Urban Logistics

Annex A of the Handbook 'Navigating Transport NAMAs'

TRANSfer Project – Towards climate-friendly transport technologies and measures

The concept

Commercial freight traffic contributes considerably to urban traffic. Typically, around 15 to 25 % of the motorised vehicle kilometres in cities can be attributed to commercial goods vehicles. In Europe, freight transit and and intra-urban freight transport accounts for 31 % of the energy use and 31 % of the CO_2 emissions in urban areas (Herzog, 2010). Furthermore, urban freight transport worsens urban air quality and frequently causes traffic congestion. In fact, freight transport is responsible for 20 % to 60 % of local air pollution from urban transport (Dablanc, 2010). Especially in developing and emerging countries, increasing purchasing power, rising motorisation and changes in retail structure will lead to an increase in urban freight traffic (Herzog, 2010).

The private sector dominates freight traffic patterns and organisation. However, local governments can take policy measures to promote efficient and eco-friendly transport within the municipal area. They can induce the private sector to improve the freight transport organisation and to optimise operations.

Elements of urban logistics:

- Work out freight transport regulations
- Promote urban logistics centres

For more details on the elements' characteristics see Box 1.

Table 1: GHG reduction matrix of urban logistics

	Avoid	Shift	Improve
Direct effects	☑ Reduces vehicle numbers and distances for inner-city goods delivery	☑ Facilitates the use of non-motorised modes for the 'last mile'	☑ Increases vehicle load factors and thus reduces emissions per tonne kilometre ☑ Limits engine idling during unloading
Indirect effects			☑ Reduces fuel consumption by improving the traffic flow
Rebound effect	☒ Increases in the volume of light truck traffic if heavy duty trucks are banned from the city centre		☒ Use of less efficient light duty trucks for 'last mile' delivery if heavy duty trucks are restricted from the city (in case of full load light duty trucks are less efficient than heavy duty trucks)
Complementary measures *(to achieve full mitigation potential)*	☑ Dense and transit-oriented urban development (see Factsheet '*Dense and Transit-oriented Urban Development*')	☑ National intermodal freight logistics centres (see Factsheet '*Freight Master Planning*')	☑ Eco-driving for commercial vehicles (see Factsheet '*Freight Vehicle Policy*') ☑ Fuel economy standards for goods vehicles (see Factsheet '*Promotion of Energy Efficient Vehicles*')

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Box 1: Possible elements of urban logistics

Work out freight transport regulations

Different regulatory instruments can be applied to limit the adverse effects of inner-city freight transport.

- Delivery time restrictions:
  Goods traffic in the city centre is only allowed during certain time windows;
- Freight vehicle routing schemes:
  Designated roads for heavy duty vehicles and delivery guides;
- Dedicated loading zones:
  Goods vehicles have to park in special zones or spaces for loading to avoid obstructions of moving traffic; non-motorised modes can be used for the last metres to the destination.

Sometimes, cities implement weight or size restrictions for vehicles entering the city centre. However, some small vehicles like vans emit more CO_2 per m^3 of load space and kilometres than large trucks.*) Nevertheless, large trucks perform only better if they are fully loaded with goods to be delivered to the area of destination (McKinnon *et al.,* 2010; Herzog, 2010).

How it works and intended effects:

- Reduces disturbances and congestion of the inner-city traffic;
  ➔ Improves road traffic operation;
- Loading zones limit engine idling during on-street unloading;
  ➔ Reduced fuel consumption and emissions;
- Proper freight vehicle routing can reduce kilometres driven per delivery;
  ➔ Reduced fuel consumption and emissions.

To be considered for implementation:

- The instruments can be implemented at low costs and within a short timeframe;
- Key for the acceptance and success of the measure is an information strategy about restrictions and alternatives.

Responsible actor: Local transport planning departments

Promote urban logistics centres

Urban logistics centres, consolidation centres or cross-docking facilities are all committed to reorganise and optimise the freight transport in cities and urban areas. In urban logistics centres, cargo from/to the same or similar source/destinations are consolidated and carried the first/last kilometres to the target area. Thereby, vehicles that carry goods for different destinations do not have to enter the city centre to deliver parts of their loads. Usually, the vehicles used for the subsequent transport are smaller and have high vehicle utilisation. Several urban logistics centres make also use of alternatively fuelled vehicles or bicycles for the final transport routes.

Often, urban logistics centres are owned and operated by private bodies. However, the local government can support initiatives to develop logistics centres by providing the necessary land and by connecting the logistics centre to high quality infrastructure. Sometimes, also public authorities construct and administer urban logistics centres (*e.g.* in Bangkok) (McKinnon *et al.,* 2010, Herzog, 2010).

How it works and intended effects:

- Reduce the number and the travel distances of inner-city goods vehicles;
  ➔ Avoid unnecessary fuel consumption and emissions.
- Enhance the utilisation rate of goods vehicles;
  ➔ Reduce the emissions per tonne kilometre.
- Facilitate the use of non-motorised modes for last kilometre transport;
  ➔ Shift to low-carbon modes.

To be considered for implementation:

- Initial investments are necessary;
- On the long-run many logistics centres operate profitably.

Responsible actor: Local transport planning departments

*) Typically, vans emit nearly three times as much CO_2 per cubic metre of load space and kilometre as large trucks. However, light delivery vehicles emit slightly less CO_2 than large or medium sized trucks (Herzog, 2010).

GHG mitigation effect and co-benefits

In several cities worldwide, urban logistics centres have been developed to improve the freight transport and to avoid adverse effects of inner-city goods vehicle traffic. Browne *et al.,* (2005) compared the results of evaluation studies of 17 different urban consolidation centres. For goods handled by the consolidation centre, considerable improvements were identified compared to goods that are transported without the use of a consolidation centre. Vehicle trips were reduced between 30 and 80 % and vehicle kilometres were cut by 30 to 45 %. At the same time, vehicles' load factors improved by 15 to 100 %. This led to a reduction in emission between 25 and 60 % for goods delivered by the urban consolidation centre. The total reduction potential of urban logistics centres will vary with cargo type, since the nature of some goods can limit the possibility to combine deliveries.

Better organisation and strict regulations for urban freight transport can further lead to several co-benefits:

- Delivery is more reliable and predictable;
- A cost reduction in logistics through increased transport efficiency will increase the overall efficiency of the economy;
- Savings in warehousing for local businesses and reduction of land consumption in the inner-city for the municipal administration (because of the bundle effect and quick accessibility of urban logistics centres outside of the cities);
- Reduction in noise;
- Reduction in local air pollution;
- Reduction in congestion;
- Increased liveability in city centres;
- Recovery of road space for passenger transport.

Towards implementation

The measure targets all participants of the freight transport sector within the municipal area: shippers, consignees and carriers in particular.

Key stakeholders

- Local transport planning departments:
  Responsible for the design and implementation of inner-city freight transport regulations (*e.g.* delivery time restrictions); make preferential policies to promote urban logistics centres and are responsible for proper accessibility to such centres.
- Local land use planning departments:
  Responsible for the inner-city structure and thus for the designation of freight delivery zones; can dedicate areas for urban logistics centres.

Table 2: Potential barriers to implementation and countermeasures

Barriers	Options to overcome
Strong opposition from local goods transport operators against delivery regulation	■ Close cooperation between carriers and public authorities; ■ Implement joint working groups; ■ Identify problems of freight transport regulations and propose solutions.
Low participation of freight transport operators in urban logistics centres	■ Attract service companies to the logistics centres and promote services like warehousing, vehicle maintenance, vehicle refuelling, leasing of loading and unloading equipment, driver accommodation or pre-retail services (*e.g.* pricing, unpacking) to all settled logistics companies.
Investment and operating costs of urban logistics centres	■ Consider using the public-private partnership (PPP) financing model for the construction and operation of logistics centres; ■ Provide capital subsidy, soft loan, etc. ■ Policy support.
All interested parties want to have free delivery time	■ Strict enforcement of delivery time restrictions; ■ Convince all shippers and consignees that reduced delivery traffic will increase the attractiveness of their business; ■ Cooperate with local business associations.

Success factors

- Careful evaluation of the effects of freight traffic regulations such as size restrictions (see below);
- Careful selection of the location of urban logistics centres (not too far from the city centre, close to interregional road and rail transport infrastructure);
- Cooperation with transport operators to consider their needs in the design and site selection of the logistics centre;
- Acceptance by the wide variety of stakeholders in urban freight transport (initiate close cooperation and consultation processes, convince the local business community);
- Encouraging the use of logistics centres through a strong regulatory framework for urban freight transport.

Practical example: Measures to improve urban logistics in Bangkok

The city of Bangkok combined regulatory measures with the development of urban logistics centres to reduce adverse effects of heavy duty vehicle traffic in the urban area. In 2000, three public truck terminals were constructed in the north, west and east of the city. At the same time, the first phase of a zonal truck-ban was implemented. The zone of the truck ban was extended in several steps. In the final step, all heavy trucks with 10 wheels or more are banned from a large area enclosed by the outer ring road. Within the truck restriction zone, some truck routes are excluded from the ban to enable heavy trucks to access ports and freight terminals. Access restrictions for smaller trucks have already been in place for several years. Four- and six-wheeled trucks are prohibited from entering the metropolitan area at peak hours (between 6 and 9 in the morning and 4 and 8 in the evening) (Takahashi and Sirikupanichkul, 2001; Herzog, 2010).

Takahashi and Sirikupanichul (2001) examine the potential effects of the heavy duty vehicle ban and truck terminals and find that they likely improved the air quality in Bangkok. Vehicle emissions per kilometre from light duty trucks running in Bangkok are much lower than emissions from heavy duty trucks, even though both vehicle types are diesel fuelled. The differences are largest in terms of emissions of nitrogen oxides and particulate matter, which are more than 10 times higher for heavy duty vehicles than for light duty vehicles. Emissions of nitrogen oxides and particulate matter are estimated be reduced due to a decrease in the mileage of heavy duty diesel vehicles. However, since the mileage of light duty diesel vehicles is projected to increase, emissions of carbon monoxide and hydrocarbons may rise. The effect on GHG emissions is expected to be positive.

Hanoi, Vietnam – Photo by Dominik Schmid, 2010

Further reading

- **BESTUFS (2011)** '*Best urban freight solutions*' http://www.bestufs.net accessed 7 October 2011.
- **Browne, M., Sweet, M., Woodburn, A. and Allen, J. (2005)** '*Urban freight consolidation centres*' – Final report for the Department of Transport http://www.oresund.org/ecomobility/content/download/38831/239756/file/RR3%20Urban%20Freight%20Consolidation%20Centre%20Report.pdf accessed 6 October 2011.
- **Dablanc, L. (2010)** '*Freight transport for Development Toolkit: Urban Freight*'. World Bank/DFID. http://go.worldbank.org/TMV4HHCPE0, accessed 3 January 2012.
- **Herzog, B. O. (2010)** '*Urban Freight in Developing Cities*' Sourcebook Module 1g, Sustainable Urban Transport Project (SUTP),GIZ, Eschborn.
- **McKinnon, A., Cullinane, S., Browne, M. and Whiteing, A. (eds) (2010)** *Green Logistics – Improving the environmental sustainability of logistics*, Kogan Page, London.
- **Takahashi, K. and Sirikupanichkul, A. (2001)** '*The effects of public truck terminal policies on air pollution in the Bangkok metropolitan area*' Transport and Communications Bulletin for Asia and the Pacific, no. 70.

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