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Freight Transportation – Challenges and Opportunities

Metropolitan Freight Transportation
The freight system meets metropolitan/urban needs

- Today’s metropolitan economies
  - Less inventory, more customized products, more frequent deliveries
  - Service economy: express deliveries
  - Growth of e-commerce and home deliveries
  - Trade nodes, role of logistics hub for the entire region/country
- One million deliveries/pick-ups in Paris metro area everyday
- There are as many urban logistics chains as there are different economic sectors, with diverse vehicles, delivery times, organization
But at a cost: air pollution, CO$_2$ emissions, poor labor conditions

- Vans and trucks remain a major cause for CO$_2$ emissions and poor air quality in metropolitan areas
  - They are diesel
  - In many countries, they are old - many trucks end their life cycle in local/regional operations
  - Constant acceleration and deceleration (delivery stops, traffic lights, congestion)
  - Increased truck-miles for final deliveries
- In large European cities, freight is responsible for a quarter of transport-related CO$_2$, a third of transport-related NOx and half of transport-related particulate matter
- Freight carbon footprint
Paris carbon footprint and freight transportation

- A 2005 study commissioned by the City of Paris
- 6.55 million tons equivalent CO$_2$ in total
- 1.75 million for freight transport
Flexible and competitive urban trucking market

- An easy job market to access, difficult working conditions and low salaries compared with long distance trucking
- Many self employed local carriers, often acting as subcontractors for large freight companies
- 12,000 small freight transport companies in the Paris metro area, half of them not legally registered
- Inefficient operations
Staging freight: mega distribution centers around metropolitan areas

- +200% freight facilities and warehouses in metro areas such as Atlanta and L.A. b/w 1998 and 2009
- Serving an import-based economy and global supply chains
- Spatial deconcentration of these facilities
- Differentials in land prices, needs for modern facilities and large parcels, availability of road infrastructure, need for connectivity with other major consumer markets
Atlanta, Georgia Metropolitan Area by Zip Code

NAICS: 493100
Warehousing and Storage

Number of Warehousing Establishments

- 0
- 1-2
- 3-4
- 5-6
- 7-8
- 9-10
- 11-13
- 14-16
- 17-20
- 21-24
- 25-28
- 29-60

Directional Distribution

- Barycenter
- Expressways
- Counties

Total Number of Warehousing Establishments: 132
Average Distance from Barycenter: 17.8 Miles

Total Number of Warehousing Establishments: 401
Average Distance from Barycenter: 20.6 Miles

Map by Hans Williams
Data Source: U.S. Census Bureau

Atlanta warehouses, 1998-2008
(NAICS 493)

Dablanc and Ross, 2012
Los Angeles warehouses, 1998-2009
(NAICS 493)

Dablanc and Farr, 2012
• The average distance of terminals to their barycenter (center of gravity) has increased:
  • by 3 miles in Atlanta (from 17 to 20 miles)
  • by 6 miles in Los Angeles (from 26 to 32 miles)
• The same sprawl indicator for all establishments (representing economic activities in general) has increased:
  • by 1.3 miles in Atlanta
  • by 0.1 mile in Los Angeles
• Logistics activities decentralized more than economic activities in general, meaning more truck-miles to connect urban destinations to and from freight terminals=> more energy, more CO$_2$
• Calculation with actual truck traffic data data for a Paris case study (parcel and express transport industry): net impact of **+16,000 tons of CO$_2$** due to ‘logistics sprawl’
Experiments in last mile deliveries, “smart city logistics”

- Media attention
- Local governments’ support and financial help
- Use of cross-docking terminals in urban centers, urban consolidation centers (UCC)
- Electric deliveries
- Off-hour deliveries: trials in Manhattan, Dublin, Barcelona, Paris, the Netherlands
- Low emission zones (London LEZ)
Major retailers using trains and barges for urban deliveries

- 90 Monoprix stores supplied by rail since 2007
- Trains arrive in a renovated freight terminal close to the center of Paris
- CNG trucks for the final distribution

- 80 Franprix stores (450 pallets) supplied by barge since Sept 2012
- A complex scheme from the suburban DC:
  - 2 miles by truck to suburban port of Bonneuil
  - 13 miles by barge to Paris port de la Bourdonnais
  - Final deliveries by truck
• The rail scheme generates a saving of 410 tons of CO$_2$ per year (and an increase by 26% in transportation costs per pallet…)

• The barge scheme is expected to save 240 tons of CO$_2$ per year
Electric deliveries + urban terminals

- Many initiatives for clean deliveries in cities’ business districts, UPS, FedEx, DHL have hybrid/electric small trucks and vans
- Sephora France entirely supplied by electric trucks
- Cargocycles: La Petite Reine avoids the emissions of 203 tons of CO$_2$
- Chronopost in Paris: use of 12 electric delivery vehicles and an urban cross dock terminal under the Place de la Concorde in a municipal car park, saving 33 tons of CO$_2$ per year
Conclusion

- The metropolitan freight system is highly flexible, efficient, it supports changing consumer and business demands as well as the trade node function of large cities.
- Energy consumption and emissions remain major issues despite recent private or public/private initiatives.
- While contributing to some reduction in CO$_2$ emissions by supporting last mile delivery initiatives, cities ignore freight and logistics’ global economic drivers and rapidly changing land uses.
References

• http://www.paris.fr/pratique/energie-plan-climat/bilan-carbone/bilan-carbone-de-paris-les-resultats/rub_8414_stand_14549_port_19612