SustraMM

Research paper about the

# Advantages and disadvantages of free public transport services

by Torsten Belter, Maike von Harten, Sandra Sorof (TU Dresden)

EnercitEE

European Union
European Regional Development Fund

INTERREG IVC
INNOVATION & ENVIRONMENT
REGIONS OF EUROPE SHARING SOLUTIONS

# Table of contents

# Introduction

Looking at the emissions emitted in 2005 (1,001 million t $CO^2$-equivalents of greenhouse gases), it is obvious that everything has to be done to avoid the severe climate change. As the sector of traffic contributes heavily (at third place after energy and industry sector) to this alarming amount, we are confronted with a challenging task.[1]

To analyse whether to support free public transport (as one approach on sustainability) or to investigate better alternatives, a list of arguments in favour and against free PT should help forming an opinion.

All conclusions - advantages and disadvantages- are arranged by target groups affected by free public transport (public transport users, the community, the local authority and the public transport operator).

# Aspects for public transport users

## Advantages for public transport users

Public transport is getting **more attractive** as…

- it can be used free of charge.
- it is easy to handle the public transport system without being bothered by a complicated pay scale system.
- the increased demand could lead to a higher frequency and thus a more attractive offer to everybody (Mohring-Effect [2])

Former car users save a lot of money as – in case of abandoning the car – all costs related to the car use do not apply anymore:

- costs for fuel,
- parking costs,
- taxes and costs for insurance,
- depreciation,
- and costs for maintenance and repair etc.

## Disadvantages for public transport users

Because of the increasing demand the current **systems could be overloaded.** If there is not an adaptation of the offer, the PT might get unattractive for the users.

[1] [Maudet 2010]

[2] [Steger-Vonmetz, Dujmovits & Hagen 2008]

# Aspects for the Community

## Advantages for the community

**Younger people** grow up with a self-conception of PT (which creates a demand for such a sustainable transportation system in future).

**Households with low income** (which cannot afford a private car) will be **discharged**, as everyone pays with the taxes. Therefore…

- PT has to be accessible for all, otherwise some people, e.g. those with mobility impairments are charged double (as they have to pay the taxes and suitable transportation apart from PT).
- a progressive taxation of richer people might be considered to support the offer of free public transport services.

As there is no ticket needed, **litter will be reduced** (in some cities tickets have overtaken fast food packaging as the most common form of street garbage). This could lead to saving paper by eliminating the need to print tickets. And it is an advantage for the local authority as well, because they save the cleaning costs.

The amount of **motorised private transport will decrease** (out of experiences a maximum of 50% of the additional PT users are previous car drivers). This results in…[3]

- a decreased environmental load (a bus can substitute 75 car, a tram 90 cars and a train 350 cars).4
- less traffic jam, which leads to travel time reduction of the remaining motorised private transport
- less demand for parking facilities which results in…
  - easier available parking spaces for remaining car users.
  - more space for buildings, parks, bicycle lanes and other things that makes the city more attractive and liveable.
- Additionally there are external costs which are caused by the car drivers but paid by the whole community. Hence the community has to pay less for…
  - the costs related to a damage on the environment (noise, pollution through emissions and land use),
  - the costs which result in deficit of health (noise, pollution, little exercise),
  - and the costs caused by accidents.

Offering free public transport services can lead to a **reduction of greenhouse gas emissions**, other air pollutants, noise pollution and runoff of toxic chemicals into fresh water supplies

According to the APTA study:

> *"…a person who rides public transportation instead of driving reduces his or her carbon dioxide output, a harmful greenhouse gas, by more than 20 lbs. a day and 4,800 lbs. annually. That saves more than weatherizing a home, adjusting a thermostat, switching*

[3] [Maudet 2010]

[4] [Maudet 2010]

*to compact fluorescent light bulbs and replacing older appliances with higher efficiency models, combined. A national climate change strategy that doesn't embrace public transportation has simply missed the bus."* [5]

Considering that we probably already passed "Peak Oil" (this describes a peak where the oil production cannot be raised any more, but steadily decreases[6]), fare free PT could support in reducing the overall **consumption of oil and gasoline.**

Fare free PT can lead to a net positive progress of safety because a reduction in car usage will **cut the number of traffic accidents** (and their (external) costs for individuals and society).[7]

The **demand for taxis is higher** because they complement the public transport supply in areas and times where no bus routes are available (e.g. in remote suburban areas) and people might be willing to take a cab even for shorter distances (this is economically efficient, because it raises the GDP).

## Disadvantages for community

People (especially those who remain car drivers) could judge that **system *unfair***, as everyone pays through taxes for fare free PT without eventually using it.

But, there is infrastructure financed by taxes that are used only by car traffic (e.g. motorways) and exclude other users.

Apparently some people might think, if anything does not cost anything, it is **not valuable**.

At the moment **PT is not totally barrier-free** which is unsocial as mobility impaired people (disabled, older people or those with a buggy) could not use the option, but finance the system.

Free public transport might create a **negative modal shift from walking and cycling** (Many surveys of existing systems (e.g. Templin/Germany) reveal that most additional PT users are previous cyclists and pedestrians.) **and car sharing** (depending on the value of modal-split in the initial situation).This might lead to…

- a negative influence on the public health in consequence of less exercise.
- an increase of $CO^2$ emissions (apparently these emissions are covered by the savings of motorised traffic).

Free public transport may encourage **people to travel more** (the only cost would be their time) which – in case of additional PT offers - might increase individuals' and total level of emissions (induced traffic). Examples are…

- fare free buses or trams which may encourage the inhabitants of the suburbs to travel a longer distance for shopping in the big city centre instead of using their local suburban centres,
- influence on the choice of place of residence, which would provoke travelling longer distances and finally

[5] [Williams & Miller 2007]
[6] [Terry Macalister 2009]
[7] [DVS 2007 - 2011]

- negative influence on the balanced spatial structure which leads to induced traffic.

The free capacity on the streets makes car driving again more attractive and could induce to additional car rides (experiments in Holland showed such results). This can and should be prevented by installing measures to permanently reduce the capacity of road infrastructure. If this is not the case at the end there will be no major modal shift. Model calculations (of Vorarlberg, Austria) show that removing the fares of public transport without accompanying measures **reduce the modal share** of motorised traffic only by 0.4% - 2.1%. This refers to the importance of accompanying measures (push and pull measures).[8]

If PT becomes fare free on the national level or at least in many bigger cities and the car use decreases substantially, the lower demand of motorised private transport may reduce the number of jobs in the automotive sector.

## Aspects for the local authority

### Advantages for the local authority

Less motorised traffic makes the **city more attractive** and increases the quality of life in cities which might lead to…

- advantages like higher economic activity (e.g. through tourism).

In small towns fare free PT is **not much more expensive than conventional PT.** The revenue of the ticket sale of small cities does not cover the costs which guarantee a good public transport system. (In Templin (Germany) only ~14% of the total costs of the public transport could be covered by the ticket revenue. The remaining part has to be financed by subvention.)[9]

According to a study from the VCD (Verkehrsclub Deutschland) nowadays municipalities do spend much more money for the provision of street infrastructure than for PT, meaning that every PT user also subsidises car users. In figures, German cities pay 53-85% of the total cost for motorized traffic which corresponds to 80-90% of the municipal budget.[10]

The cost of car traffic is related to 100-150€ per person and year (depending on the commune). An example: The total expenses for PT in Graz (Austria) are half of the expenses for road traffic. That means even in cities with an exemplary sustainable transport concept like in Graz (Austria) subventions of 169€ per person and year are spend for motorised traffic but only 84€ for PT.[11]

> → *ICLEI offers a calculation program for cities to recover the hidden costs of car traffic*
>
> *http://www.iclei-europe.org/home/*

The **costs for maintenance for streets decline** (if the car traffic volume drops dramatically).

[8] [Steger-Vonmetz, Dujmovits & Hagen 2008]
[9] [Maudet 2010]
[10] [Erdmenger & Führ 2005]
[11] Ibid.

If investing in infrastructure projects like a city tunnel, it is not reversible – in contrast it is **possible to abolish free PT** (though very unpopular), which shows that such a measure holds a lower economic risk for the local authority.
Implementing free PT could **positively affect the image for the tourism industry** (this can be used to attract tourist and ameliorate their mobility).
Public transport empowers the economy:
Public transport providers are important employers for many cities. They provide green jobs, which cannot be delocalised, as it happens with jobs in industrial plants. Investments for public transport create 25% more jobs than an equivalent investment for road or highway construction.
1.2 million jobs are created by public transport providers in Europe and each one is even linked to 4 jobs in other sectors of the economy.
As every Euro earned with public transport is connected to additional 4 € value creation in the whole economy, public transport represents 1-1.2% of the EU GDP. [12]

## Disadvantages for the local authority

A prognosis shows a tendency to decreased future macroeconomic profits of PT services. This decline is mainly because in rural areas there are less people living and using PT (Figure 1).[13] However there are still people who depend on public transport services. That means a minimum service standard has to be maintained.

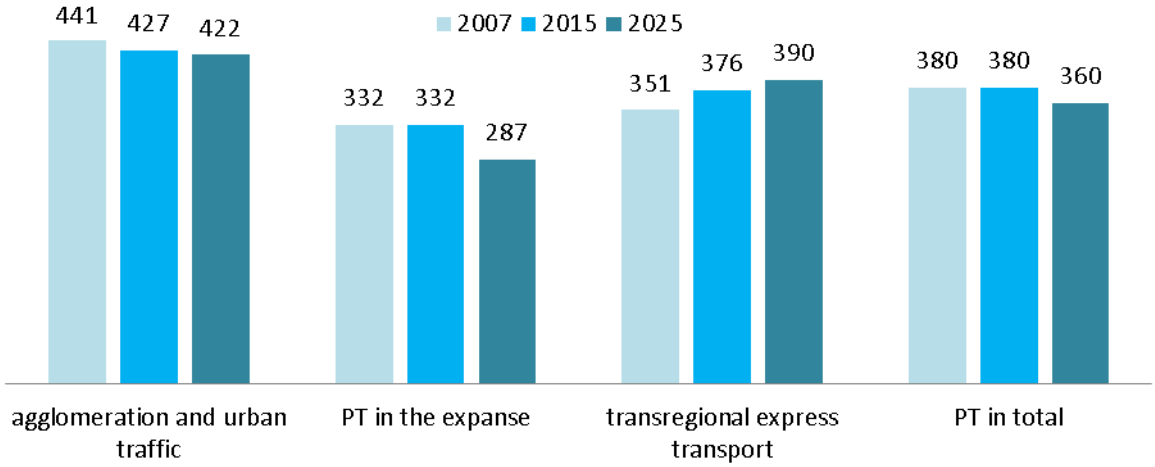


**Figure 1: Index of the macroeconomic profit (consumptive financial requirements of PT = 100[14])**

Especially in bigger cities a huge amount of **money earned through ticket sales** (in Berlin currently about 666 Mio € per year) **would have to be replaced** by the local authority and furthermore the cost recovery in big cities is usually higher (in Hamburg about 85% of the

[12] [UITP 2012]
[13] [Geißler und Jetzki 2010]
[14] Ibid.

required costs are covered by the ticket sales). Therefore it is much easier to realize a fare free public transport system in smaller town.[15]

## Aspects for the public transport operator

### Advantages for the public transport operator

For the public transport provider it is **easier to calculate the costs** for investments, because they would have a fix income through the taxes.

The local PT operator saves the expenses for the fare system. This includes…

- costs for tickets and their printing.
- costs for installing ticket machines and their maintenance.
- costs for staff selling the tickets.
- costs for ticket inspectors.

Allowing **passengers to use all bus doors** for entrance and exit, makes service **faster** (this is an advantage for the PT users as well) and **more efficient**. Additionally, bus-drivers save time, as they do not need to sell tickets.

Fostering more **public pride** in shared community resources ("this is our public transport"), could result in **less damage** than before as "inhabitants have made buses theirs" through partnerships with public institutions (an evaluation of free public transport in Aubagne/France discovered that there was less damage than before [16]).

**Saving staff costs; disappearing jobs for ticket inspectors can be covered** by a higher demand on bus drivers or service staff (they may change the business from inspector to bus driver).

Reducing the motorised private transport could lead to less traffic and a **travel time reduction** in the PT (which could save some vehicles as well while offering the same number of rides) [17]. Therefore the operating costs could decrease.

### Disadvantages for the public transport operator

As the ridership of PT would increase heavily, current **systems could be overloaded then** which requires additional funding for the extension of the system. This might evoke a resistance to improve and promote fare free PT.

- The planning of the estimated demand in the future meaning might be hard to forecast. This could result in unexpected problems with huge lack of capacity.
- The sale for tickets to destinations out of the free area still has to be pursued. This is a hint for the suitability of fare free PT in isolated cities.

[15] [BVG & Institution of public law 2010]

[16] [Robert 2011]

[17] If the travel time of a PT vehicle from a starting point to the end can be reduced by about 5min (35min. travel time instead of 40min.), the circulation of that route will be even 10min. faster and saves another vehicle (at a 10-min frequency).

- It makes sense to fully use the allocated capacity (additional passengers will not cost significantly more), but if the PT is already operating at the maximum capacity, every extra passenger would cause new costs.

Apparently it could be reasonable to offer free PT at off-peak times.

## Good practice example - Hasselt

Since 1997 the **Belgium city of Hasselt** (centre of administration and trade) is offering fare free public transportation for his ~70.000 inhabitants and 200.000 commuters from the surrounding area! [18] As the city had a serious problem with the traffic (cars crowding the city, insufficient parking spaces) the conditions were disappointing for all traffic users. The percentage of car holders in Hasselt increased about 25.4 % from 1987 to 1999, despite an increase of inhabitants of 3.3%. Hasselt ranked first in car-ownership as being only the 4th largest city in Belgium.[19]

Therefore the mayor Steve Stevaert decided to curb the car traffic and to extend the bus system. But besides making the public transport free, there were a lot of other **measures taken before**:

Instead of expanding the four-lane ring road, the street became a pedestrian- and bicycle-friendly **Green Boulevard** with 400 new trees.[20]
**800 parking's in the city were eliminated** and the fee for parking were determined to 1€ for the first hour and 10€ for half day (investing the revenues for the public transport).
Walking and cycling infrastructure was radically improved (spacious zones, new facilities- So, in 1998 Hasselt was awarded the 'Banner of the Federation of Pedestrians').[21]
The infrastructure of intersections and streets was adapted as **buses needed separate lanes** (travelling by bus should be faster than by car). Even five new bus lines (earlier Hasselt had 4) were opened and meanwhile (July 2000) 510 trips per day take place (84 trips per day before the mobility project). As shown in Figure 2 & 3 the accessibility has been significantly improved.
**Car-free areas** (network of pedestrian streets) with free guarded bike racks and luggage guard services were installed.
Everyone can **borrow a bicycle, tandem, scooter or wheelchair free of charge** (on the Groenplein (pedestrian area). People can also borrow a stroller free of charge and two wheelchairs are available for free from the tourism bureau).[22]
**Busses became accessible for disabled** so that wheelchair users have access to the entire fleet of buses and can even reserve a spot by calling the "Belbus" line an hour in advance.[23]

[18] [ILSR 2009]
[19] [Lambrechts 2002]
[20] [Sust.org], p. 6
[21] Ibid.
[22] [Olson 2007a]
[23] [Olson 2007b]

The number of bus lines rose by the time from two to 50, the bus frequency was raised (5 to max. 30 min.) and the bus system was improved every year.[24]

**Figure 2: Road network with bus grid in 1987**

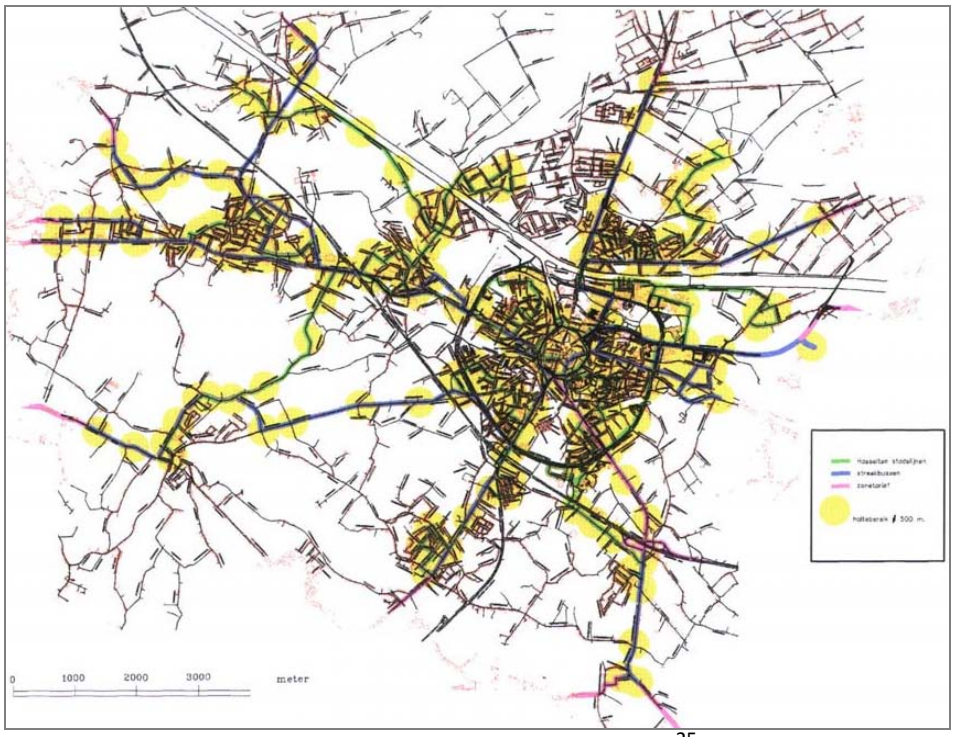


**Figure 3: Accessibility of PT stops after implementation**[25]

After the implementation of the new mobility plan, many positive effects can be noticed. However it should be kept in mind that **this was achieved by both** the elimination of fares as well as the implementation of bus priority measures such as separated bus lanes **(pull**

[24] [Gramm & Pesch 2009; p. 13, 14]
[25] [Gramm & Pesch 2009; p. 13,14]

**measures) and push measures** like cutting the number of parking spaces and increase parking fares.

## Some interesting figures from Hasselt:

In November 1997, 16 per cent of all bus riders previously drove a car.[26]
More than 40 per cent of the people visiting hospitals switched from a car to the bus. [27]
More than 32 per cent of the people "going to market" switched from using cars to buses. [28]
Up to 30% more people come into the city and upgrade the sales.
33% of the bus users did not travel at all before. The remaining two-thirds of the bus users who have already come a way, can be divided as follows: [29]

- 54,3% used the bus even before
- 22,8% travelled the way by car before
- 18,4% rode by bike before
- 13,9% were pedestrians before the introduction of the free PT

Talking about the costs of the new Mobility plan, it should be mentioned that the revenue from the ticket sales had just covered 9 % of the total costs for the public transport. However, **after the implementation the city spends even less money** (1.26% of annual municipal budget)[30] **on transportation with the new Mobility plan, despite the increased cost for pedestrian, cycling, and PT infrastructure and services.** So the city of Hasselt even saves money with this innovative mobility plan! But the measure is just partly financed through the municipal budget (1.8Mio US-$ in 2006, covering 26% of the costs) and the rest contributes the Flemish national government.[31]

## Further examples[32]

Further examples of fare free public transport services are the city of Templin (Germany), the free transit zone in Perth (Australia), Aubagne near Marseilles ( France), Island Transit on Whidbey Island (Washington) or the 7th Avenue free fare zone in Calgary (Canada). [33] And there are free rides in Zagreb (Croatia) (usage of public transport 2 stops from main square are free of charge since 2009 and several months later, two additional stops were also announced as free of charge, on the edge of area, there are several public garages, so car drivers can park their cars).[34] Actually there are numerous examples of systems which became fare free at some point or were free right from the start. There can be found exemplary fare free systems of public transport all over the world

[26] [Olson 2007a]
[27] [Olson 2007a]
[28] [Olson 2007a]
[29] [Kalbow 2001]
[30] [Gramm & Pesch 2009; p. 17]
[31] [Olson 2007a]
[32] [http://freepublictransit.org/Success_Stories.php]
[33] [Sidawy 2010]
[34] [EST goes EAST Clearing House]

## Conclusion

Removing fare boxes is not enough, but the measure has to be planned well in advance while keeping the whole system in mind. Within this sustainable mobility policy, there are two traffic policies: a Large Traffic Policy and a Small Traffic Policy.
The Large Traffic Policy includes the public transport policy (fare-free transit with appropriate service levels), a Mobility Plan (dissemination of policy, car-free days, shop by bike and so on), Cycle Policy Plan, Parking Policy Plan, a possible programme of transitory fares, Green Boulevard and an Outer Ring Road Plan for example.

The Small Traffic Policy offers quicker solutions to local residents like "no parking" signs, speed humps (sleeping policemen that prohibit speeding), raised crosswalks, street narrowing's (corner and mid-block bulges), and many others.

By following these **push** (degradation of the conditions for car drivers) **and pull principals** (offering an incentive with the fare free public transport), the measure will be more effective and successful!

Making transit free of charge as an incentive to PT, but will not allow in itself huge numbers of people to abandon their cars. In many cases, more public transit vehicles, running more frequently are required, too. Additionally, buses and shelters have to be attractive. The decade-old experience in Hasselt has shown that investing in the service beforehand, not only makes the transition smoother, it will get people on the bus and out of their cars.

# Bibliography

## Sources concerning the research on fare free public transport


[BVG & Institution of public law 2010] *Bericht über das Geschäftsjahr - 1. Januar 2010 bis 31. Dezember 2010 der Berliner Verkehrsbetriebe (BVG) & Anstalt des öffentlichen Rechts* (DE) [Report on business – 1. January 2010 to 31. December of the Berlin transport operators and the institution of public law] www.bvg.de/index.php/de/binaries/asset/download/900847/.../1-1 August 2012

[DVS 2007 - 2011] *Getötete bei Verkehrsunfällen nach Art der Verkehrsbeteiligung 2007-2011* (DE) [Persons killed in traffic accidents sorted by traffic involvement], published by Deutscher Verkehrssicherheitsrat (DVS) [German traffic security council] 2007 – 2011 http://www.dvr.de/betriebe_bg/daten/tabelle2.htm June 2012

[Erdmenger & Führ 2005] *Versteckte Kosten des städtischen Autoverkehrs* (DE) [Hidden Subsidies for Urban Car Transportation], published by Christoph Erdmenger & Vivien Führ in 2005 http://www.increase-public-transport.net/fileadmin/user_upload/Procurement/SIPTRAM/Hidden_Subsidies/German_leaflet_final.pdf June 2012

[Geißler und Jetzki 2010] *Finanzierungsalternativem im ÖPNV* (DE) [Financial alternatives in public transport], published by Dr. Torsten Geißler & Dipl.-Wirt. Ing. Martina Jetzki in September 2010 http://www.michaelservos.de/wp-content/Nulltarif.pdf June 2012

[Maudet 2010] *Nulltarifsystem im öffentlichen Personennahverkehr (ÖPNV). Theorie und Praxis der Finanzierung* (DE) [Fare free public transport. Theories and practical experience with financiation], published by René Maudet in 2010, degree dissertation http://www.schwarzfahren.de/pdf/2010_maudet_nulltarifsystem-im-oepnv June 2012

[Steger-Vonmetz, Dujmovits & Hagen 2008] *Nulltarif im öffentlichen Verkehr ökonomische, gesellschaftliche und verkehrspolitische Aspekte der Einführung eines Nulltarifs im Verkehrsverbund Vorarlberg* (DE) [Fare free public transport: economic, social and traffic political aspects for the implementation of fare free system fort he transport provider Vorarlberg], published by Christian Steger-Vonmetz (coord.) Rudolf Dujmovits & Angelika Hagen in December 2008 http://www.uni-graz.at/igam7www-wcv-wissber-rudolfdujmovits-nr28-dez2008.pdf June 2012

[Terry Macalister 2009] *Peak oil: what does the data say?* (EN), published by Terry Macalister in 2009, The Guardian http://www.guardian.co.uk/news/datablog/2009/nov/13/peak-oil-iea-uppsala?INTCMP=SRCH June 2012

[UITP 2012] *Public transport empowers the economy* (EN) published by International association of public transport (UITP) in 2012 http://www.uitp.org/advocacy/pdf/empowers_the_economy.pdf June 2012

[Williams & Miller 2007] *Public Transportation Use Substantially Reduces Greenhouse Gases, According to New Study* (EN); published by Mantill Williams & Virginia Miller in September 2007 http://www.apta.com/mediacenter/pressreleases/2007/Documents/070926_climate_report.pdf June 2012

## Sources concerning the research on the example in Hasselt


[EST goes EAST Clearing House] *Improving public transport in Zagreb – Croatia* (EN) on Webpage: Environmentally Sustainable Transport goes EAST Clearing House http://esteast.unep.ch/index.php?option=com_content&view=article&id=141&Itemid=27 June 2012

[Gramm & Pesch 2009; p. 13, 14] *Kostenlose Nutzung des ÖPNV am Beispiel der Stadt Hasselt (Belgien) Grundlagen, Umsetzung und Evaluation sowie Übertragungsmöglichkeiten des Modells auf deutsche Verhältnisse am Beispiel des Aachener Verkehrsverbundes (AVV).* (DE) [Fare free usage of public transport on the example of Hasselt (Belgium): basics, implementation, evaluation and transfer of this model with German circumstances with the example Aacherner transport provider], published by Michael Gramm & Markus Pesch in August 2009 http://www.boeckler.de/pdf_fof/S-2009-207-4-1.pdf June 2012

[http://freepublictransit.org/Success_Stories.php] Successful Implementation of free public transit all over the world (EN) http://freepublictransit.org/Success_Stories.php June 2012 (expired)

[ILSR 2009] *Transit Policy – Hasselt, Belgium* (EN), published on Homepage: Institute for Local Self-Reliance in January 2009 http://www.ilsr.org/rule/land-use-policy/2468-2/ June 2012

[Kalbow 2001] *Wirkungsanalyse des Nulltarifs im ÖPNV am Beispiel der Stadt Darmstadt* (DE) [Analyses of the effects of fare free public transport with the example of the city Darmstadt], published by Michael Kalbow in Köln 2001, degree dissertation http://www.ivda.de/ivda3/files/nt/D_Arbeit.pdf June 2012

[Lambrechts 2002] *Hasselt gemeinsam anders mobil – Eine Geschichte über eine nachhaltige Verkherspolitik in Hasselt zu Beginn des 21. Jahunderts* (DE) [Hasselt together different mobile – A history about a sustainable traffic policy in Hasselt at the begin of the 21. century], published by Daniel Lambrechts in January 2001 and updated in May 2002 http://www.unet.univie.ac.at/~a8727063/Oeko/hasselt.html June 2012 (data file „Hasselt.doc" with a detailed plan on the Mobility Plan in Hasselt and it´s results with extended data, p. 3)

[Olson 2007a] *Fare-Free Public Transit Could Be Headed to a City Near You* (EN), published by Dave Olsen in July 2007 http://www.alternet.org/environment/57802?page=1 June 2012

[Olson 2007b] *No Hassle Transit? Try Hasselt* (EN), published by Dave Olsen in July 2007 on "THE TYEE" http://thetyee.ca/Views/2007/07/09/NoFares3/ June 2012
See also: Three English interviews with Dave Olsen – an author who is dedicated with fare free public transport and especially with the Hasselt-case (EN) published by the Tyee in 2007 http://thetyee.ca/Views/2007/07/05/Dave_Olsen.mp3 (audio data) June 2012

[Robert 2011] *Aubagne aura le premier tramway au monde entiérement gratuit!* (FR) [Auubagne – fare free street cars – a first], Published by Marcel Robert July 2011 http://carfree.free.fr/index.php/2011/07/06/aubagne-aura-le-premier-tramway-au-monde-entierement-gratuit/ June 2012 http://fptsuccess.blogspot.com/2011/07/aubagne-fare-free-streetcars-first.html (EN) June 2012

[Sidawy 2010] *Free transport in Aubagne: why it works* (EN), published by Elsa Sidawy in July 2010 http://www.innovcity.com/2010/07/28/free-transport-in-aubagne-why-it-works/2/ June 2012

[Sust.org] *The Green Boulevard Hassselt/ Belgium – case study* (EN); published by Sust.org – a Scottish webpage dedicated to sustainable design in architecture and the built environment http://www.sust.org/pdf/hasselt.pdf June 2012