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Impacts of Environmental Access Restrictions on Freight Delivery Activities -- The Example of Low Emission Zones in Europe

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• Impacts of Low Emission Zones on the urban freight market
  • Phase 1: Overview of Low Emission Zones in Europe
  • Phase 2: Three cases in Europe (London, Berlin, Gothenburg) and the situation of Paris
  • Phase 3: Development of scenarios for the Paris region and emissions analysis
Overview of Low Emission Zones in Europe

• About 200 LEZs in twelve European countries
• Incl. 165 in Germany and Italy
Commercial vehicles within LEZ

- 99% of Low Emission Zones target commercial vehicles
- 12% target only commercial vehicles
- One LEZ (London) targets both HGVs and LGVs, but not private cars
Method

- Litterature review
- Three case studies in 2014-2015
  - Three-to-five-week visits, hosted in partner academic teams (University of Westminster, DLR, Chalmers/UFT)
  - Interviewing freight companies, municipalities, business organizations
- Data collection on freight traffic and freight companies statistics
- One failed attempt at a comprehensive survey by questionnaire within one major freight organization (RHA in the UK)
LEZ in London, UK

- Large area: 610 sq mi
- Since 2008
- Local initiative
- HGVs and vans
- Control by cameras
- Congestion charge since 2003
- Ultra Low Emission Zone for 2020
LEZ in Berlin, Germany LEZ

- 34 sq mi
- Since 2008
- National programme
- All vehicles
- Stickers
  - Green sticker

Source: Senat Berlin
LEZ in Gothenburg, Sweden LEZ

- 12 sq mi
- Since 1996
  - Extension in 2007
- HGVs and buses
- Vehicles < 6 years
- Through road with no restriction
- Logistics activities out of the zone
Impact on commercial vehicles’ traffic flows

- Traffic growth has stabilized since the introduction of LEZs

Source: TfL
Evolution of M25 traffic - point A (1000 veh/yr)
• Difficult to conclude to a direct impact of LEZs
  • Economic downturn of 2008
  • Many other local explanations (end of construction activity in Berlin), new infrastructures, etc.)
Impact on vehicle fleet

- London and Berlin: accelerated rate of commercial fleet renewal

Share of LEZ compliant vehicles in Greater London

Share of green sticker vehicles in Berlin

Source: TfL

Source: Senat Berlin
• **In Gothenburg in 2007**
  • Inside LEZ: 4% HGVs > 6 years
  • Outside LEZ: 12% HGVs > 6 years

• **Comparison with Paris (in 2013)**
  • In Paris: 15% HGVs are Euro 0, I, II and 29% are Euro III (i.e. 44% HGVs > 8 years)

Source: City of Gothenburg
Impact on freight operators

• LEZs better accepted than originally planned
  • Pragmatism
  • Most transport companies have no choice and must operate in these large cities

• Enforcement is important
  • Amsterdam: without cameras, 66% compliant; with cameras (2010), 97% compliant
  • German cities have various enforcement levels
• At the macro level
  • Decrease in freight vehicle-miles
  • Decrease in the number of small freight companies
    • 15% fewer freight operators in London between 2007 and 2012

• At the micro level
  • Investments in newer vehicles
  • Investment in clean vehicles
  • Reorganization of routes
  • In the medium term, reduction in operating costs
Decrease in the number of freight companies

Source: BfG

Evolution of the number of local units used for transport

Evolution of the number of freight operators (9-49 employees) in Berlin region

London

Berlin
• Other impacts, emerging trends
  • Conforting the role of truck rental companies for freight operators of all sizes
  • Mergers
  • Innovations in city logistics
    • Stadsleferansen
    • Frevue, Gnewt Cargo
• **Clean vehicles: what the companies say**
  
  • Electric power is an energy for the future, but reliability and price are obstacles to wider development
  
  • The reduction in payload translates into more vehicles and new routes
  
  • Buying larger vehicles is difficult because of a lack of supply from the automotive industry
  
  • The development of electric vehicles must be supported by public authorities: subsidies, training, infrastructure
Scenarios for Paris

• Three scenarios
  • 2018: Euro 5 LEZ in city of Paris (83 km²)
  • 2021: Euro 5 LEZ in A86 and Euro 6 in City of Paris, automated control in Paris
  • 2025: all electric

• Evolution of:
  • Traffic volume
  • Fleet
  • Freight companies
  • Emerging trends
• Oldest vehicles (≤ Euro 2) marginally impacted by LEZ as in 2021 their share is small
• Impact on emissions is higher than impact on vehicle number
• For more recent vehicles (Euro 3 to 5) a LEZ would reduce their number significantly
• Greatest impact of LEZ would be on NO\textsubscript{x} emissions
• In 2021
  • 15 to 20% of NOx emissions reduction from road traffic in Paris
  • 2 to 5% in PM reduction
• All-electric scenario generates a sharp increase in the number of total freight vehicles (vans) therefore congestion and non engine related PM emission

• And a strong decrease in $\text{NO}_x$ and $\text{CO}_2$
Conclusion

• One of the most remarquable impacts of Low Emission Zones is more **indirect** than direct
• LEZs disrupt the market on which urban delivery carriers operate
• Reduction in the number of firms making urban deliveries
• This may benefit the urban freight market by compelling operators to find ways to more efficient activities
• Such modernization is necessary as the urban freight market in Europe is dysfunctional
  • environmentally because of the old vehicles used until now
  • socially because of the large number of small firms breaking the sector’s labor laws and safety standards
• These indirect economic impacts reinforce the direct effect of LEZs on air quality