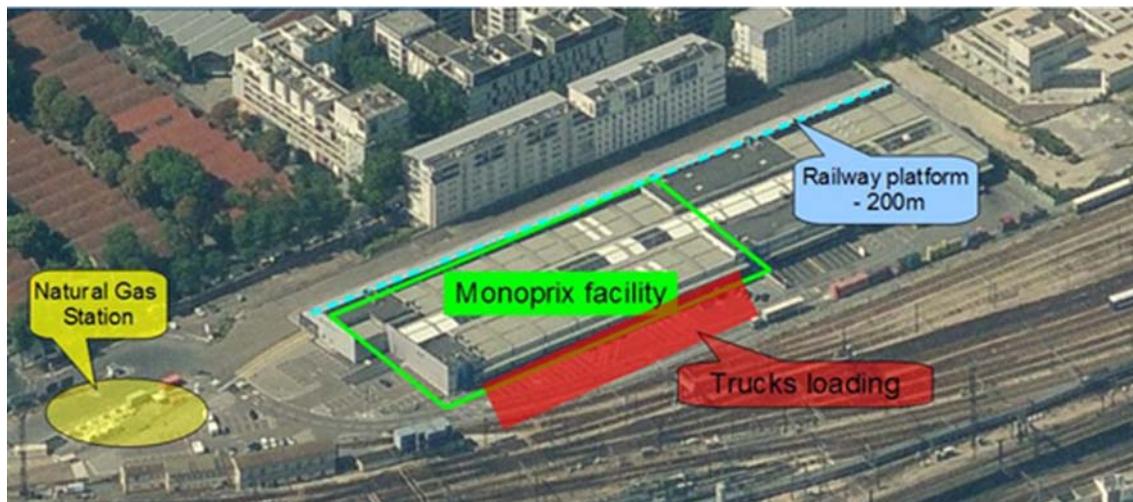
Monoprix rail experience has received a lot of attention and has provided significant environmental benefits, although at a high financial cost for the municipality and for the

Map 6: Map of the location of Monoprix suburban warehouse and urban rail terminal



Source: courtesy of APUR.

Figure 1: Aerial photo of the Paris Bercy rail facility



Source: courtesy of APUR/Monoprix.

company. A study made in 2009 showed that the introduction of the train represents a reduction of 700,000 km of annual truck movements onto the suburban highway network of Paris. It achieves a decrease of 36 per cent of particulates and 56 per cent of nitrogen oxides emitted annually by Monoprix to deliver the pallets previously brought by trucks. CO₂ emissions decreased by 47 per cent, representing a saving of 410 tonnes per year. Noise emissions, on the contrary, did not decrease. Night operations in the rail terminal have had a negative impact on adjacent communities. Residents in apartment buildings located across the street from the terminal (visible on Figure 1) complain about excessive noise emissions.

Financial impacts are important since the municipality invested €1 million to renovate the rail terminal and it does not collect any fee from the use of the facility. Even more importantly, the new organisation has increased the transport cost per pallet by 26 per cent for Monoprix. A key factor in cost reduction would be to run two trains per night in the future, either for more Monoprix products or for another user. This would result in a better use of the employees dedicated to the rail operations, and a more optimal use of the rail facility.

Conclusion

The city of Paris has been very active in promoting cleaner and more efficient ways of delivering goods to urban residents and businesses. However, the experiments implemented or promoted by the city only deal with a very limited share of the total urban freight flows. As a result of all urban logistics spaces experiments in Paris, one can consider that about 1000 tonnes of CO₂ (40 per cent are from the Monoprix train) have been saved every year since 2003 (Dablanc and Rakotonarivo, 2010), while the city's carbon footprint assessment ('Bilan Carbone') made in 2004 indicated that freight was responsible for more than six million tonnes of CO₂ in a year.¹² Some policies that focus on global and long-term improvements, such as the inclusion of freight land-use directives in the Paris land use master plan, or a more efficient management of the city's on-street delivery bays, may provide better results but are poorly visible by elected officials and the general public as their benefits only appear in the long term.

12. www.paris.fr/portail/pratique/Portal.lut?page_id=8414, last accessed on 20 January 2011.

The Paris case demonstrates that a freight-oriented policy in an urban area can be complex to implement and that it is a long and incremental process. Some structural conditions must be met, which are not always the responsibility of local governments but are the responsibility of national governments and the private industry: this is the case, for example, for providing adequate clean delivery vehicles, many of which are not affordable to smaller freight companies. Manufacturers have recently announced new electric or hybrid vehicles, and this may be a very important factor for a successful diffusion of city logistics initiatives.

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