'Public Transport First' Strategy

Annex A of the Handbook 'Navigating Transport NAMAs'

TRANSfer Project – Towards climate-friendly transport technologies and measures

The concept

A high quality public transport system is characterised by its ability to effectively meet the mobility needs of people.

For users, a high quality public transport system has to be accessible, fast, reliable, affordable and attractive (Böhler, 2010). From an environmental perspective the system needs to operate efficiently, including low emission vehicles and high occupancy rates.

Expanding the public transport network, successfully managing its operations and improving its services are key factors to ensure public transport use. A high quality public transport system can accommodate a high number of trips and is far more efficient (factor 2–4) than individual motorised transport. In this regard, high quality public transport can be considered the backbone of a sustainable urban transport system. It is a key element of any GHG reduction strategy in cities, as better public transport has a 'pull' effect on motorists, thus encouraging a modal shift from cars to more sustainable modes of transport.

Elements of a 'Public Transport First' Strategy:

- Provide a transit-oriented public transport network;
- Invest in infrastructure that enables interchange between modes;
- Develop the public transport services demand oriented;
- Improve reliability and travel time;
- Improve comfort for passengers.

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

Table 1: GHG mitigation matrix of a 'Public Transport First' Strategy

	Avoid	Shift	Improve
Direct effects		☑ Attracts car users to efficient mode and use of energy	☑ High occupancy rates reduce energy consumption per pkm ☑ Modern bus and train fleets can reduce energy consumption
Indirect effects	☑ Supports a Transit-oriented Development (ToD)	☑ Improves conditions for walking and cycling as it enables intermodality, it offers reliable mobility without cars and a daily alternative (*e.g.* during bad weather)	
Rebound effect	☒ Can increase travel distances of people that do not have access to a car ☒ Expansion of the network can contribute to urban sprawl	☒ Can induce a undesirable shift by attracting people that previously cycled and walked	☒ Modern buses can result in an increase in fuel consumption, *e.g.* due to air conditioning
Complementary measures *(to achieve full mitigation potential)*	☑ Public transport (PT) integration into land-use planning (LUP) (*e.g.* ToD) (see Factsheet '*Dense and Transit-oriented Urban Development*')	☑ All 'push' measures (such as parking policy or congestion charging) (see Factsheets '*Economic and Regulatory Instruments for Road Traffic*' and '*Sustainable Parking Management*') ☑ Walking and cycling infrastructure (see Factsheet '*High Quality Walking Infrastructure*')	☑ Green procurement (see Factsheet '*Green Mobility Management*') ☑ Eco-labelling and emission standards (see Factsheet '*Promotion of Energy Efficient Vehicles*')

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Box 1: Possible elements of a 'Public Transport First' Strategy

Provide a transit-oriented public transport network

A public transport network that meets mobility needs within a city is the backbone of any low-carbon urban transport system. It needs to have a sufficient capacity and a demand oriented network of lines. If the network is designed in a transit-oriented way, urban development follows the main lines and clusters a variety of functions along the transit stations, improving access. Determined by current conditions and city structure, it can be necessary to increase the frequency of services, add additional lines to an existing system or even to build a new public transport system.

There are different options for mass transit such as light rail transit (LRT), a metro system or bus rapid transit (BRT). The options differ in terms of passenger capacity, flexibility as well as investment and operational costs. For several cities in developing countries, BRT has proven to be an optimal solution thanks to its flexibility and low investment costs compared to rail-based systems (Wright and Fjellstrom, 2004). Nevertheless, the best option for a city depends on local conditions.

How it works and intended effects:

- Increased frequency of services enhances the attractiveness of the public transport system and offers a comfortable, low-carbon alternative to private motorised modes.
  - ➔ Make people shift from cars to public transport more likely (or keep them as PT users).
- Additional lines enhance the system's accessibility and more potential riders are served.
  - ➔ Prevents increasing motorisation.

To be considered for implementation:

- Moderate costs associated with an increase in the frequency of services.
- Adding lines or implementing a whole new system can be very time-consuming and cost intensive.
- Besides investment costs, long-term operational costs have to be considered.
- BRT systems typically cost about USD 1–15 million per kilometre. An underground metro system can cost more than USD 200 million per kilometre (Wright and Fulton, 2005).

Responsible actor: Local transport departments

Invest in infrastructure that enables interchange between modes

It is important that the transfer between different lines (both rail and bus) as well as interchange from and to other modes of transport is as easy as possible.

Interchange of public transport and private motorised modes is important in the outskirts of a city. Park and ride (P+R) facilities enable people in suburban and rural areas, who lack a high quality public transport system, to reach the station by car and to use public transport to travel to the city centre.

Furthermore, commuters rely on a good connectivity between the local public transport system and regional trains or buses.

It is important that there is also a high connectivity between public transport and non-motorised modes within the urban area. Adequate pedestrian and cycling infrastructure such as bike and ride (B+R) facilities improve the access around transit stops. In dense city areas, public bike schemes can complement public transport services.

How it works and intended effects:

- Improved transfer between public transport lines reduces waiting/interchange times and thus the overall travel time and increases the service level.
- The system accessibility is enhanced at the outskirts so that additional riders can be served.
  - ➔ Facilitates a shift from automobile travel to public transport for certain sections of a trip.
- Improved connectivity with non-motorised modes and between different public transport levels makes the trip more comfortable.
  - ➔ A shift from automobile travel to more efficient modes becomes more attractive.

To be considered for implementation:

- Plan the transport hubs carefully.
- Moderate costs arise for the modification of existing stations or the provision of parking infrastructure at public transport stations in the outskirts.

Responsible actor: Local transport departments

Improve reliability and travel time

Reliability and travel time are key parameters of the public perception of a public transport system. Separate bus lanes that are reserved primarily for buses or ensuring bus priority at intersections (*e.g.* by using modified traffic control signals) reduce travel times, especially during rush hour, and improve reliability of the service.

To implement separate bus lanes, a reallocation of existing road space or the construction of additional lanes is required.

How it works and intended effects:

- Improved reliability and reduced travel times enhance the attractiveness of the bus system.
  - → Attracts passengers and thus supports a shift from automobile travel to public transport.

To be considered for implementation:

- Separate bus lanes need investments and construction time. The city of Edinburgh implemented the "Greenway" programme to improve bus reliability. The total costs were about GBP 7.5 million (≈ USD 11.7 million) including the development of 26 kilometres of bus lanes (Eltis, 2010).

Responsible actor: Local transport departments

Develop the public transport service demand-oriented

The local public transport operator can ensure that the public transport system is demand-oriented. This means that an adequate/optimal level of PT capacity is supplied.

Often it is beneficial to implement a public transport system that consists of different levels. For instance, trunk/main line buses with large capacities and higher travel speeds can operate on routes with large passenger volumes, whereas smaller feeder buses with more frequent stops connect remoter, less frequently used stops. Transport hubs should enable passengers to easily switch between different vehicles.

How it works and intended effects:

- Reduce overcapacities that are economically inefficient.
  - → Reduces fuel consumption.
- Higher occupancy rates can be achieved.
  - → Lower energy consumption per passenger kilometre.
  - → Enhanced profitability of the network.

To be considered for implementation:

- Set service level benchmarks.
- Coordinate between operators.
- Some achievements can be made at lower costs by better coordination (*e.g.* avoid doubling of lines).
- Costs are higher if new vehicles have to be purchased.

Responsible actor: Public transport operators

Improve comfort for passengers

The use of public transport should be as comfortable as possible. The following components characterise a comfortable public transport system:

- Passenger safety and personal security.
- Common information and ticketing system (in case the public transport system consist of different levels or has more than one operator).
- Easy and adequate ticketing system with special offers for frequent users.
- Comfortable stations (*e.g.* bus shelters, boarding islands, good lighting) and vehicles (*e.g.* cleanliness, air conditioning).
- Comprehensive rider information at stations and vehicles.
- Real-time information about arrival times and disturbances.

How it works and intended effects:

- Higher comfort attracts more people to use public transport.
  - → A shift from automobile travel to more efficient modes becomes more attractive.

To be considered for implementation:

- A combination of several of these relative small measures can have a great effect on ridership.
- Cost: The city of Preston (UK) improved information and access of the PT system and introduced better cleaning and maintenance of bus shelters at costs of GBP 1.1 million (≈ USD 1.7 million) (Taylor, 2009).

Responsible actor: Public transport operators

GHG mitigation effect and co-benefits

Shifting trips from private motorised modes to public transport has huge greenhouse gas mitigation potential. Wright and Fulton (2005) analysed the GHG mitigation potential of an imaginary city, where 10 million passenger trips take place each day. Their mitigation scenario contains a BRT system of 50 km. Compared to the reference case, the share of cars, taxis, mini-buses and walking is reduced in favour of the BRT system, which reaches a mode share of 5 %. Thereby, over a period of 20 years, the CO_2 emissions were reduced by 4 %. Assuming construction costs of USD 2.5 million/km, the emission reductions were achieved at USD 66/per tonne of CO_2. Further, the authors show that the largest (25 %) and most cost-effective (USD 30/per tonne of CO_2) GHG reductions can be achieved if a BRT system is combined with improvements in the cycling and walking infrastructure. Real world effects will vary depending on local circumstances and are determined by local infrastructure cost, cultural preferences and baseline mode shares.

Co-benefits of a high quality public transport are:

- Less congestion;
- Less noise;
- Better air quality;
- Improved safety;
- Recovery of urban space and higher attractiveness of the city — the cityscape is upgraded and less space is required for parking and streets;
- Improved low income mobility — especially poor people often depend on a high quality public transport network.

Towards implementation

The measure targets all citizens: primarily, the high quality public transport system is intended to attract car drivers and especially commuters, since the shift from automobile to public transport leads to a reduction in CO_2 emission and brings co-benefits.

Key stakeholders

- Local transport planning departments:
  Ideally responsible for planning the public transport network and arranging transport services. Public transport infrastructure is often provided by local governments.
- Local public transport operators:
  Organise and implement the services and are responsible for the quality management (*e.g.* reliable, clean, safe, secure).

Table 2: Potential barriers to implementation and countermeasures

Barriers	Options to overcome
Lack of financial resources	■ Public-private partnerships (PPP) can supplement public funding (*e.g.* private investors operate the public transport system, private companies build or maintain bus shelters in return for advertisement rights). ■ National or international funding (*e.g.* through national transport funds). ■ Earmarking of revenues from economic instruments to reduce automobile use (*e.g.* parking pricing) or incorporate urban development benefits to transport providers (*e.g.* Hong Kong's approach to Transit-oriented Development).
Lack of land for road space	■ Reallocation of existing road space, favouring more efficient modes of transport (*e.g.* dedicated bus lanes). ■ Ban private motorised modes from certain streets or areas. ■ Fragmentation of local public transport operators.
Fragmentation of local public transport operators	■ Develop a transport association, which incorporates different providers and mitigates conflicting interests.

Success factors

- Avoid parallel extension of road networks as this challenges the comparative advantage of public transport in travel time and comfort.
- Close cooperation between land-use planning authority, transport authority and local public transport operators (*e.g.* round tables).
- Choose the type of public transport modes carefully: rail system are associated with long construction times and provide little flexibility to future development; the construction of underground systems is very expensive and time-consuming; multiple systems including BRT can suit varying demand best (Wright and Fjellstrom, 2004).
- Follow a long-term vision, inform the public about the improvements and involve communities in planning processes.

TransMilenio Bogotá, Colombia — Photo by Carlosfelipe Pardo, GIZ Photo Collection 2011

Practical example: BRT in Bogotá

Within three years, the city of Bogotá (Colombia) designed and implemented a Bus Rapid Transit (BRT) system called TransMilenio. The bus-based system consists of different levels. On main routes, articulated buses operate on exclusive busways where elevated stations allow pre-board ticketing and fast boarding. Feeder buses that share streets with the rest of the traffic connect peripheral neighbourhoods to the system. Pedestrian and cycling infrastructure around stations was improved to ensure accessibility to the system. High passenger comfort is achieved by providing enclosed stations, clear route maps and real-time information displays.

Public investments for the BRT system in Bogotá were USD 5 million per kilometre. Local and national funds were used to finance the development of the system. The full operational costs are covered by fares, which are approximately USD 0.37 for single trips. Today, the BRT system in Bogotá comprises 84.4 kilometres and more than 1 400 000 trips are made each day. Since the beginning of the system's operation, significant increases in the public transport share have been observed. Approximately 9 % of the passengers that used to commute by car now take the bus. Until today, local air pollution has been cut by 40 % and travelling times have been reduced by 32 %. Furthermore, 287 087 tonnes of CO_2 emissions are avoided annually thanks to the system (C40 cities, 2010b; Peñalosa, 2005).

Further reading

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