



# Promotion of Low-Carbon Modes for Passenger Transport

Annex A of the Handbook 'Navigating Transport NAMAs'

TRANSfer Project – Towards climate-friendly transport technologies and measures

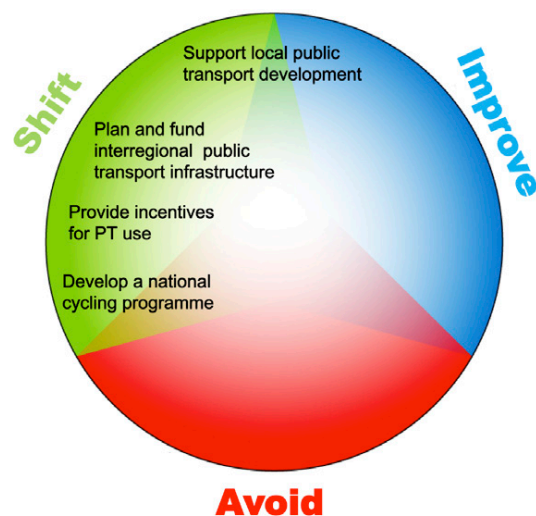
## The concept

Public transport and non-motorised modes offer low-carbon mobility options. High modal shares of public transport (PT), walking and cycling lead not only to reductions in the emissions per passenger kilometre, but also typically reduce transport activity. However, only a well-developed and attractive network offers passengers an adequate alternative to the car.

The role of the national government in the promotion of low-carbon transport modes is threefold: a) the national government is responsible for the interregional public transport system as well as for interregional cycling infrastructure; b) on national level a favourable framework for the use of low-carbon modes on local, regional and national can be set; c) the national government can support local public transport development by targeted grants.

In detail, the national government can promote low-carbon modes for passenger transport by:

- Planning and funding interregional public transport infrastructure;



Source: Wuppertal Institute, 2011

- Supporting local public transport development;
- Providing incentives for public transport use;
- Developing national cycling programmes.

Table 1: GHG reduction matrix of promoting low-carbon modes for passenger transport

	Avoid	Shift	Improve
<b>Direct effects</b>		<input checked="" type="checkbox"/> Attract car and aircraft users to low-carbon modes for long-distance trips <input checked="" type="checkbox"/> Attract car users to low-carbon modes for local trips	<input checked="" type="checkbox"/> Support the use of low-carbon vehicles for PT
<b>Indirect effects</b>	<input checked="" type="checkbox"/> Impedes increasing motorisation <input checked="" type="checkbox"/> Supports Transit-oriented Development (TOD)		<input checked="" type="checkbox"/> High occupancy rates of PT vehicles reduce fuel consumption per passenger-km (pkm)
<b>Rebound effect</b>	<input checked="" type="checkbox"/> Can induce traffic by offering additional, more convenient and probably low-cost services <input checked="" type="checkbox"/> Reduced travel times due to high speed PT can lead to an increase in trip distance		
<b>Complementary measures</b> (to achieve full mitigation potential)	<input checked="" type="checkbox"/> Dense city structures	<input checked="" type="checkbox"/> 'Push' measures on national level (e.g. fuel pricing) <input checked="" type="checkbox"/> 'Push' measures on local level (e.g. parking pricing) <input checked="" type="checkbox"/> Local high quality public transport system	<input checked="" type="checkbox"/> Vehicle fuel economy standards → Modern PT vehicles can reduce fuel consumption

On behalf of

## Box 1: Possible elements of the measure

### Plan and fund interregional public transport infrastructure

Emissions from interregional or intercity transport can be reduced by shifting trips from private cars to transregional public transport networks such as rail systems or long-distance buses.

A comprehensive national plan for interregional public transport helps to coordinate public transport and to merge the networks of different providers. Besides planning and coordination, significant funds have to be dedicated to the public transport infrastructure. Financial resources are especially needed to expand and maintain the interregional rail network. In particular, on heavily used routes between metropolitan areas passenger rail systems can operate very energy-efficient and offer the largest emission reduction potential. In addition to interregional and intercity rail networks, high speed rail systems can contribute to emissions reductions. High speed rail systems are under development in many countries (e.g. Japan, Germany, Italy). They provide an attractive alternative to short-haul flights, which are responsible for the growth in emissions especially in developed countries.

In many developing countries inter-city passenger rail is poorly developed. Inter-city coach systems are a good alternative to rail-based systems or can complement rail networks in rural areas. National bus operators can be state owned so that the government has the responsibility to improve its services. If several private companies operate the system, national regulations can be necessary to ensure an efficient and attractive operation.

#### How it works and intended effects:

- Expansion of the interregional network;
  - ➔ Induces a shift from automobile use to public transport for long-distance trips;
  - ➔ Supports a modal shift for short distance trips (use of local public transport in the destination city).

#### Towards implementation:

- Very costly;
- Expansion of the long-distance rail network is very time consuming (bus based system can provide a cost-effective alternative);
- Long-term benefits for the public and the national economy.

*Responsible actor:* Ministries of transport

### Support local public transport development

In many countries public transport is subsidised, since investments and operating costs are not covered by fares. Often cities lack the necessary financial resources to develop and maintain an attractive public transport system. A national public transport funding programme can provide local authorities with the necessary resources to improve the local public transport system. Financial support is necessary to develop or expand public transport infrastructure. Furthermore, sometimes cities need additional financial support for the system's operation.

The national funds are best tied to emission criteria (e.g. use of energy-efficient public transport vehicles).

#### How it works and intended effects:

- Improvement of the local public transport system through national funding
  - ➔ Shift to public transport on local level
  - ➔ Use of low-emission vehicles for public transport

#### Towards implementation:

- Institutional capacity necessary to channel the funds
- Can be implemented as co-financing scheme between national and local level to ensure efficiency of investments

*Responsible actor:* Ministries of finance and taxation

### Provide incentives for public transport use

Typically, public transport users react sensitive to changes in the ticket price. Elasticity of public transport depends on several factors and usually varies between  $-0.2$  and  $-0.5$ , whereby long-term effects of price changes on ridership are even larger (Litman, 2011a). An approach to incentivise the use of public transport is to provide tax credits for public transport tickets (implemented, e.g. in Canada). Passengers with monthly or annual passes get a credit on their income tax returns.

Moreover, the national government can reduce or abolish value-added taxes (VAT) on public transport tickets to reduce fares. Furthermore, direct national subsidies for the public transport system can enable providers to reduce fares. Especially in developing countries, subsidies ensure that low-income households have access to mobility.

#### How it works and intended effects:

- Reduction of the costs for public transport use
  - ➔ Shift towards public transport and reduction of vehicle ownership

#### Towards implementation:

- Reduced public transport fares have substantial short term effects and additional effects over time
- Tax crediting programme need sufficient institutional capacity to handle the requests
- Cities usually have the power to raise revenues from public transport. Thus, it has to be ensured that the fare reductions are not outweighed by local increases in the ticket price

*Responsible actor:* Ministries of finance and taxation

### Develop a national cycling programme

A national cycling programme is a valuable tool for national governments to encourage cycling. The cycling programme sets common objectives (e.g. rise of mode share, improvement of traffic safety) and identifies a range of actions that have to be carried out on national or local level to achieve this objective. Actions include soft measures such as awareness campaigns, infrastructural measure or alterations of the legal framework for cycling. For instance, guidelines for cycling routes can be regulated on national level. The national cycling programme sets the financial and legislative framework for local cycling strategies. Furthermore, the national cycling programme can dedicate financial resources to improve cycling conditions at regional and local level, since in most countries no budget is earmarked for cycling. The national cycling programme can also support cycling of tourists by developing interregional cycling systems along sights.

Cycling programmes demonstrate political will and raise awareness for cycling. Currently, several countries have developed a national cycling plan (e.g. Germany, Finland, Singapore) (ECMT, 2004).

#### How it works and intended effects:

- Improves cycling conditions
- Raises awareness for cycling
  - ➔ Increases the mode share of bicycles

#### Towards implementation:

- The national cycling programme becomes fully effective when measures are carried out at local level

*Responsible actor:* Ministries of transport

### GHG mitigation effect and co-benefits

The actual emission reduction potential of railway projects depends on the energy source for the railway system (electrified or diesel locomotives) and on the occupancy rate of the trains. In an analysis of the different instruments to reduce emissions from transport in Norway, it was estimated that the development of intercity rail infrastructure could lead to emission reductions of 43 000 tonnes of CO<sub>2</sub> annually. The investigated infrastructure expansion would provide sufficient capacity to double the number of trains connecting Norwegian cities. The emission reduction costs were projected to amount to approximately

EUR 5 700 per tonne of CO<sub>2</sub>. Furthermore, the study investigated the effect of high-speed railways between Oslo and Trondheim and Oslo and Bergen. Currently, these routes have a high passenger volume. Emissions reductions from these two high-speed routes were estimated to reach 164 000 tonnes of CO<sub>2</sub> at cost of EUR 3 000 per tonne of CO<sub>2</sub> (Norwegian Public Roads Administration, 2010). Electrified railway systems offer a high emission reduction potential in Norway due to the high share of renewable energy in the country's electricity mix.

Assessing different policy options to reduce emissions of the Australian transport system, the effects of different levels of fare reductions for urban public transport (through government

subsidies) were analysed. It was found that a 20 % fare reduction would reduce the share of automobile travel by approximately 2 % and a cut in fares of 80 % would lead to reductions of more than 8 %. Fare reductions would affect especially commuting travel, where the use of private cars would fall by 12 %. All in all, emissions from urban passenger transport would be reduced by 4 % (Bureau of transport and communication economics, 1996).

Co-benefits of the support of development of alternative modes for passenger transport are:

- Congestion reduction and consequently reduced travel time;
- Improvements in the local air quality;
- Noise reduction;
- Reduced public transport fares offer an affordable mobility option for low-income households;
- Attraction of foreign investors through a proper national public transport system;
- Health benefits for cyclists;
- Economic benefits.

Towards implementation

The measure intends to provide incentives for all motorists to shift mode. However, in terms of intercity and regional public transport, especially long-distance travellers are addressed. Usually, long-distance commuters especially react very sensitive to improvements in the network and alterations in public transport fares (Litman, 2011a).

Key stakeholders

- National transport ministries:  
Coordinate the trans-regional networks for public transport and are responsible for an attractive public transport system for long-distance trips; Responsible for the national cycling strategy and the development of interregional cycle tracks.
- National ministries of finance and taxation:  
Responsible for the allocation of funds; manage subsidies and responsible for tax credits; can support the development of local public transport infrastructure by providing dedicated funding and increase the attractiveness of public transport trips by reducing their costs.

Table 2: Potential barriers to implementation and countermeasures

Barriers	Options to overcome
High cost for public transport subsidies and infrastructure investments especially for rail	<ul style="list-style-type: none"><li>■ Combine the instrument with revenue generating policies (e.g. fuel taxation) and earmark revenues for public transport expenses;</li><li>■ Compared to the effects of increasing car travel high expenses for public transport can be justified<sup>[1]</sup>.</li></ul>
Various public transport operators on horizontal and vertical levels	<ul style="list-style-type: none"><li>■ Create a multi-agency transport organisation to facilitate a better coordination.</li></ul>
Lack of cycling coordination on national level	<ul style="list-style-type: none"><li>■ Implement a cycling joint working group that co-ordinates national effort and closely cooperates with regional and local institutions.</li></ul>
Distorted public image of cycling	<ul style="list-style-type: none"><li>■ Carry out national public awareness campaigns to promote cycling as a mode of transport.</li></ul>

[1] Transit improvements are often cheaper than the investments necessary to accommodate more urban driving and external cost of public transport are lower (Litman 2011).

Success factors

- Close cooperation between local, regional and national stakeholder to enable interregional coordination of public transport and cycling networks;
- Sufficient financial resource have to be earmarked for public transport and cycling;
- Information and campaigns are necessary to raise awareness for financial incentives for public transport (e.g. tax crediting programmes) and the application process has to be simple.

Practical example: Government programmes in Canada and India

In 2006, the government of Canada introduced a tax credit programme for public transport. Public transit passes with a weekly or longer duration as well as electronic payment cards became tax deductible. Individual citizens have to proof purchase of public transport tickets to claim the tax credit at the national revenue

agency. The amount of the tax credit is calculated from the individual ticket expenses multiplied by the lowest personal income tax rate. For instance, annual expenses for public transport tickets of USD 1 200 would result in a tax credit of USD 180. Up to now, no evaluation of the Canadian tax programme is available. Thus, it remains to be seen whether the measure achieves the government’s objective to reduce congestion and GHG emissions.

In India, the national government developed a funding programme to improve the infrastructure in cities. The Jawaharlal Nehru National Urban Renewable Mission (JNNURM) selected several cities based on their population size and importance. These cities had to create city development plans to obtain targeted funding for specific projects in the areas of land-use, environmental management and urban infrastructure. For instance, in several Indian cities Bus Rapid Transit (BRT) systems were funded by the national government under the JNNURM scheme (Bongardt, Breithaupt and Creutzig, 2010).





Intercity-Express, Germany –  
Photo by Jonathan Gomez, 2011

#### Further reading

- **Bongardt, D., Breithaupt, M. and Creutzig, F. (2010)** *'Beyond the fossil city: Towards low carbon transport and green growth'*, GTZ, Eschborn, Germany.
- **Bureau of transport and communication economics (1996)** *'Transport and Greenhouse – Costs and options for reducing emissions'* Report 94, Australian Government Publishing Service, Canberra, Australia <http://www.bitre.gov.au/publications/68/Files/R094.pdf>, accessed 27 September 2011.
- **ECMT – European Conference of Ministers of Transport (2004)** *'National policies to promote cycling'* <http://internationaltransportforum.org/pub/pdf/04Cycling.pdf>, accessed 28 September 2011.
- **Government of Canada (2008)** *'Tax credit for public transit passes'* [http://www.transitpass.ca/about\\_e.asp](http://www.transitpass.ca/about_e.asp), accessed 28 September 2011.
- **IEA – International Energy Agency (2001)** *Saving oil and reducing CO<sub>2</sub> emissions in transport – Options and Strategies*, IEA/OECD, Paris.
- **Litman, T. (2011a)** *'Transportation Elasticities, Prices and other Factors affect Travel Behaviour'*, Victoria Transport Policy Institute, Victoria, <http://www.vtpi.org/elasticities.pdf>, accessed 31 August 2011.

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