public bikes and sustainable mobility
Opportunities and Limitations From a Social Ecology Perspective

MASTER’S THESIS
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ABBREVIATIONS AND ACRONYMS

CDM  Clean Development Mechanisms (Kyoto Mechanism)
CFCs  Chlorofluorocarbons
CO₂  Carbon Dioxide
COP  Conference of the Parties to UNFCCC
CTC  Cyclists’ Touring Club (UK)
EEA  European Environment Agency
ENCE  European Network for Cycling Expertise
ESUM  Ecological Sustainable Urban Mobility
ICLEI  International Council on Local Environmental Initiatives
IPCC  Intergovernmental Panel on Climate Change
ISOE  Institute for Social Ecological Research (GER)
JI  Joint Implementation (Kyoto Mechanism)
O₃  Ozone
OECD  Organisation for Economic Co-operation and Development
SO₂  Sulphur Dioxide
UCLG  United Cities and Local Governments
UNCCC  United Nations Climate Change Conference
UNDSD  United Nations Division for Sustainable Development
UNEP  United Nations Environment Programme
UNFCCC  United Nations Framework Convention on Climate Change
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1 GETTING THE BALL ROLLING

Unfettered yet fitting in perfectly,
Unconventionally conventional,
An independent form of movement.

- Carlo Castelvecchi

Urban air pollution and traffic congestion are among the key environmental challenges facing European cities in the 21st century, to which municipalities are now tasked with finding a solution. A growing number of cities claim to have found the answer: the bicycle. This timeless 19th-century-technological revolution has experienced a revival in recent years and is currently evolving into the greatest trend in urban public transportation (Horx 2008). Infected by the “bike-mania” spirit, European cities are reinventing the bicycle, reintroducing it as “individual public transport”. In this context, the bicycle is more than just a human-powered vehicle on two wheels, it is part of a complex service - the public bike scheme.

Custom-built bicycles are strategically placed at computerised rental points throughout the city, offering a flexible mode of transport, accessible to all. The idea of bike-sharing is rooted in the attempt to improve mobility for all members of the society, while reducing motorised traffic volume and thus responding to the requirement to cut greenhouse gas emissions. It forms part of a greater solutions-approach to climate change and although its direct contribution appears minimal in view of the global dimension of the issue, bike-sharing can play a vital role in addressing the problem. Principles of bike-sharing have the potential to encourage more sustainable and healthy urban lifestyles (Beatley 2000:7) in a manner consistent with the vision of green urbanism. Following the development of high-tech public bike systems, the idea of bike-sharing gained momentum in 2005 with the installation of vélo‘v in Lyon, France. The boom, however, started in summer 2007 when Paris implemented the largest worldwide public bike scheme with over 20,600 bicycles, which some identify as “la Vélorution” - a French play on words merging vélo (bicycle) and revolution.

For this dissertation, Lyon and Paris - key players in the public bike universe - serve as examples to engage with both the potential and the limitations of the scheme. Based on social ecological approaches to urban transportation, the thesis investigates the capability of public bikes to achieve a more sustainable mobility culture. Social ecology does not perceive mobility as mere physical movement from A to B; instead it conceives mobility as a multi-dimensional phenomenon including social, mental and communicational spheres (Becker and Jahn 2006). It therefore combines physical mobility with social equality concerns and places it in relation to environmental issues. While the freedom of people’s physical movement is inevitably
linked to social mobility, it needs to be ensured in an ecologically sustainable manner. Public bikes are therefore analysed according to their contribution to sustainable urban mobility with regards to social and environmental concerns. Economic implications and the feasibility of public bike schemes in terms of finance will only be marginally discussed. The very few existing studies on public bikes already cover the economic dimension, so I refrain here from repeating a similar analysis (see Beroud 2007). Consistent with the tradition of social sciences, I intend to shed light on previously overlooked aspects by combining empirical data with theoretical concepts. It is not yet possible to write a fully-fledged status report of public bike systems at this early date, so this thesis should be regarded as an exploratory study, which seeks to prepare for more in-depth research in this field. Due to the dynamic nature of transport systems, the assumptions formulated in this paper are based on facts available today, which are likely to change in the near future. In fact, the thesis intends to contribute to the evolution of public bikes by encouraging engagement with the potential and drawbacks of the system.

With this thesis, I seek to provide a thought-provoking study for both those who disregard bicycles as a viable mode of transport and prefer to stick to the use of polluting vehicles, and those who blindly follow the emerging bike-sharing crowd. I plan to look at perspectives normally unexplored within the confines of the debate and encourage engagement with the persistent issue of urban transportation. The implementation of public bike schemes illustrates a genuine effort of European municipalities to confront the issue of polluting traffic and points a way forward in the quest for solutions. At the same time, I aim to promote a more critical approach to the latest form of public bike schemes, incorporating the social, environmental and political implications. Hence, this study highlights the opportunities of this form of sustainable transport while also revealing opportunists who make use of the boom to realise political and economic interests at the expense of social and environmental concerns. Based on the proverb “all that glitters is not gold”, the main purpose of the thesis is to stimulate an open discussion on public bikes.

The structure of this thesis broadly falls into three parts, namely the background of the topic, its conceptual framework, and the discussion of the empirical data with reference to theoretical concepts. The first part commences with Chapter 2, which embeds the topic within its wider context and establishes the link between the climate change debate at the global level and the activity of municipalities at the local level. The Fourth Assessment Report of the Intergovernmental Panel on Climate Change serves as a basis to introduce the reader to the latest findings on climate change. The section draws on international agreements, notably the Kyoto Protocol, to highlight divergent views on proposed solutions. Thereafter, the section highlights the role of cities in general and urban transport in particular with regards to the global issue of climate change. Though urban centres are major contributors to global warming, they are also hubs of innovative solutions for curbing climate change. Therefore, the section explores sustainable modes of transport and introduces the bicycle as a viable means of urban mobility. Finally, the public bike scheme is presented as the municipalities’ effort to establish cycling as part of peo-
This section examines how the idea of bike-sharing evolved into today’s public bikes through three separate generations.

Chapter 3 develops the study’s conceptual framework by using the mapping methodology of Hopwood, Mellor and O’Brien (2005). In order to establish a normative definition of ecological sustainable urban mobility, the section discusses various concepts that influence the sustainability debate. With the help of a coordinate system, the section describes the evolution from neo-liberal economics over market environmentalism, green consumerism, ecological modernisation to sustainable development and social ecology. The final part argues for a paradigm shift from sustainable urban transport to ecological sustainable urban mobility, which is used as a benchmark for the evaluation of public bike schemes.

The fourth chapter draws attention to the cases of Lyon and Paris and discusses the advantages and shortcomings of public bikes. To set the scene, the situation for bicycles in both French cities is examined and the circumstances of implementation for vélo’v in Lyon and velib’ in Paris are covered. To familiarise the reader with both systems, the section provides technical information on the schemes as well as an introduction to the terms of use. With reference to vélo’v and velib’, the section goes on to identify direct and indirect opportunities and gaps in the scheme with regards to its contribution to ecological sustainable urban mobility.

Finally Chapter 5, taking into account new theoretical insights and recent empirical findings, provides a synthesis and an outlook on potential research fields.
2 FROM CLIMATE CHANGE TO PUBLIC BIKES

Public bikes are not only presented as a new mode of transport but also as a means to combat air pollution and to reduce greenhouse gas emissions. The mayor of Paris, Delanoë (cited in Marie de Paris 2007b:3), insists:

Vélib’ porte ainsi la signature de la contribution des Parisiens aux combats essentiels pour la réduction de la pollution et des émissions de gaz à effet de serre. ¹

The contribution of public bikes to mitigating climate change at the global level may be minor; however, it is crucial to understand their interrelationship. Climate change comprises both global and local dimensions, as local causes may have global impacts and vice versa. The following sections describe the process of narrowing down the scope of the study in four steps: the global scope of climate change, the causal relationship between cities and climate change, the contribution of urban transport to climate change, and finally the local scope of public bikes and their direct influence on the reduction of greenhouse gas emissions leading to their indirect influence on climate change.

2.1 THE DEBATE AROUND CLIMATE CHANGE

Climate change is one of the hottest topics of public debate, involving politicians, business companies, non-governmental organisations (NGOs), the general public and the media. Evans and Steven (2007:2) observed a shift from climate change being a green issue discussed among NGOs and business companies, to being a political issue as governments entered the debate foremost through the UN Conference on Environment and Development 1992 in Rio de Janeiro.

To define the issue, I rely on United Nation’s Intergovernmental Panel on Climate Change (IPCC), as “most authoritative source of information” (Dunn and Flavin 2002):

Climate change in IPCC usage refers to any change in climate over time, whether due to natural variability or as a result of human activity. (IPCC 2007a:2, footnote)

Although there is a high degree of consensus among the scientific community on the existence of climate change and the role humans play in causing it, Giddens (1999) has the right to ask whether “global warming [is] occurring and [whether] it has human origins”. He answers the question himself by saying “probably - but we won’t, and can’t, be completely sure until it is too late” (Giddens 1999).

¹ Vélib’ [the public bike scheme] therefore illustrates the contribution of Parisians to the essential battle to reduce pollution and greenhouse gas emissions.
Before it is "too late", a serious debate around climate change is vital. The following sections shed light on the current scientific findings as published in the Fourth IPCC Assessment Report *Climate Change 2007*, on the historical origins of scientific and political perceptions of the issue, as well as on the "solutions-debate" with emphasis on the Kyoto Protocol (Evans and Steven 2007).

### 2.1.1 Causes and Effects of Climate Change

Since the beginning of climate change science, researchers have struggled to locate certainties, determining the causes and effects of climate change, and predicting future scenarios. The Assessment Reports of the IPCC are perceived to be the most reliable source for contemporary scientific evidence on causes of climate change, as they are the product of strict procedures in which scientific, technical and socio-economic information are reviewed by hundreds of experts. The Fourth Assessment Report reveals a high degree of consensus among the scientific community concerning the existence, causes and effects of climate change (IPCC 2007a:10).

The IPCC (2007a:12) highlights anthropogenic sources as causes of climate change, in particular fossil fuel use, land use changes and agriculture emitting carbon dioxide (CO$_2$), methane and nitrous oxide. As pointed out in the synthesis report (IPCC 2007c:5), “carbon dioxide (CO$_2$) is the most important anthropogenic GHG [greenhouse gas]”. Furthermore, “its annual emissions grew by about 80% between 1970 and 2004”. Energy supply (25.9%), industry (19.4%), forestry (17.4%) and transport (13.1%) are among the sectors with the largest share in anthropogenic greenhouse gas emissions. The causal link between road transport and CO$_2$ emissions will be discussed in more detail in section 2.3.

Looking at effects of climate change, the IPCC (2007a) observes numerous environmental alterations, which are perceived to be of anthropogenic origins. The effects can be summarised as follows:

- Unusual increase in global average air and ocean temperatures, with eleven of the past twelve years (1995-2006) ranking among the warmest years since measurement commenced (1850).
- Melting of glacier and ice caps as well as rises in global sea level by 0.17m
- "[C]hanges in precipitation amounts, ocean salinity, wind patterns and aspects of extreme weather including droughts, heavy precipitation, heat waves and the intensity of tropical cyclones" (IPCC 2007a:7)

In considering future scenarios, the Fourth IPCC Assessment Report (IPCC 2007a:17) concludes:

>[P]ast and future anthropogenic carbon dioxide emissions will continue to contribute to warming and sea level rise for more than a millennium, due to the time scales required for removal of this gas from the atmosphere.

Effects and causes of global climate change can indeed have a local scope, so that polluters and victims of extreme weather are often to be found in different geographical regions. Heidi Bachram (2004:5) insists that high-income, industrial
countries are the main producers of greenhouse gas emissions. Based on findings of the World Resource Institute, she highlights that “the US and the EU, with only 10 percent of the world’s population, are responsible for producing 45 percent of all emissions of carbon dioxide (CO₂)” (Bachram 2004:5).

With regards to the human dimension, the Global Environment Outlook 4 of the United Nations Environment Programme (UNEP) summarised the effects of climate change in the following way:

Climate Change affects the warming and acidification of the global ocean; it influences the Earth’s surface temperature, the amount, timing and intensity of precipitation, including storms and droughts. On land, these changes affect freshwater availability and quality, surface water run-off and groundwater recharge, and the spread of water-borne disease vectors and it is likely to play an increasing role in driving changes in biodiversity and species’ distribution and relative abundance. (UNEP 2007b:70)

The UNEP (2007b:72) calls attention to the impact of climate change on livelihoods threatening food security and water availability. IPCC’s working group II of the Fourth Assessment Report (2007b:813) adds that the vulnerability to impacts of climate change are most severe in areas where non-climatic stresses, such as poverty, are already present. Air pollution is thought to be a principal cause of myriad premature deaths, and although air quality has improved in some cities, UNEP urges drastic steps to reduce greenhouse gas emissions (UNEP 2007:72).

2.1.2 Historical Origins of Climate Change Science

To a patient scientist, the unfolding greenhouse mystery is far more exciting than the plot of the best mystery novel. But it is slow reading, with new clues sometimes not appearing for several years.


Scientists and “ordinary” people alike have long been fascinated by the climate and suspect that the weather can be influenced by human activities (Weart 2007). The following paragraphs highlight the scientific milestones, which most influenced the course of climate change science.

According to Evans and Steven (2007:4) the scientific history of climate change had its origins in the discovery of the greenhouse effect in 1827 by the French physician Jean-Baptiste Fourier in his work Mémoire sur les temperatures du globe terrestre et des espaces planetaire. Fourier (1827) discovered that the Earth retains heat generated by the Sun and the Earth’s surface warms as a result of the atmosphere.

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2 See Appendix D for a graphic on the greenhouse effect and global warming
3 W.M. Connolley translated Fourier’s work as “Memoir on the Temperature of the Earth and Planetary Spaces”. 
Using Fourier’s concept of the greenhouse effect, Arrhenius (1896:270) introduced the idea of human-caused carbonic acid\(^4\) affecting the Earth’s climate by stating “... carbonic acid ... is supplied to the atmosphere chiefly by modern industry ...”. However, according to Evans and Steven (2007:4) Arrhenius did not perceive climate change as an urgent issue, as he thought the process would take thousands of years and that technological innovation would solve the problem before humans were seriously affected by climate change.

In the 1930s public awareness of air pollution increased, while at the same time people reported significant warming trends. These observations by laypeople were supported by the amateur Callendar who “… insisted that greenhouse warming was on the way” (Weart 2003).

Yet, it was only in 1961, a major “milestone in climate change science” (Evans and Steven 2007:5), that the scientist C.D. Keeling found out that carbon dioxide (CO\(_2\)) concentrations grew quickly from year to year. While the scientific community became increasingly interested in the phenomenon of climate change, public awareness usually peaked and fell depending on disasters and media coverage. One of the peaks was in 1988, when heat waves and severe droughts hit the central United States with up to 5000 related fatalities. In the same year, the United Nations founded the IPCC indicating that, while public interest declined soon after climate related disasters, the scientific community remained interested.

2.1.3 Contemporary Context of the Climate Change Debate

The climate change discourse of 2007/08 is a product of a series of previous environmental discourses, in particular the acid rain discourse, which began to take shape in the 1960s followed by the “ozone debate” of the 1980s. The emphasis on climate change gained momentum in the late 1980s with the foundation of the IPCC, as mentioned above. As Hajer (1993:43) points out, climate change is part of a set of “new environmental issues” calling for a new approach in environmental policy, as the problems can no longer be localised. According to him (Hajer 1993:43), “before the early 1980s pollution problems were fairly localized and were approached on an ad hoc basis: if incidents occurred, a solution was found”. The acid rain discourse provoked policy-makers to give up this ad hoc strategy and to turn towards more integrative measures requiring international cooperation.

Hajer (2005:300) made extensive studies of environmental discourses from the 1960s onwards; here I rely on his definition of “discourse”:

Discourse is defined here as an ensemble of ideas, concepts, and categories through which meaning is given to social and physical phenomena, and which is produced and reproduced through an identifiable set of practice. ... It is important to point out that discourse, thus understood, is not synonymous with

\(^4\) ‘Carbonic acid’ describes the solution of carbon dioxide (CO\(_2\)) in water (H\(_2\)O) and has H\(_2\)CO\(_3\) as its formula. For further explanation on the decomposition of carbonic acid see: http://www.newton.dep.anl.gov/askasci/chem99/chem99661.htm
discussion: a discourse refers to a set of concepts that structure the contributions of participants to a discussion.

According to Hajer (2005:300), environmental discourses are embedded in particular perceptions of the environment reflected in existing practices used to handle environmental problems. He uses the example of the acid rain debate to illustrate the discursive structure of the environmental discourse, including the evolution of the argument and the role of participants, involving scientists, politicians, environmental activists, the media and the public alike. Acid rain was used as metaphor for ecological crises in general that changed the discussion of air pollution and provoked institutions to react differently to the issue. During the 1950s, air pollution was perceived in terms of “urban smog” and was therefore confined to cities, so that responses to air pollution were concentrated accordingly in cities (Hajer 2005:303). Acid rain served as a means to break with this traditional perception and include the countryside within the focus of institutional responses. As the acid rain discourse took shape, it evolved into a policy issue with two competing discourses: “traditional pragmatism” and “ecological modernisation” (Hajer 2005:310).

The first discourse perceived acid rain as a domestic “incident” related to sulphur dioxide (SO₂) emissions in coal-fired power stations in the UK and pointed to the UK’s existing policy of pollution reduction as a solution to the issue. Traditional pragmatists did not push for a change in policy-making unless “… experts showed it would solve real environmental problems in an effective and economically feasible way …” (Hajer 2005:311).

The second position perceived acid rain as a transboundary issue and called for institutional change in the domestic as well as international arena. Eco-modernists pushed for immediate action on the grounds of the “precautionary principle” arguing that measures need to be taken even if the impacts of acid rain lacked supporting scientific evidence. Taking as their basis the principle “pollution prevention pays”, they argued that environmental care can be a profitable business because of the necessary investment in research and new equipment (Hajer 2005:311). In section 3.2.2, I discuss the concept of ecological modernisation in more detail.

Overall the acid rain debate moved the issue of air pollution to the centre of political debate and triggered a discussion around responses to transboundary environmental issues. The precautionary principle and eco-modernist approaches emerged as new concepts in environmental politics and are still guiding contemporary policies.

The second event in the series of new environmental issues emerged in the mid 1980s when scientists discovered a hole in the Earth’s ozone layer resulting from chemicals that deplete the ozone layer, such as chlorofluorocarbons (CFCs) (Andre

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5 Acid rain describes the phenomenon when sulphur dioxide (mainly from smelters and coal burning power plants) and nitrogen oxides (mainly from automobile exhaust) react in the atmosphere with oxygen to result in acidic precipitation are acid deposition. Biological organisms in aquatic systems are affected as well as plants and buildings (for details see McCormick 1989)
and Velasquez 1990; see also Lieberman 1998). This observation forced governments to perceive air pollution as a transboundary issue with global dimensions requiring global policies.

One landmark in the evolution of international agreements on combating air pollution was reached in 1987 with the Montreal Protocol on Substances that Deplete the Ozone Layer, initiated by UNEP, which came into force in the year 1989. The parties to the protocol acknowledged “... potential climatic effects of emissions of these substances”, such as chlorofluorocarbons, halons, carbon tetrachloride and hydrochlorofluorocarbons (UNEP 2000:1).

Although there is no direct link between the ozone and climate change debates, it should be borne in mind that the Montreal Protocol is often perceived as a precursor of subsequent climate change agreements, in particular the Kyoto Protocol. The issue of climate change entered the international political arena in the late 1980s and resulted in four international agreements: Rio’s UNFCCC in 1992, the Kyoto Protocol of 1997, the Political Declaration of Johannesburg in 2002 (climate change only formed a small part of the declaration) and the Bali Roadmap of 2007 (UN 1997; UN 1998; UN 2002; UN 2007). Whereas the former two are unprecedented endeavours to address climate change in far-reaching policies, the latter two merely reinforce UNFCCC and the Kyoto Protocol. Therefore emphasis is placed on Rio’s UNFCCC but more so on the Kyoto Protocol, which forms the core of contemporary climate change debate and is therefore discussed in a separate section (2.1.4).

The UN Conference on Environment and Development 1992 in Rio de Janeiro, referred to as the "Earth Summit", urged governments to rethink economic development by incorporating environmental issues “... making eco-efficiency a guiding principle for business and governments alike” (UN 1997). The Earth Summit was unprecedented as for the first time climate change was recognised as an urgent issue requiring international action. The summit produced the United Nations Framework Convention on Climate Change (UNFCCC), which proposed the reduction of greenhouse gas emissions to 1990 levels by 2000 (Cannell 1999:172, see also Bachram 2004:13). The UNFCCC is considered as a framework for intergovernmental efforts on how to address global warming by reducing emissions. The UNFCCC, moreover, perceives climate change as a global issue requiring a common strategy.

However, despite considerable progress in the debate around climate change, Bachram (2004:13) points out that, firstly, the UNFCCC has no binding targets on emissions reduction and secondly, does not recognise industrial activities, over-consumption and free trade policies as promoters of global warming. She further criticises the framework for considering economic development as part of the solution rather than part of the problem.
2.1.4 The Kyoto Protocol: Fuelling the Solutions Debate

As a follow-up to the UNFCCC, Conferences of the Parties to the Conventions (COP) were held regularly. COP 1, held in 1995 in Berlin, initiated negotiations, which resulted in COP 3 in Kyoto in 1997, where governments decided on the Kyoto Protocol. Although introduced in 1997, it only entered into force in 2005, due to the refusal of many governments to ratify the protocol. The signature of a minimum of 55 nations, representing 55 percent of global greenhouse gas emissions, was required for the protocol to enter into force. As of 23 October 2007, 176 countries had ratified, approved or accepted the protocol and according to ABC News (2007), the Prime Minister of Australia, Kevin Rudd, recently signed the ratification document of the protocol as the first official act of the new Government. According to the UNFCCC (2007) Kazakhstan and the United States are now the only two countries opposing the Kyoto Protocol.

The Kyoto Protocol adopted several points of previous international environmental agreements, such as the reduction of national greenhouse gas levels by a certain percentage from a particular base year. The core components of the Protocol can be summarised as follows: a global 5.2 percent cut in greenhouse gas emissions below 1990 levels by 2012; the introduction of “Clean Development Mechanisms” (CDM), “Joint Implementation” (JI) and “Emissions Trading” (ET).

In the light of the IPCC statement that an emission reduction of 50-70 percent was necessary if global warming was to be mitigated, Bachram (2004:6) justifiably commented, that the Kyoto Protocol was far from sufficient. A cut of 5.2 percent seems negligible with regards to the pressing issue of climate change and the future scenario of more frequent occurrences of climate catastrophes (IPCC 2007a:16).

CDMs and JI are the two project-based mechanisms and are designed to help Annex I Parties meet their Kyoto targets. CDMs describe the possibility of enabling industrialised countries to reach their target through the supporting “green” projects in developing countries. The outcomes of such projects are measured in terms of “certified emission reduction” (CER). As defined in the Kyoto Protocol under Article 12 paragraph 2:

The purpose of the clean development mechanism shall be to assist Parties not included in Annex I in achieving sustainable development and in contributing to the ultimate objective of the Convention, and to assist Parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments under Article 3. (UN 1998:11)

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6 Annex I Parties include the following industrialised countries: Australia, Austria, Belarus, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Estonia, European Community, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, UK, USA
While CDMs concentrate on developing countries, JI allows Annex I Parties to implement emission-reducing projects, such as land-use change and forestry activities in the territory of another Annex I Party. The protocol speaks of “emission reduction units” (ERU) that are generated by such projects that can be transferred to another Annex I country, to ensure its fulfilment of the Kyoto commitments (UNFCCC n.d.).

Emission trading combines CDMs and JI, as it provides industrialised countries with the option to purchase units of CDM- or JI – projects from other industrialised countries in order to meet their target. Article 17 defines emissions trading as something “supplemental to domestic actions” (UN 1998:15), enabling the Party to meet its target at lower costs.

All three mechanisms are believed to provide “cost-effective opportunities to reduce emissions” (UNFCCC n.d.) considering the fact that benefits for the atmosphere are the same wherever measures are undertaken. These approaches are indeed innovative, yet are at the same time highly controversial.

The theory behind CDMs was that industrialised countries would meet their commitments by reducing the emissions of a developing country at lower costs. Projects include assistance to transforming carbon intensive energy production into hydrostations or solar panels (Rowlands 2001:796). Because forests function as carbon sinks by absorbing CO₂ through photosynthesis, they are a focal point of the climate change debate. Therefore, CDMs mainly involve afforestation projects according to the principle “planting trees in developing countries to offset emissions in your own” (Cannell 1999:176). Cannell (1999:ibid.) points to the fact that such “Kyoto forests” are partly planted on previously non-forest lands resulting in considerable side effects. He (Cannell 1999:177) asserts, “afforestation can affect biodiversity, water use, soil quality, soil erosion, local climate, acidification, visual amenity and the local economy”. Rowlands (2001:802) adds that CDMs do not contribute to solving the problem of climate change, but rather displace the problem by creating new problems, such as water pollution. Thus, benefits for developing countries are more than questionable, considering the potential harmful impacts of climate change activities on the local population. JI projects are subject to the same criticism as they also run the risk of problem-displacing by generating harmful side-effects in host countries.

Emissions trading has also been similarly criticised as involving the “routinized buying and selling of permits to pollute” (Bachram 2004:6). Bachram points out that world leaders took ten years to agree on an approach that is totally inadequate to tackle the climate change issue. She claims that “although emissions trading is represented as part of the solution, it is actually a part of the problem itself”. Underlying causes of climate change, namely economic growth and carbon intensive industries, remain untouched. Looking at the protocol, economic development still seems to be regarded as the way forward, as ecological measures have to be foremost cost-effective. Glover (1999; see also Byrne et al. 2006:93) concludes that policy formulation of climate change is mainly concerned with the commodification of the atmosphere.
Furthermore, Baird (2003) maintains that rich, industrialised countries are by far the biggest polluters using enormous amounts of fossil fuels and are therefore indebted to the poor. As Baird (2003) points out, even emissions from China and India, as emerging economic powers, only represent a fraction of the emissions produced by the EU, North America and Australia. India, for instance, has “one of the largest renewable-energy programmes”; while the US keeps producing fuel-intensive sports utility cars (Baird 2003). She therefore urges a fair climate policy in which industrialised countries cut their emissions dramatically – not through CDMs or emissions trading, but through finally switching from fossil fuels to renewable energies.

The Kyoto Protocol aside, businesses, companies, international organizations and environmental groups have all presented possible solutions to climate change. The answers vary according to the underlying interests of each party.

Stressing the large scale of global warming and then telling people they can solve it through small actions like changing a light bulb evokes a disconnect that undermines credibility and encourages people to think that action is meaningless. (Retallack 2006, cited in Evans and Steven 2007:37)

Evans and Steven (2007:38) call for an "IPCC for perceptions and politics" in order to provide greater clarity on the solutions debate. To avoid mere problem-displacement, as Rowlands (2001:802) signals, the international climate change regime, which is composed of "national interests, values of technocentrism, administrative rationalism, economic rationalism and effectiveness criteria of modernisation", would need to incorporate alternative discourses (Glover 1999:508).

Green technologies emerged as a multibillion-dollar industry and attitudes of business companies changed from denying climate change to finding ways to turn it into a profitable industry (Dunn and Flavin 2002:24). Hence, suggested solutions involved capital-intensive technologies striving for the goal of opening up new markets. Green labelling and marketing of so-called “eco-products” have great potential for businesses, as such products are in vogue in many industrialised countries. In the area of urban transportation, alternative fuel vehicles, such as hybrid cars would serve as example of a green technology. Dunn and Flavin (2002:40) conclude that, “… companies are beginning to recognize their strategic interests in engaging more proactively on the climate issue”.

As discussed in section 4.4, public bike schemes represent a balancing act between the perpetuation of ecological modernisation principles intending to reconcile environmental targets with economic goals, and the requirement of an alternative discourse involving a change in socio-technological systems towards more sustainable ends. The role of public bikes in the climate change debate, however, can only be understood through the role of cities in general and urban transportation in particular.
2.2 The Role of Cities in the Climate Change Debate

Cities are not only subject to weather extremes resulting from climate change – the most prominent example being the devastation of New Orleans by Hurricane Katrina in 2005 – but are also among the principal emitters of greenhouse gases (Beatley 2000:359; Byrne et al. 2006:84; C40 Large Cities 2007; Reid and Satterthwaite 2007). As centres of human activities, cities use large amounts of fossil fuel for industry, transport of goods and people, food provision, heating, lighting and so on. Therefore, urban areas\textsuperscript{8} are the main sources of greenhouse gas, especially in high-income countries, where urban lifestyles require large amounts of energy. Foster (1999) borrows the term “metabolism” as used by Marx, to refer to the process in which cities require a resource input and emit an output in terms of solid waste, greenhouse gas and wastewater. In other words, cities “are like organisms, sucking in resources and emitting wastes” (Tickell 1998, cited in Beatley 2000:3). To measure this metabolism, scientists developed the so-called “ecological footprint” indicator, which quantifies human resource consumption to calculate how much of the Earth’s resources we need to sustain such urban lifestyles (Chambers, Simmons and Wackernagel 2000; Huber 2001:198). UNEP (2007a) assumes that over 80 percent of global greenhouse gas emissions originate from cities. In the Global Environment Outlook, UNEP (2007b:46) highlights the fact that the vast majority of energy is still produced with fossil fuels, while the supply of renewable energies is increasing only slowly.

The prospect for the 21\textsuperscript{st} century is marked by an ever-increasing trend in urbanisation with up to 75 percent of people living in conurbations (Mattrisch 2000:9; see also Wilby and Perry 2006). As centres of human activities, cities worldwide will continue to contribute to global warming, yet they will also face extreme weather conditions. Looking at the greatest emitters of greenhouse gas and the most severely hit victims of climate catastrophes, it becomes obvious that they are often located apart. As mentioned above, cities in high-income countries are the principal sources of greenhouse gas emissions and air pollution, due to carbon-intensive lifestyles (UNEP 2005). At the same time, people of developing countries are most vulnerable to the consequences of climate change and represent the greatest victims although they consume the smallest proportion of natural resources.

In considering the scope of this study on Western European cities it is crucial to discuss urban lifestyle trends in Europe and shed light on the steps that have been taken to tackle the issue of greenhouse gas emissions. However, European cities should not only be discussed in negative terms concerning their energy consumption, but should also be acknowledged as centres of wealth exhibiting high living

\textsuperscript{7} Green technology, or environmental technology, is the attempt to solve ecological issues through technological innovations. It is often employed in the area of energy conservation, the exploration of alternative energy sources and the generation of alternative fuels.

\textsuperscript{8} The European Environment Agency (2006:49) defines urban area as "built up areas lying less than 200 m apart".
standards, which local authorities seek to maintain. Reid and Satterthwaite (2007:1) emphasise:

High-income nations have generated the bulk of greenhouse gas emissions past and present. It is up to them to show how far less carbon-intensive lifestyles and production systems can be combined with high living standards.

To meet the requirements of Reid and Satterthwaite two aspects need to be understood, namely the nature of urban lifestyles and efforts of municipalities in European countries to satisfy residents’ needs in an environmentally sustainable manner. However, it should be borne in mind that urban lifestyles are always embedded in the geographical and cultural location of the city, its structural design, traffic infrastructure, political and public discourses, as well as in personal attitudes. As discussed in section 3.4, social ecology emphasises the need to integrate lifestyle research into the study of environmental issues. At the same time, there are concrete trends in European land-use planning, such as urban sprawl, that reinforce carbon-intensive lifestyles by perpetuating car-dependency. The following section sheds more light on such trends.

2.2.1 Urban Land Use and Lifestyle Trends in Europe

“Europe is first and foremost urban” states Mega (1996:133), a claim difficult to disprove as to date 80 percent of the European population live in cities of more than 20,000 inhabitants (Eltges 2003:107). Overall, urban areas cover “… 25% of the EU’s total territory” (EEA n.d.). As organisms, cities are indeed great polluters of the environment; however, in many ways the grouping of people into cities is favourable for the environment, leading, for example, to lower land use and energy consumption. Looking at the quality of life, on the other hand, cities are not always favourable for those living in them – urbanites suffer from noise and air pollution, due to a high level of motorised traffic for example (EEA n.d.). The issue of motorised traffic in urban areas (section 2.3) can be explained through three contemporary trends in EU cities: urban sprawl, retreat of basic services from urban neighbourhoods and, pluralisation and individualisation of people’s lifestyles. These trends minimise the potential of cities to contribute to the battle against global warming, especially due to the increased use of private cars (EEA n.d.).

According to Scheiner and Kaspar (2003:320), increasing individualisation in Western societies affects urban settlement patterns and thus influences mobility demand leading to a growing need for fossil fuel. Increasing socio-cultural differentiation and a pluralisation of lifestyles exhibit complex forms of mobility (CITY:mobil 1999:36). Götz et al. (2002) speak of “mobility styles” and argue that choice of mode of transport is highly influenced by individual lifestyle groups (see section 3.4). Scheiner and Kaspar (2003:320) distinguish between long- and short-term mobility, whereas the former describes choices of housing locations, and the latter concerns trips and travel. They observe that people live further away from their workplaces, due to frequent changes of jobs, increasing home ownership and better commuting possibilities. With growing incomes and decreasing prices of motor vehicles, more and more people in Europe own cars, and consequently leave dense city
centres to move into suburbs. The European Environment Agency (EEA 2007a:274; footnote added) confirms that “car ownership in EU-15\(^9\) and the number of kilometres travelled have increased at the same rate as GDP growth since 1990”.

With regards to settlement patterns, the phenomenon highlighted above is referred to as “urban sprawl”, which emerged in European cities during the past decades (EEA 2007a:117, see also CITY:mobil 1999:19; Mattrisch 2000:7). While in the past cities expanded as a result of population growth, today new lifestyle trends prompt citizens to live outside city centres. Living spaces continue to grow with less people sharing households, while the number of cars per household increase (UNEP 2007b:258). Urban sprawl is characterised by low-density settlement patterns following the wish of many citizens to own a house with a garden.

Beside urban expansion, land use has the potential to increase or reduce automobile dependence, so that in some cases people have no choice but to use personal cars (Zhang 2006:311). The choice of mode of transport not only depends on the density of urban areas, but also on the accessibility of basic services and places of interest. There is a growing trend in Europe to establish “greenfield shopping-malls”, resulting in a retreat of basic services from urban neighbourhoods and an increasing traffic-flow out of town (Mattrisch 2000:8; EEA 2003). Land prices are lower and more space is available with the result that many facilities move out of residential areas. According to a study by the EEA (2003), there is a direct link between the number of shops in a city and the choice of transport as well as the distance covered. Using figures on Denmark from 1948-1999, the EEA (2003:1) argues that while the number of grocery and other shops decreased in urban areas, the kilometres more than tripled and the use of the private car grew five-times.

The EEA (2006:7) suggests that municipalities should coordinate urban expansion and increase accessibility to ensure sustainable and energy-efficient urbanism. As shown above, land-use planning influences the choice of mode of transport, as for example “the share of public transport and the intensity of its use generally increases with increasing density of the population of an urban area” (EEA 2003:4). Therefore, local authorities should opt for planning favouring mixed development and high density “by mixing

**Box 1: Example of sustainable land-use planning - Quartier Vauban in Freiburg, Germany**

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9 Austria, Belgium, Denmark, Finland, France, Germany, Greece, Republic of Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and the United Kingdom.
urban functions, introducing zoning and parking policies and improving public transport” (EEA 2003:3; see also Wadhwa 2000:288).

If suburbs are planned carefully, greenhouse gas emissions can be reduced to a large extent. There already exist a number of such “green” neighbourhoods in Europe, one of which is Vauban in the city of Freiburg in Southern Germany (see Box 1).

Hence, cities do not only pose major threats for the environment, but also offer a high potential for efficient land use and energy consumption. Timothy Beatley (2000:4) argues:

Green and sustainable cities present fundamental opportunities to both apply new technology (such as public transportation, district heating, and green building and design) and bring about major lifestyle changes (such as walking, bicycling, and reductions in consumption).

Without denying unfavourable trends of urban sprawl, it is crucial to deal with cities in terms of their opportunities. As presented in the following section, local authorities in European cities are dedicated to improving urban living conditions while at the same time reducing energy consumption and greenhouse gas emissions.

2.2.2 Efforts of EU Cities in Addressing Climate Change

Looking at recent measurements of greenhouse gas emissions across EU-15 countries as a whole, the amount has decreased little since 1990, mainly due to the closure of coalmines in Germany (EEA 2007b:24). If no further measures are taken, most countries will not even meet the Kyoto targets by 2010, which are not enough by far to mitigate climate change. Existing measures are insufficient to reach the targets, so that further major steps need to be taken including regional, domestic and local policies to reduce the use of fossil fuels. The EU’s environmental policy focuses increasingly on cities because of the important role they play in addressing these problems.

At the local level, several cities around the world have initiated individual measures to mitigate global warming and to improve urban living conditions. To facilitate benchmarking, some cities linked up at the regional or global level and created overarching organizations, such as the International Council on Local Environmental Initiatives (ICLEI), United Cities and Local Governments (UCLG), and C40 Large Cities. ICLEI is a network of more than 500 cities and acts as official representative of local governments at UN conferences. At the Bali UNCCC, ICLEI organised a side-event on local solutions where it launched “The World Mayors and Local Governments Climate Protection Agreement”. Together with UCLG and C40, they agreed inter alia on the following commitments (see ICLEI 2007):

- To reduce greenhouse gas emissions by 80 percent of 1990 levels in industrial countries by 2050.
- To build a sustainable energy economy to reduce fossil fuel and nuclear dependency.
• To call on national governments to agree on international binding emission-cutting agreements.

This agreement, however, does not entail concrete steps and seems instead to perpetuate the targets and mechanisms highlighted in the Kyoto Protocol. This is also the case for UCLG’s Declaration of Paris on Climate Change and Local Governments in March 2007. It calls “… on industrialised countries and multilateral bodies to respect the Kyoto Protocol …”, and thus to implement controversial Kyoto mechanisms such as CDMs, JIs and emissions trading, the declaration, but does not opt for concrete steps, such as efficient land use planning and better provision of public transport (UCLG 2007).

Contrary to the vague long-term visions mentioned above, the Council of European Municipalities and Regions (CEMR) suggests concrete recommendations on reducing energy consumption in its handbook on energy saving. Municipalities are asked to implement low-carbon energy sources and energy-efficient appliances in public housings and buildings. Furthermore, renewable energies should be produced locally. To raise public awareness, energy consumption of public utilities should be displayed in front of the building. The CEMR (2006:34) highlights the European Display Campaign, the European Mobility Week and the Sustainable Energies Campaign as examples of cooperation efforts of European municipalities.

In Chapter 28 of the Agenda 21 local authorities are determined as key players in achieving sustainable development (UNDSD 1993). Following the Earth Summit in Rio 1992, several local authorities, aiming to promote sustainable development, initiated Local Agenda 21 projects. Climate change is only a fraction of the Agenda 21; hence cities focus on social, economic, cultural and environmental issues. One example is “London 21”, a network of local initiatives promoting a “greener, healthier and more sustainable Great London” (London 21 2007). Among others, projects include “Sustainability Weeks”, “London Green Map” and the “Environmental Inequalities Project”. In the environmental sector, there are initiatives on recycling, composting, zero-emissions, walking and green spaces.

Emissions of gases contributing to global warming are at the same time air pollutants influencing regional air quality. As a result, climate policies affect regional air quality and vice versa (European Commission 2003a:29). EU Member States agreed to various regulations regarding energy production, road transport and industry, so that concentrations of air pollutants reduced from 1990 to 2004. However, pollution deriving from air transport increased and does not seem to likely to decrease in the near future, due to growing global trade and air travel. Furthermore, total energy consumption increased steadily from 1990 to 2004. In urban areas air pollution fell as a result of the switch from coal and oil heating to gas as well as the introduction of catalytic converters in road vehicles. Nevertheless, emissions values in cities are still higher than certain proposed limits, especially during

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10 The Agenda 21 is a further outcome of the Earth Summit in 1992 in Rio de Janeiro.
summer months when ozone values \((O_3)\)\(^{11}\) regularly exceed the limit (EEA 2007c:13).

Motorised traffic and traffic congestion contribute greatly to air pollution in urban areas, while at the same time adding to global warming through the burning of fossil fuels. The following section discusses the role of transportation with regards to pollution and mobility. The focus is on sustainable urban transportation as a way to counter the issues.

### 2.3 Urban Transportation and Climate Change

The assumption that transport is “... one of the most polluting of all human activities” (European Network of Cycling Expertise [ENCE] 2003:1) is correct, if one takes a look at recent figures published by the EEA (see 2007b:79). The European transport sector, including national aviation, road transportation, railways and national navigation, accounts for 21 percent of all greenhouse gas emissions in Europe.

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\(^{11}\) Ozone is a product of a reaction of sunlight on air containing hydrocarbons and nitrogen oxides, so that Ozone values are often higher in summer. While Ozone in the upper atmosphere filters damaging ultraviolet light, ground-level Ozone is an air pollutant harming respiratory systems of humans and animals. According to the EEA (2007c), a large num-
Within the sector, road transport is by far the biggest polluter mainly due to CO₂ and associated emissions. Thus, road transport contributes heavily to global warming as well as local air pollution. As indicated in the graph (Fig. 1), both freight and passenger transport in EU-15 are projected to grow further, so that greenhouse gas emissions will also grow for each EU-15 Member State, except Germany and Luxembourg (EEA 2007b:80).

The European Commission (2003, cited in ENCE 2003:1) confirms that “if current trends continue, by 2010, CO₂ emissions from transport will be 40% higher than they were in 1990”. Considering the scope of this thesis on urban areas, freight transport will be left aside, although its impact on the climate is well acknowledged. Looking at passenger transport, it becomes evident that such prospects (Fig. 1) are clearly connected to the hegemony of automobiles. While urban sprawl forced people to own a car, it was the car that made urban expansion possible in the first place. As already mentioned above, land use and the choice of the mode of transport are inevitably linked, so that by now everyday life in high-income countries is often organised around private cars, especially for those living on the outskirts.

However, Wadhwa (2000:283) points out that such ostensible individual freedom was achieved at a high cost, as road transportation entails injuries, material damages, energy dependence, environmental degradation and even death. The car-based lifestyle, as Wadhwa continues, has a highly negative impact on human health leading to premature death for multiple reasons, such as obesity and respiratory diseases. As an example, a health report on Germany (Achterberg 2006) reveals that noise pollution of road traffic leads to stress and sleep disorder. Particles emitted by motor vehicles lead to an irritation of the respiratory system (Achterberg 2006:91). It is interesting to note that “the level of pollution inside a car is invariable higher than the ambient air pollution level” (Dekoster and Schollaert 1999:13). Looking at obesity, the WHO accuses widespread sedentary lifestyles among others as a cause of the emerging challenge of epidemic obesity (Branca, Nikogosian and Lobstein 2007:xii). Obesity is responsible for cardiovascular diseases and diabetes as well as orthopaedic problems. Although people in Europe became more mobile in the past decades, physical activity decreased. The WHO (Branca, Nikogosian and Lobstein 2007:139) points out that on average Europeans "cycle about 0.5 km and walk about 1 km while travelling 27.5 km by car" every day. Finally, the majority of deadly accidents in Europe occur with cars (53.7%; as comparison: only 4.5% of fatalities occur by bicycle) and are still among the greatest cause of deaths among young people from 18-25 in Europe, despite a decreasing number of fatalities (European Road Safety Observatory 2007:9).

In view of traffic situations in urban areas, frequent congestion is already part of the cityscape, particularly during rush hours. In this sense, Dekoster and Schollaert (1999:9) rightly state that “the car is the victim of its own success”. Given that in-

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ber of the EU’s urban population is exposed to ozone values exceeding the limit set for the protection of human health.
Initially the car promised to be a fast and flexible mode of transport, it has to be noted that people today spend hours in traffic jams. Dekoster and Schollaert (1999:10) conclude that car use has to be reduced to maintain mobility and avoid “a complete standstill”. Beroud (2007:36) calculated for the city of Lyon, that for trips of up to 5 km, bicycles and the underground are in fact faster than cars.

Yet, why is it then that people still favour cars when it comes to selecting their mode of transport? Dekoster and Schollaert (1999) provide a surprising answer in a document produced for the European Commission: The majority of EU residents are in fact not in favour of cars, but in most cases have no choice but to use the car, due to the lack of suitable alternatives. The endeavour for alternatives is often referred to as “sustainable mobility”, which has become an aim for transport planning in many European cities. The subsequent section 2.3.1 explores the concept of sustainable mobility whereas section 2.3.2 highlights the bicycle as one sustainable mode of transport.

2.3.1 Sustainable Mobility

Transport is listed as a field of activity in the main international agreements mentioned in 2.1.1.2: UNFCCC claims to “… reduce or prevent anthropogenic emissions … in all relevant sectors including … transport” (Art. 4.1c); the Agenda 21 pushes for a “… more effective design and management of traffic and transport systems. … to limit, reduce, or control, as appropriate, harmful emissions …” (Art. 9.13); and the Kyoto Protocol confirms the previous commitments to “limit and/or reduce emissions of greenhouse gases … in the transport sector” (Art. 2.1.a.vii).

The European Commission also realised the growing environmental risk stemming from carbon-intensive road transport, and consequently published a Green Paper12 on urban mobility in March 2007. In 1999, the European Commission had already called on elected representatives in Member States to accept their responsibility to provide citizens with a healthy urban environment, while at the same time ensuring mobility (Dekoster and Schollaert 1999:9). Looking at potential consequences of carbon-intensive transportation, Banister and Hickman (2006:150) argue that it is irresponsible of governments and the public not to act and to continue business as usual. In fact, people’s behaviour and governments’ inaction accelerate the process of climate change, as the number and size of cars, as well as travel distances are steadily growing (Banister 2007:7).

In the past years a debate has evolved regarding urban transport, which accounts for 40 percent of road transport emissions, offering several solutions. There seem to be two basic approaches, namely the technological and the behavioural approaches, each offering different solutions. The former suggests more energy-efficient vehicles or vehicles running on “clean” fuel, while the latter believes in the

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12 The Green Paper of the EU was a result of a consultation process with city representatives, NGOs, European institutions and EU citizens. It does not offer specific policy measures; instead it intends to open a debate on new urban mobility. The European Commission plans to come up with an Action Plan in Autumn 2008.
change of people’s behaviour as the most efficient solution. As technicians push for development and the introduction of new technology, “public educators” aim for the return of well-known modes of transport, such as walking and cycling.

Hajer (2005) indicates that, principles of ecological modernisation and market environmentalism guide contemporary environmental policy (section 2.1.3 and 3.2). Both concepts perpetuate the belief that environmental protection and economic development can go hand in hand. In fact, market environmentalism perceives free market principles as solution to ecological issues, whereas ecological modernisation believes in the potential of technological innovation to address environmental issues. Both ecological modernisation and market environmentalism are usually concerned with the cost-effectiveness of their proposals, yet in most cases they focus on the supply side. The result might be relatively capital-intensive, public or private, low-carbon emission vehicles. Thus the latest proposal of the European Commission (December, 2007a:2) calls on governments of Member States to:

>Promote the market introduction of clean and energy efficient vehicles and contribute thereby to energy efficiency in transport by reducing fuel consumption, to climate change protection by reducing CO₂ emissions and to improving air quality by reducing pollutant emissions.

Wadhwa (2000:285) supports the technological approach to sustainable transportation, including innovations in automobile technology, road infrastructure and traffic management to reach fuel efficiency, emissions control, noise reduction and less congestion. He stresses also the importance of regulatory policies, such as the “polluter pays” principle, in order to facilitate the market introduction of such vehicles (Wadhwa 2000:286). However, since Wadhwa (2000:283) argues that sustainable transportation should be compatible with desired lifestyles, he risks perpetuating low-density car-based lifestyles.

Baeten (2000:70) criticises such a technocratic approach on the grounds of social fragmentation, as he argues that conventional transport planning entails socio-political conflicts, which cannot be addressed by means of technological innovation. He targets local decision-makers who use the sustainable transport rhetoric to pretend a consensus among society and thus disregard “... the deeply contested ways through which the transport system is continuously shaped and transformed, and which inevitably results in a variety of winning and losing interest groups” (Baeten 2000:71). According to him, benefits of a technology-driven transport planning remain with already elitist groups of society, while the marginalised remain more or less excluded.

Although Banister and Hickman (2006) acknowledge the potential of new technology to reduce greenhouse gas emissions, they point out to the fact that despite the availability of low-carbon vehicles, emissions keep rising each year. In their opinion, the key solution lies in behavioural change, which could make a 60 percent reduction in emissions by 2030 possible. By drawing on desirable future scenarios, they opt for policy packages promoting walking and cycling, better quality public transport, lower speed limits, integrated land use and transport planning, increased
car occupancy and road tolls. In the Green Paper, the European Commission (2007b:3) supports the importance of behavioural change and argues that a new urban mobility culture is urgently needed. Beside the suggestions as outlined by Banister and Hickman, the Green Paper highlights intermodality (the possibility to use more than one mode of transport to reach one’s destination), traffic restrictions and safety measures as crucial strategies to realise a more sustainable mobility.

“Mobility is culture” – claims the Institute of Social Ecology Research (ISOE) and points to the need to combine the technology perspective with the social perspective. Deffner et al. (2006) argues that people need to be targeted in their routines, motivations, values and attitudes, in order to bring about a change in polluting mobility behaviour and to achieve a sustainable mobility culture. Social-ecological mobility research of the ISOE provides policy recommendations including group specific measures and calls from a shift from a supply-side approach to a demand-side approach. Overall, multi-optional mobility needs to be ensured for all members of the society, while at the same it needs to be decoupled from harmful effects for the environment and human health (Deffner et al. 2006).

2.3.2 The Bicycle as Mode of Transport

Walking and cycling are the most sustainable modes of transport ...

- Kenworthy (2006:73)

Bearing in mind the negative side effects of private cars concerning health, environment, safety and the overall travel time, it becomes obvious that cars are not a suitable mode of transport in towns. According to a recent Eurobarometer opinion survey, conducted in May 2007, EU citizens are ready for a change of prevailing transportation schemes. The vast majority of 80 percent are well aware of the car’s negative environmental impact and 90 percent request an improvement in traffic conditions through alternative schemes (The Gallup Organization 2007:5). Although public transport is well-developed in most European cities, it does not have the potential to fully replace a car’s convenience. On the search for the best solution to the problem of growing traffic and air pollution, an increasing number of people seem to be rediscovering the bicycle as the perfect mode of transport for European cities.

Several surveys show that most car trips in urban areas are less than 5 km and a considerable number are even less than 3 km (Lambrey 2004:2; see also Massin 2005). At the same time, as mentioned above, traffic congestion is already the norm in many European cities. Both phenomena exacerbate the impact on the environment as ignition and stop-and-go manoeuvres lead to higher gas emissions (Interface for Cycling Expertise 2000, cited in ENCE 2003:2, see also Dekoster and Schollaert 1999). As an individual, flexible mode of transport, the bike offers similar advantages to cars without having such negative side-effects (CITY:mobil 1999:112). The European Cyclists’ Federation (ECF 2003) found out that the average bicycle trip in EU Member States is 2.5 km and in cycling dominant areas, such as in the Netherlands, cyclists cover distances of at least 5 km. Depending on the
traffic, the door-to-door travel time for short trips up to 5 km is often less on a bicycle.

In addition, bicycles use considerably less space than cars, offering a greater fluidity in urban mobility and saved space that can be otherwise used. In 2003, twenty hectares of soil per day in Germany alone got sealed for traffic purposes, and the trend does not seem to slow down (Naturschutzbund n.d.). According to the EEA (2005), around 2000 hectares of previous mainly agricultural land are transformed into paved infrastructure for transportation purposes, including roads, airports and car parking facilities. Urban sprawl and consequently greater use of personal cars is perceived to be the main cause of the need for land take for transport (EEA 2005). Within European cities a considerable amount of space is required to accommodate car parking, whereas local authorities still neglect to appoint appropriate places for bike parking, even though they only necessitate a fractional amount of space. Beatley (2000:169) discovered that parking facilities for six to ten bicycles require the same amount of space as one automobile.

In relation to climate change and air pollution, bicycles are one of the cleanest modes of transport, as they do not contribute to atmospheric pollution and noise pollution. If produced under eco-design principles using recyclable and replaceable parts, bicycles have a low environmental impact. According to Sharp (1991, cited in ENCE 2003:3) “... surveys have shown that a cyclist can travel 1,600 miles [2575 km] on the equivalent energy of one gallon [3.8 litres] of petrol”.

Furthermore, it is an affordable mode of transport\textsuperscript{13}, enabling less advantaged citizens to be mobile and consequently to be able to access multiple locations. Spatial mobility and social mobility are interdependent, as for instance, car-driven land use planning deprive many people who cannot afford a car from accessing basic services that have retreated from their residential areas. Baeten (2000:69) urges the need to include “transport inequalities” and “transport poverty” in the discourse of sustainable mobility. He cites Swyngedouw (1993, in Baeten 2000:84) to emphasise his argument:

> If questions of social justice in the debate and praxis of mobility are not again put high on the agenda, it may force itself on to the political platform very soon by means other than words.

Despite relatively low costs, bicycles cannot completely solve the issue of social exclusion because trends of urban sprawl and the dispersion of basic facilities force people to cover greater distances that exceed the reach of bicycles. Intermodality would be an answer, as it makes the bike interesting for distances of 5 km onwards. Intermodality resonates throughout the land, and an integration of multiple modes of transport is perceived as a necessity in city planning. While intermodal schemes, such as park-and-ride, are already in place in certain cities, there is still a long way to go before intermodality is fully optimised. Therefore the European

\textsuperscript{13} As for 2003, there were 200 million bicycles in the EU, which adds up to about 500 bikes per 1000 EU inhabitants (ECF 2003).
Commission urges local authorities to think and act strongly in intermodal terms (European Commission 2007:2). Public and private modes of transport are not mutually exclusive; on the contrary they are interdependent and should thus be treated as such (Bouyromenko and Myasoedova 2000:266). It should not be a goal for bicycles to compete against cars, and cars against public transport, as each of these modes has indispensable advantages, which cannot be replaced by others. Under certain circumstances driving the car is the best option, however, public authorities should facilitate intermodalism in a way that allows people to reach their destination in time while minimising the environmental impact. According to Szyliowicz (2003:189) intermodalism signifies trans-sectoral cooperation and a “total systems perspective”. Yet he reveals a lack of intermodal communication and although he acknowledges, “… achieving coordination is never easy …” he perceives intermodalism as the sole solution to realising sustainable mobility. Government officials, the private sector, interest groups and the public need to be brought together to reform the current transport scheme. In Szyliowicz’s (2003:192) opinion, successful transportation planning must be carried out “… by the people, for the people and with the people”.

Despite growing public awareness on the environmental impact of motorised transport and despite people’s growing interest in alternative modes, such as bicycles, there are still considerable barriers to cycling, which need to be addressed. Objective factors, such as weather conditions are often overestimated by transport planners and do not necessarily pose a problem. Beatley (2000:167) points out the high usage of bicycles in Northern European cities to prove that bad weather conditions are not the greatest barrier (see also a survey conducted by Dekoster and Schollaert 1999). Pucher (1997:44) adds that “[t]he German lesson is that bicycling can be increased even under quite unfavourable circumstances [bad weather], provided the right public policies are implemented”.

Safety, inconvenience and fear of bike theft are among the greatest objective barriers alongside with subjective barriers, such as social acceptability. Almost all barriers can be addressed by carefully planned infrastructure and well-organised campaigns. Pucher and Buehler (2008) suggest:

> The most important approach to making cycling safe and convenient ... is the provision of separate cycling facilities along heavily travelled roads and at intersections, combined with extensive traffic calming of residential neighborhoods.

In addition to cycling lanes or cycling tracks, Dekoster and Schollaert (1999:40) suggest better road surfaces, lighting at crossroads, small roundabouts and an adaptation of the phasing of traffic lights to the speed of cyclists. These measures facilitate fluidity for cyclists, minimising the physical effort, while maximising their safety. In several European cities, such as Odense, Amsterdam and Münster, remarkable amenities for cyclists are already in place. Hence cooperation among European city representatives is crucial for benchmarking and sharing experiences. However, it should be borne in mind that each city has its unique outlook and
unique culture, so that amenities need to be planned according to local circumstances.

Events and campaigns can be used to counter prejudices against bicycles and introduce the bike as an efficient and convenient mode of transport. Pro-cycling policies need to clearly inform about advantages of bikes yet at the same time, policies need to be followed by actions based on the principle "if you build it they will come" (Moore, Barker, Ramsden 2006).

Dekoster and Schollaert (1999:44) also speak of “false” perceptions of bicycles, for example, that bicycles are too heavy and difficult to manoeuvre. “Hiring out bicycles is a good way of enabling a large number of people to try cycling before purchasing a bicycle” suggest Dekoster and Schollaert (1999:60). This idea seemed to open doors, so that a relatively new transport scheme started to mushroom all over European cities: public bicycles. The next section takes a look at the historical evolution of these bikes, thus introducing the discussion on their potential to contribute to sustainable mobility and consequently to a positive influence on the Earth’s climate.

2.4 Public Bikes: the Revival of an Old Revolution

Bicycles, as shown above, can offer an efficient alternative to cars for inner-urban trips of up to 5 km. However, if the bicycle aims to replace cars as a commuting vehicle covering a wider area, good access to rail and underground is essential, thus intermodality should be promoted. In many cases, cyclists are confronted with two issues when it comes to the practice of intermodality, namely the lack of space for bikes in trains and the underground, and/or the lack of safe bike-parking facilities. For Noland (2006:72), as for many others, the solution would mean, “... to provide bicycle rental facilities at stations”. People would not have to worry about their bicycle theft or how to take their bikes on trains, especially during peak hours.

The dichotomy of public versus private transportation seems to be overcome by this “new” transport scheme, namely public bikes. As advertised in cities that have introduced this “individual public transport”, the scheme intends to combine the advantages of both types of transport: the public bicycle still allows people to be flexible, like any other bicycle, while at the same time it is accessible to anyone, like any other form of public transport. Furthermore, public bikes are also believed to attract new cyclists, allowing them to try out cycling without having to purchase or maintain a bicycle. Public bikes are currently seen as the best way to establish the bicycle as a widely accepted mode of transport. Such bikes could be perceived as a compromise between the technological approach and the behavioural approach to urban mobility as discussed in 2.3.1 by employing newly-developed technology to achieve a behavioural change.

The public bicycle scheme is actually not as new as often presented, as it represents forty years of evolution. Paul DeMaio (2003, see also DeMaio 2001) identified three generations of public bikes beginning in 1964 leading up to 2007. The follow-
ing paragraphs briefly describe the history of this transport scheme by drawing on DeMaio’s classification.

2.4.1 First Generation: Free Bikes for All

It was in 1964 when Luud Schimmelpennink and his colleagues introduced the White Bikes as one action in the series of White Plans of the Dutch street magazine PROVO to confront the “traffic terrorism of a motorized minority” (Voeten 1990). In order to turn Amsterdam into a car-free city, they collected several hundred old bikes, painted them white and left them on the streets for everyone to use. While the first batch were confiscated by the police, the following White Bike actions ended with people stealing, vandalising or throwing the bicycles into the canal. This experience was repeated in Milan in the 1980s and in several US cities (Beroud 2007:9). Although, the aim to provide residents with free bicycles obviously failed, the White Bikes scheme inspired cities around Europe to introduce bicycles as part of the public transport agenda. Schimmelpennink, however, did not give up and recently established “The Depo/White Bike System”, which belongs to the third generation of public bikes (Beatley 2000:178).

2.4.2 Second Generation: The Shopping-Trolley Solution

To counter the problem of theft, a public-private partnership between the Cycle Innovation of Scandinavia and the City Bike Program of Copenhagen (Fonden Bycyklen) introduced the shopping-trolley mechanism in Copenhagen in 1995. The Free City Bike Program (Bycyklen) started off with 1100 custom-built bicycles attached to 120 special racks, from where they can be picked up and returned with a coin deposit of 20 DKK (≈ 2.70 €). The scheme is financed by public funds and ads mounted on the wheels of the bikes, yet vandalism and graffiti hinders companies from sponsoring the system (DeMaio 2000a).

The bikes are designed for short trips and day-use only, as they are quite heavy, not very comfortable, and do not have lights. To counter maintenance issues, the bikes have only one gear and roll on solid rubber tires. Maintenance is undertaken by the Bycykelservice in the Reva Center, which uses the work as a social service by training unemployed workers as a way to reintroduce them into the workforce. Although the City Bike Foundation does not have to pay for the labour, it spends around 50 € per bike each year (a new bike costs 135 €) on parts (DiDonato, Herbert and Vachhani 2002:4).

Several issues emerged, as some users abuse the sharing principle by either using the Bycyklen for a week or by not returning it at all. Due to the fact that racks are designed so that Bycyklen relies on kickstands, bikes tend to fall over. Consequently theft, heavy use and vandalism result in an unreliable mode of transport hindering widespread use (Santos, Pinaud and Janneau 2006:44). Nevertheless, Bycyklen is still in place today comprising 2000 bicycles; moreover, Helsinki and Århus adopted the Danish City Bike concept in 2000 and 2005 in collaboration with the Cycle Innovation of Scandinavia.
As positive side effect, DeMaio (2000b) concludes:

As has been proven in Copenhagen, City Bikes reduce bicycle theft. In the five years that the Copenhagen City Bike program has been around, Copenhagen has experienced a 30% drop in bicycle thefts according to the Danish Statistics and Insurance Information Organization. This has occurred because the City Bikes provide the same service that a stolen bike would provide.

2.4.3 Third Generation: The “Smart” Solution

A further attempt to solve the problem of theft and to incorporate the bicycle into public transportation emerged with the development of what DeMaio (2003:9) calls “smart bikes”. High-tech and information technology were employed to create a system, which became the most widespread public bike scheme to date. To discourage theft, users are now obliged to register with a bank or credit card, and obtain a “smart card” enabling them to pick up bicycles from specific bike racks, where public bikes are supported and locked. In some cases, such as Call a Bike in Munich or Berlin, users need to call the operator and receive a numerical code to unlock the bicycle. Due to the smart cards and the mobile phone-based system, the operator knows who is riding which bike and has therefore the possibility to trace back lost bicycles. The lack of anonymity is believed to prevent people from stealing the bike.

The bikes are either located in groups of stations or individually on strategic places, such as train stations or metro stations, public utilities, workplaces, parks and other places of interest. To make them accessible day and night, the street based rental-stations are fully automated. Most pricing systems discourage long trips, by steeply increasing the costs or by setting a time limit, so that the sharing principle is facilitated. If bikes are not returned in time, penalties may apply, which are debited from the user’s account.

To prevent people from disassembling and stealing parts of the bikes, they are built of non-standard components that are not usable on other bikes. Most bikes are designed for durability, all-round utility and visibility, with sturdy frames, solid rubber tires, adjustable seats, lights, chain guards and hub gears (Noland 2006:72, see also DeMaio 2003:9). Some bikes possess baskets or basket-like facilities to enable transportation of middle-sized luggage. Usually, the overall design is eye-catching, with each city choosing a distinctive appearance, according to the image of the city. This is thought to be at once a good form of publicity for both the bikes and the city, while the design is at the same time one more feature discouraging theft.

Due to the high-tech bikes and automated stations, the third generation scheme is comparatively expensive to install and maintain, so that many European cities opted for a contract with advertising companies. Clear Channel Outdoor and JCDecaux Cyclocity are currently the main public bike operators in Europe. They “donate” bikes and stations, as well as providing the maintenance and service, and obtain in return rights to advertise around the town. Details of the contract will be discussed in relation to the public bike scheme in Paris and Lyon in Chapter 4.
The outdoor advertising company Clear Channel was one of the first to install a third generation bike system in Rennes in 1998, called Vélo à la Carte. Many cities, especially in France and Spain, followed the example of Rennes and introduced such bikes into their cities, always with the help of private companies. As of February 2008, there are over hundred schemes of the third generation type operating in Europe (see Appendix C for a list of all public bike systems). With over 20,000 bikes and 1400 stations, vélib in Paris is currently the largest system.
3 CONCEPTUAL FRAMEWORK

To evaluate public bikes in terms of their contribution to mitigating climate change necessitates an investigation of their potential in achieving ecological sustainable urban mobility. Yet, what exactly is meant by “ecological sustainable urban mobility” and how can it be attained? As Fusco (2003:2; Deffner14) already observed, there is as yet no established formal concept of ecological sustainable urban mobility. Taking into account IPCC’s assessment report, the majority of scientists know what unsustainable urban mobility implies, but as yet there is no clear vision of a sustainable mobility system (Fusco 2003:2).

By drawing on specific concepts within the discourse around environmental issues, I intend to formulate a normative definition of ecological sustainable urban mobility. For this purpose, I will attempt to shed light on the discourse around “sustainability”, which remains a pervasive concept both used and misused for myriad intentions (Carter 2003:201). To reach an appropriate definition of ecological sustainable urban mobility, I will describe the path of the environmental discourse around transport planning beginning from the concept of neo-liberal economics over ecological modernisation, market environmentalism and green consumerism to sustainable development and social ecology, and finally ecological sustainable urban mobility. The sequence of these concepts is on the one hand historically determined and on the other hand it describes their proximity to the final and most recent concept of ecological sustainable urban mobility.

In order to shift attention from describing the causes of unsustainable mobility to envisioning sustainable mobility, I will construct a normative conceptual framework. To better grasp the evolution of the discourse and to understand the relationship between those concepts, as well as their response to the issue of unsustainable transportation, they have been placed in a coordinate system (see Fig. 215). I borrow the mapping methodology of Hopwood, Mellor and O’Brien (2005:41), who developed a graph in to position the different interpretations of sustainable development. The authors categorised views on sustainable development according to their social equity concerns (y-axis) and their environmental concerns (x-axis). With the social equity concerns axis, Hopwood, Mellor and O’Brien (2005:41) intend to visualise “... the level of importance given to human well-being and equality”, while the environmental concerns axis “... covers the priority of the environment from low environmental concern through technocentred to ecocentred”. Additionally, Hopwood, Mellor and O’Brien (2005) group the views into broader approaches to neces-

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14 Jutta Deffner (scientific researcher, Institute of Social-Ecological Research) interviewed 5 February 2008
15 It should be noted that Figure 2 is a simplified sketch, which does not presume to use the coordinate system in the mathematical sense of exact line item specification, so that units of measurement are obsolete.
sary changes to achieve sustainable development, namely status quo, reform and transformation. Hopwood, Mellor and O’Brien (2005:42) argue:

That it [sustainable development] can be achieved within the present structures – status quo; that fundamental reform is necessary but without a full rupture with the existing arrangements – reform; and that as the roots of the problems are the very economic and power structures of society a radical transformation is needed – transformation.

For the purpose of this study, I adopt the basic coordinate system of Hopwood, Mellor and O’Brien (2005:41), including the overlaid pattern of broader views, however, I modify and expand the mapping method to suit my own conceptualisation as put forward at the beginning of this Chapter. Although the model of Hopwood, Mellor and O’Brien (2005) is a good tool to visualise the evolution from neo-liberal economics to ecological sustainable urban mobility, it cannot be applied one-to-one. The labels of the axes and the overlaid patterns need to be interpreted with more subtlety with regards to the topic of urban mobility, in order to avoid confusion. Here, techno-centred does not equal technology per se, it rather refers to the belief that unsustainable mobility can be solved through technological innovations alone (see Wadhwa 2000). Eco-centred, in comparison, does not reject technology as such, it rather promotes a holistic approach to the issue of unsustainable mobility. Beside emphasising ecological concerns, eco-centred concepts acknowledge the complexity of mobility as socio-technical system, and call for a radical transforma-
tion (Becker and Jahn 2006:45). Hence, the abovementioned concepts are positioned according to their inclusion of social and environmental concerns as well as their stance on urban mobility. The model is therefore expanded to include transport concerns, which are visualised through speech balloons containing examples of modes of transport that put forward as “solution” to unsustainable mobility. The underlying arrow indicates the evolution towards ecological sustainable urban mobility, representing the keynote of the conceptual framework. It also acknowledges the interplay of the concepts, which will become easier to comprehend through the following sections.

Applying the broader categorisation to sustainable mobility (Hopwood, Mellor and O’Brien 2005:42): status quo describes the belief that sustainable mobility can be achieved within the present structures; reform signifies that the existing transport system needs to be reformed without challenging the underlying structure; and transformation calls for a radical change by questioning underlying mechanisms that perpetuate unsustainable mobility.

Only if all members of a society have access to desired destinations and only if people are encouraged to accept their responsibility to move around town without harming the environment, is urban mobility truly sustainable. In other words, the provision of mobility for the entirety of an urban population needs to be decoupled from forms of transport that are directly or indirectly harmful to the environment. At the same time, mobility refers to social positioning and the ability of individuals to follow their aspirations towards personal goals. Therefore, it is assumed that sustainable urban mobility ideally combines both social equity and eco-centred principles, instead of merely providing technological innovations that are only affordable for a minority (Baeten 2000). To visualise the normative and visionary outlook of the concept of ecological sustainable urban mobility, it has been placed in the upper right corner of the coordinate system (Fig. 2). For the moment, public bikes are placed between sustainable transport and sustainable urban mobility, as its affiliation is yet to be determined. Public bikes have the potential to contribute to the achievement of ecological sustainable urban mobility, however, if their limitations, as will be discussed in section 4.5, are not overcome, they risk to be yet another product of the sustainable transportation rhetoric (see Baeten 2000).

The concepts are mapped as follows (see Fig. 2):

The concept of neo-liberal economics is assumed to be neither concerned with environmental issues nor social equity problems, as they “see neither the environment nor society as facing insuperable problems” (Hopwood, Mellor and O’Brien 2005:42). Neo-liberal economists support the status quo and intend to maintain existing power relations, as long as they are beneficial for economic purposes. Therefore the concept of neo-liberal economics is perceived as the point of origin and is placed at the bottom left. Concerning mobility, unsustainable modes of transportation are not perceived to be an issue; on the contrary, the high-carbon emission passenger car for instance is praised as ideal mode of transport (Shell 2004:2; see also Foster 2001:98).
Ecological modernisation, the concept of market environmentalism, and green consumerism intend to reconcile ecology and economics through the means of technology and marketing. Although these concepts are also believed to support the status quo, they start to include a weak commitment to environmental sustainability (Hopwood, Mellor and O’Brien 2005:43). Technology and market forces are perceived to be the key to ecological issues, while social equity is out of their focus, so that these concepts are placed in the middle of the bottom line. In terms of mobility, these concepts are most likely to favour privatisation measures and clean fuel vehicles.

Sustainable development, which translates into sustainable transportation, is a vast and often ill-defined concept, which combines social, economic and environmental concerns, so that it takes up the centre of the coordinate system (Carter 2003:199). Furthermore, proponents of sustainable transportation favour a reform approach to the issue of unsustainable mobility. Without calling for a fundamental change, the concept requires a modification of the current transport system to respond to mobility needs, while mitigating negative impacts of transportation modes. Hence, the response to unsustainable transportation is quite diverse, but public transportation and intermodalism seem to fulfil the criteria of sustainable transportation (Szyliowicz 2003; OECD 2000; The Centre for Sustainable Transportation 2002).

Social ecology looks at societal origins of environmental issues and therefore attempts to combine social equity concerns with environmental concerns. Compared to the previous concepts, social ecology challenges underlying power relations that trigger unsustainable mobility and consequently calls for a radical transformation. Contrary to Hopwood, Mellor and O’Brien (2005:46), social ecology here does not refer to the eco-philosophy of Murray Bookchin. Instead, it is a translation of the German “Soziale Ökologie”, and stands for an academic discipline fostering research on the link of lifestyle and environmental issues (Becker 2001:4). Mobility is perceived as culture and is a core focus of social-ecological research, so that this interpretation of social ecology is more adequate to discuss public bikes than Bookchin’s philosophy (Becker and Jahn 2006; Deffner et al. 2006). In the map, social ecology is placed next to sustainable urban mobility, as it is perceived as a key concept to attaining the goal of ecological sustainable urban mobility. In terms of the issue of unsustainable transportation, the response of social ecological research considers behavioural change and change management of socio-technical systems as most effective.

Ecological sustainable urban mobility, as mentioned above, is perceived to combine social equity concerns with eco-centred concerns, so that it is placed in the upper right corner. It is directly influenced by social ecology, and also calls for a transformation of existing urban mobility cultures into more sustainable ones. Although the focus lies on travel behaviour, ecological sustainable urban mobility does not reject technological solutions. In fact, it argues for a combination of social, technical and political measures in order give consideration to the complexity of mobility. Consistent with its eco-centred position, the concept promotes a combination of hu-
man-powered zero-emission modes of transport and behaviour oriented policy measures.

Although the abovementioned concepts appear somewhat different and even antagonistic to what will be defined as ecological sustainable urban mobility, they influence one another and eventually shape the sustainable mobility discourse. As illustrated in Figure 2, the concepts of ecological modernisation, market environmentalism and green consumerism do collapse into one another, as all three combine economic goals with environmental issues, albeit through different approaches. Interrelationships among these concepts and the remaining ones will become more intelligible during the following sections, in which all of them are presented and discussed in more detail. The reader will be able to relate the proposed solutions of each concept concerning the issue of unsustainable transportation to the principles of each concept.

3.1 “Growthmania”

The notion “growthmania” was introduced by Herman Daly (2006) to describe the mindset of neo-liberal economics, which always foregrounds economic growth. For neo-liberal economists, growth is the answer to each and every issue, so that they would argue that economic growth is the best solution to mitigate pollution for instance, as it enables people to be rich, so that they can afford a clean-up of the pollution while at the same time invest in the discovery of new resources and the development of new technologies. Additionally, each problem is to be turned into an economic opportunity. In Daly’s (2006:49) words, “… grow forever or at least until it kills you – and then count your funeral expenses as further growth”.

The neo-liberalist mindset is believed to dominate contemporary economic and political activities. It influences political decisions on all levels hence it is crucial to understand its core principles. However, in this thesis I will only deal with it briefly, as it should be regarded as background information to better comprehend the subsequent concepts.

As the name implies, neo-liberal economics, or “neoliberalism”, originates from the ideas of liberal economics as introduced by Adam Smith in the 18th century. He emphasised the importance of free, unregulated markets to achieve private gain and economic progress (Kegley and Wittkopf 2001:250). Adam Smith also uses the notion of “laissez-faire economics” to refer to a form of capitalism without any government interference in trade affairs. Kegley and Wittkopf (2001:251) point out:

Commercial liberalism recognizes that in the short run free trade will result in unequal rewards for some and produce inequalities in countries’ rate of growth, but argues that the long-term gains for all in a laissez-faire economic system of free markets are most important.

The preference for laissez-faire policies forms the basis for neo-liberal economics. Economic efficiency is the key goal of neoliberalism, and it is thought to be accom-
plished through free market mechanisms. Interventions of the state are believed to undermine such mechanisms and are therefore rejected.

Neoliberalism is in fact characterised by a set of principles enabling economic enterprises to maximise their profit, while minimising their expenses. Such profit-oriented mindset provokes many opponents, so that in fact most definitions of neoliberalism are biased (Martinez and Garcia 1997; Foster 2002a). While proponents believe in the potential of economic growth to achieve better living conditions for all by eventually benefiting everyone, opponents have a quite different view.

As opponents, Martinez and Garcia (1997) critically summarise neo-liberal principles as follows:

1. The rule of the market
2. Cutting public expenditure for social services
3. Deregulation
4. Privatization
5. Eliminating the concept of “the public good” or “community”

Martinez and Garcia (1997) point out that the wealth mainly remains with the corporate elite, which becomes richer, while workers and the lower stratum of the society remain poor. Regarding the environment, neo-liberal economists are perceived to reject any environmental policy that could diminish their profits (Martinez and Garcia 1997). Similar to Darwin’s theory of “survival of the fittest”, neoliberalism favours individual responsibility and rejects public services. Each member of the society is seen to have the potential to gain wealth, yet Martinez and Garcia (1997) conclude, “the beneficiaries of neo-liberalism are a minority of the world’s people. For the vast majority it brings even more suffering than before ...”.

**Neo-liberal Economics and Transport**

Concerning transportation, neo-liberal economists favour any mode that realises maximum economic growth. In the long-term, as Foster (2001:98) maintains, automobile dependence seems to be the “... most efficient way of generating profits”. There are myriad large-scale industries involved in the production of cars, roads and fuel, which all contribute to economic growth. As “epoch-making innovation”, the automobile acts as the very symbol of the neo-liberal mindset. Today, industrialised, capitalist societies are organised around the car and its dependence on fossil fuel, which makes the private car not just a mode of transport but a “way of life” (Foster 2001:99).

Shell, for instance, praises the social, economic and emotional significance of passenger cars for the contemporary modern society, as a symbol for freedom and flexibility. According to its study on passenger cars, Shell (2004) even predicts the growing importance of the automobile to sustain mobility and consequently a growing number of privately owned cars. Considering the negative impact of the use of cars, as discussed under section 2.3, the neo-liberal approach to the issue of
unsustainable mobility clearly leads to a deterioration of the problem rather than a solution.

3.2 Economics and Ecology: The Perfect Couple

3.2.1 Free Market Environmentalism

As with economic planning and its economic goals, environmental planning and government regulations are often perceived as being too costly and ineffective to achieve environmental goals. Adler (2000) notes that, "dissatisfied with the status quo approach to environmental policy, a growing number of scholars and policy analysts are turning to the marketplace to address environmental concerns". Consequently they come up with what many call "free market environmentalism" a concept that argues for the use of market forces to address environmental issues.

This turn is somewhat ironic, as traditional environmentalists previously rejected private property and free market principles, and with it the right to exploit, store and build at will (Stroup n.d., see also Frazier 2003). Traditionally, environmentalists perceived ecological problems as outcomes of free market and neo-liberal principles. They denounced private property and the irresponsible attitude of cutting expenses by polluting those living downstream as a principal cause of environmental catastrophes.

This makes it all the more surprising that a concept evolved, which intends to merge previously mutually exclusive economic and environmental attitudes. The economist Stroup however does not perceive any contradiction between privately owned land and concerns for the eco-system. He (Stroup n.d.) even points out that "when air or water pollution damages a privately owned asset, the owner whose wealth is threatened will gain by seeing that the threat is abated, in court if necessary". Therefore, Stroup identifies privatisation of land and resources as key to environmental protection. He argues, that it is much easier to hold private owners accountable for pollution than public decision-makers. Furthermore, private owners have strong incentives to keep their property clean, as otherwise it would lower the value of the property. Hence it is the market and the demand for quality resources that act as principal motivation to manage land and resources in a sustainable manner. In Stroup's words, "if I mine my land and impair its future productivity or its groundwater, the reduction in the land's value reduces my current wealth".

Adler (2001:661) agrees with Stroup and adds that environmental issues do not derive from market failure per se, but from inadequate environmental policies. While policy makers tend to point to externalities produced by market failure as

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16 "Environmentalist" does not describe a member of a homogenous group; on the contrary, environmental groups seem to occupy diverse niches, which often compete against each other (Jamison 2001:147). Jamison (2001:151) classifies environmentalists into four categories: community environmentalism, professional environmentalism, militant environmentalism and personal environmentalism.
principal cause, Adler (2001:668) turns the tables by arguing that “regulations, fiscal instruments, or direct management of environmental resources – hamper the effectiveness of existing environmental programs”. Free market environmentalism favours privately owned resources and consequently their incorporation into market institutions over centrally planned political measures. Adler (2001:677) calls for a reformation of environmental policy based on the following set of principles:

In the environmental context, these principles should seek to reduce government interventions that distort economic and environmental decisionmaking or subsidize environmental harm, promote technological development and wealth creation, develop and expand property rights in environmental resources, hold private actors accountable for the environmental harms they cause, and foster ecological innovation by decentralizing decisionmaking.

Although Adler (2000) acknowledges that a number of environmental activists and lobbyists remain critical towards privatisation and economic principles, he points to the phenomenon of “market language” within environmental debates. Notions, such as “cost-effectiveness” and the “polluter-pays principle” point to an increasing trend of those embracing the neoliberal mindset. There is a close interplay between market environmentalism and neo-liberal economics, except that neoliberalism focuses on economic growth in general, while market environmentalism turns ecological issues into a profitable business (Dunn and Flavin 2002:40).

Looking at activists among free market environmentalists\(^{17}\), Frazier (2003) points to the Nature Conservancy, which in his opinion has done a much greater job in preserving the environment than either the Sierra Club or Greenpeace\(^{18}\) for instance. The Nature Coservancy usually purchases land in order to conserve it. Furthermore, think tanks, such as the Competitive Enterprise Institute, intend to empirically prove that privately owned land is much better conserved than public lands where people tend to overuse and deplete resources (see also Hardin 1968).

The majority of militant environmentalists however would reject the concept of free market environmentalism on the grounds of lack of social justice concerns and their suspicion towards private economic enterprises. Considering their view of the link between ecological degradation and human exploitation, they argue for “the building of alliances between environmental and social justice movements” (Hopwood, Mellor and O’Brien 2005:49).

Most proponents of market environmentalism are to be found among economists who discover profit opportunities in using arguments of market environmentalism for their purposes. Goldman (2005) critically analyses ostensibly green arguments that are put forward by the World Bank to push for public-sector privatisation. What he calls “green neoliberalism” is based on market environmentalist principles, which

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17 It should be noted that market environmentalism is especially popular among conservationists, who only represent a fraction of the environmental movement.

18 The Sierra Club and Greenpeace are one of the largest mainstream environmental groups that underwent a bureaucratisation process to be now ‘experts of activism’ who take part in political lobbying and consultation (Jamison 2001:160).
3 CONCEPTUAL FRAMEWORK

intend to reconcile environmental and economic goals. As for Goldman (2005:242), the World Bank constructs a pro-privatisation argument in three steps. The first step is to point out the degradation and pollution of the environment – an argument that obviously does not offer any grounds for criticism. As a second step, the World Bank traces the causes of degradation back to governments’ failures to adequately manage natural resources, so that the third step seems logic and inevitable. Only private companies are left to ensure environmental protection and wise management of resources by putting a price on them.

As discussed in section 2.1.4, principles of market environmentalism highly influence the global climate change debate through turning the issue into a business. Emissions trading acts as one example for the application of market environmentalism on mitigating climate change. The outcome can be described as a commodification of the atmosphere resulting in the trade in “nothingness” (Glover 1999). The next step would be a privatisation of air as already occurs with water resources.

MARKET ENVIRONMENTALISM AND TRANSPORT

In looking at urban transportation planning, arguments of market environmentalism are once again applied to legitimise the growing trend of privatising public transport services. Privately operated transport services are perceived to be firstly more cost-effective and secondly more environmentally friendly, as private enterprises are perceived to offer best quality transport in order to remain competitive.

Since the 1990s, EU guidelines advocate privatisation in the transport sector to enhance greater competition among service providers across European countries (Dickhaus and Dietz 2004). The experiences vary greatly from country to country and from sector to sector, however, due to a trend towards monopolies or duopolies, “… the intended effects of competition (to lower user costs) are thereby often put into question” (Dickhaus and Dietz 2004:5). Looking at public bikes, there is a similar trend, as to date there are two major companies competing for the public bike market, namely JCDecaux and Clear Channel. The effects of privatisation, or public-private partnerships in the bike-sharing sector will be discussed in more detail in section 4.5.

3.2.2 ECOLOGICAL MODERNISATION

Ecology and the economy do not only meet on the grounds of private property and the free market, but also on the grounds of technological innovation. To understand the emergence of ecological modernisation19, it is crucial to know the circumstances under which the concept came into being. Hajer (2002) gives a historical overview of the debate in which he presents ecological modernisation as a powerful force influencing environmental politics. According to Hajer (2002:93), ecological modernisation was a product of a transition within the environmental movement from

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19 In the USA, scholars refer to ecological modernisation as ‘industrial ecology’.
the radical anti-nuclear, anti-corporate, anti-capitalist critique of the 1970s to the pragmatic, policy-oriented and technocratic stance of the 1980s. To explain the transition, Hajer (2002:94) offers four reasons, the first of which was the concern of the public towards economic issues due to the economic recession of the late 1970s. Secondly, the environmental movement itself experienced a process of professionalisation with the establishment of non-governmental organizations, which concentrated their actions more towards lobbying (see also Jamison 2001). As third factor, the scope of environmental critique moved from nuclear power to air pollution and other issues in order to gain support from broader society rather than solely from counter-cultures. With this, environmental groups proposed solutions that were more acceptable to general society. This shift of the environmental discourse to issues such as acid rain and ozone, as put forward in section 2.1.3, was also due to the growing environmental interest of broader society (Hajer 2002:94; see also Hajer 2005). The last reason lies within political institutions, which started to take up environmental concerns and consequently looked for pragmatic solutions.

The concept of ecological modernisation emerged in 1982 within the discipline of environmental sociology and was initiated by the German scholar Joseph Huber. His underlying assumption was that there is no alternative to industrial development outside it, but only within the paradigm of modernisation and industrial development (Huber 2001:287). Industry should not be regarded as the enemy, as in fact it inherits a constructive role in environmental protection. According to Huber (2001:287), only industry has the capacity and the know-how to foster a process of "ecologisation" (Ökologisierung) of society.

In considering the role of industry, Huber (2001:288) noted that most projects of alternative production remained at the margins, yet to effectuate change in societal behaviour, alternatives should be established at the centre. Only if alternatives are conducted on a large scale, can major changes be achieved. Hence he advocates innovations in production processes and product design:

- Use renewable energies for production
- Substitute toxics with new materials
- Use resources more efficiently
- Recycle material

With this techno-industrial approach, Huber intended to achieve a decoupling of economic growth and resource consumption. Unlike market environmentalism, Huber (2001:290) maintains a socio-political approach to environmental issues, in which governments are required to formulate environmental policies. However, in-

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²⁰"Ecologisation" - this literal translated notion of Ökologisierung never entered the environmental vocabulary. Huber does not only refer to societies’ environmental awareness, but also to their actual commitment. Hence, it could also be translated as ‘greening’ the behaviour of members of a society. One example, namely ‘green consumerism’ will be discussed in 3.2.3.
dustry is regarded as the main actor, so that environmental politics should be con-
fined to defining eco-standards and a fiscal framework, which is favourable for
ecological innovation and the market of eco-friendly products.

With ecological modernisation Huber asserts a win-win situation for economy and
ecology: while the environmental impact of production and products is minimised
through technological innovation, these products open up new markets leading to
economic growth, and at the same time eco-friendly production reintroduces a
positive image of industry into society. Hence ecological modernisation can be re-
tered to as “Ökologisierung der Ökonomie durch Ökonomisierung der Ökologie”
(Huber 2001:292).

Further proponents of the concept of ecological modernisation are the sociologists
Arthur Mol and Gert Spaargaren (see Mol and Spaargaren 1993), who use this con-
cept as a response to the eco-alarmism of the early-1970s. In contrast to this
pessimistic outlook on the state of the environment, ecological modernisation offers
an optimistic scope for action (Mol and Spaargaren 1993:436). Consequently, en-
vironmental awareness moved from the periphery to the centre of political and eco-
nomic attention and activity. Mol and Spaargaren (1993:437) speak of a growing
independence of the ecological sphere “... vis-à-vis the political, cultural and eco-
nomic spheres”. The authors perceive politics and economy as central social insti-
tutions of modernity, which need to be studied from the viewpoint of the ecological
sphere to eventually include ecology into these institutions. Ecological modernisa-
tion can therefore be described as institutionalisation of “ecological rational action”.Mol and Spaargaren (1993:438) conclude:

With regard to economic interests and aims, the environment can no longer
be seen as a matter of partial interest or as an external precondition, but it
has been afforded its own momentum.

While Mol and Spaargaren, as well as Huber, celebrate the shift of environmental
awareness from the periphery (as counter-ideology) into the core (as economic
mainstream ideology), a number of theorists see ecological modernisation as being
highly problematic (Carter 2003; Foster 2002a; Fisher and Freudenburg 2001; Har-
voy 1998; York and Rosa 2003; and York 2004). Rooted in eco-Marxist22 perspec-
tive, Foster (2002a) believes that capitalism is the principal cause of environmental
degradation and its pursuit for profit will not be mitigated through ecological mod-
nernisation. According to Foster (2002a:3) it is completely needless to internalise
ecological issues (externalities) into the economic system, as ecological crises do
not translate into economic crises. He emphasises, “we should not underestimate
capitalism’s capacity to accumulate in the midst of the most blatant ecological de-
struction, to profit from environmental degradation ...”. He mentions the waste
business as one example, in which industry first destroys and pollutes the envi-

21 “Ecologisation of economy through economisation of ecology.”
22 Eco-Marxists argue that Marx was not only concerned with the exploitation of labourers,
but also with the exploitation of natural resources. He is therefore regarded as - among
others – ecologist (see Foster 2002a, 2002b, 1999; Grundman 1991; Groß 2006)
ronment for the purpose of maximising profits to return and also profit from the cleanup. In other words, the more the industry pollutes, the more it can profit from mitigating the pollution. Therefore there are no incentives for enterprises to reduce either pollution or resource depletion. The main problem does not lie with modes of production, but with the neo-liberal capitalist mindset per se. Ecological modernisation is not only useless in the sense that it does not target the capitalist mindset, it is also counterproductive by offering businesses a new rhetoric, which enables them to expand their markets in the name of the protection of the environment.

Harvey (1998:338) approaches ecological modernisation from a different angle by looking at its rhetoric. He warns that ecological modernisation "presumes a certain kind of rationality that lessens the force of moral arguments and exposes much of the environmental movement to the dangers of political co-optation". By borrowing notions and arguments of the environmental movement, and by combining them with economic principles, ecological modernisation becomes a persuasive concept. Similar to Foster, Harvey points out that although ecological modernists seem to adopt environmental reasoning, they do not have the same viewpoint on the incompatibility of ecology and capitalism. Trade-offs between economic growth and ecological concerns are not being considered; instead Harvey (1998:342) blames business companies for exploiting the concept for their own purposes. Additionally he underlines the lack of social justice concerns in the concept of ecological modernisation and consequently calls for an integration of the environmental justice discourse into the concept. According to him (Harvey 1998:352), the two biggest issues in today's world, "... unrelenting capital accumulation and the extraordinary asymmetries of money and political power ..." are simply ignored.

Although York and Rosa (2003:281) acknowledge the contribution of ecological modernisation theorists to the sociological discipline by questioning conventional views on modernisation, they challenge the concept in four points: Firstly, the argument of ecological modernisation that social institutions would change due to environmental problems does not translate into environmental actions. Secondly, ecological modernisation theorists fail to thoroughly investigate general impacts of modernisation processes on the environment. Thirdly, proponents of the concept solely focus on the betterment of modes of production of certain industries so that "ecological improvements in one sector may come at the expense of increased ecological impacts in another" (York and Rosa 2003:282). Fourthly, ecological modernisation rather speaks in terms of resource "efficiency" than in terms of total resource "consumption". The authors provide evidence, that although modernisation processes lead to more efficient production processes, overall resource consumption remains high and environmental impacts even increased during the last decades. In sum, York and Rosa (2003:283) are especially sceptical of the ostensible potential of modernity to solve environmental problems. York (2004:360) adds that the optimistic outlook on modernisation as a progressive force is somewhat misleading and distracts from its actual impact as a driver of environmental destruction.
To bridge proponents and opponents, Fisher and Freudenburg (2001:707) call for more in-depth studies to move the ecological modernisation discourse forward. In their opinion it is neither feasible to defend the concept in its present form, nor is it useful to completely reject it. As a matter of fact, ecological modernisation has been very influential, so that “black-and-white disagreements” are rather counter-productive (Fisher and Freudenburg 2001:706).

Hajer (2002) is also to be placed somewhere between proponents and opponents, as he looks upon ecological modernisation critically without completely dismissing it. He rather advocates for a “reflexive ecological modernisation”, which emphasises discussions on social sources of pollution in order to determine whichever practices should be maintained or changed (Hajer 2002:281). To avoid “economization and scientification” of the environmental discourse, Hajer calls for interdisciplinary approaches to demystify science as the domain of absolute truth. Expert opinions need to be contextualised through critical public debates to eventually find “socially acceptable strategies of modernization” (Hajer 2002:283).

**Ecological Modernisation and Transport**

With regards to the focus of this thesis, ecological modernists would most likely look at the optimisation of the production and emissions of vehicles, while at the same time ensuring economic growth. They would likely refrain from questioning the very need of the car industry; instead they would favour innovations within the industry. As a symbol of modern mobility, hybrid cars and hydrogen vehicles could be perceived as outcomes of the ecological modernisation discourse.

With regards to public bikes, ecological modernists are likely to support this scheme as a technological innovation on the one hand and as a good business strategy for outdoor advertising companies on the other hand. Public bikes could even be interpreted as a product of eco-modernist thinking, because the equipment of third generation public bikes involves modern technology; at the same time, as a public service, they provoke public debates and trigger behavioural change (Hajer 2002).

### 3.2.3 Green Consumerism

Green consumerism is both a concept describing ideal consumption patterns and a marketing strategy of business companies. While the abovementioned concepts focused on the supply-side only, green consumerism represents foremost the demand-side with a hidden reference to the supply-side. Although environmental groups previously stressed reduction of consumption, there has been an increasing interest in recent years concerning consumption strategies that focus on the quality of products, rather than the quantity (Buttel 2003:333). Gosden (1995:35) states:

> The idea is that when awareness of environmental problems penetrates deeply enough into the community consciousness the purchasing power of the mass market will force all manufacturers to green both their products and their manufacturing processes...
Green consumerism perceives people as powerful agents to induce change without having to give up their customary culture of consumption by questioning consumption per se. It is the power of their credit cards, which enables the public to actively participate in decision-making (Gosden 1995:35). Contrary to this view, Buttel (2003:334) argues that individual consumption has little impact on the energy and resource demand of industries as “... tendencies of capital competition and capital accumulation have causal priority over consumption institutions”. Additionally, consumers are bound to basic conditions of the political-economic system and socio-spatial infrastructure, which forces them to follow certain consumption patterns (Buttel 2003:334).

Looking at the supply-side, green consumerism is linked to a point of view in which the consumer is a victim of an exploitative industry, “… adapting to environmental concerns as if they were merely a new fashion to squeeze the juice out of, before moving on” (Gosden 1995:35). Critics accuse green consumerism of provoking more environmental damage by promoting consumption of new products and by downplaying the actual environmental impact of consumption in general. “Green product” is just a marketing tool and has nothing to do with a company’s concerns for the environment. One aim is to “greenwash” a company’s image, while another is simply to saturate the market for ostensible green products, most consumers not requiring anything other than something that “makes them feel good” (spokesman for Mobil Chemical Company, cited in Gosden 1995:39, see also Buttel 2003:334). Some advertisements for “green” products go even further in making the potential consumer feel guilty for not buying rather than for buying. Gosden (1995:40) highlights an example of an advertisement for Toyota Camry, which started its slogan with “to help save the Earth’s delicate ozone layer …”. With this, the responsibility for the destruction of the ozone layer remains with the consumer, while the industries are off the hook.

Other critiques include businesses that consciously mislead consumers by declaring their products as green, although their environmental impact has only been shifted from one sector to another. One example would be biodiesel, which is still marketed as an environmentally sound alternative to fossil fuel, although its production requires deforestation of large areas (Greenpeace 2008). As already mentioned in Chapter 2, green consumerism leads to problem-shifting rather than problem-solving.

At the time of the publication of Gosden’s article, green consumerism appeared as a wave that seemed to trickle away with relatively few people practicing green shopping. Today, green consumerism has entered a new phase, becoming part of a fashionable “green” lifestyle, as exemplified by celebrities (Williams 2007). Companies respond to the emerging interest in living “green” by switching from greening utilitarian products to marketing “green” luxury goods, such as the Lexus LS (hybrid car). As the notion already implies, “luxury” refers to goods and services that are not actually needed – the very symbol of an affluent capitalist society. Green consumerism in today’s form perpetuates the consuming behaviour of an affluent capitalist society, which is the very cause of the depletion of resources and
environmental degradation. Overall, however, it should be borne in mind that “green consumers” are not a homogenous group, as their motivation to buy green products might be both value-driven (genuine care for the environment) or fashion-driven.

Despite all criticism, which is mostly justified, green consumerism may have a positive long-term impact on people’s environmental awareness. According to a survey conducted by Shellenberger in April 2007, “folks who were engaged in these green practices [green shopping] were actually becoming more committed to more transformative political action on global warming” (cited in Williams 2007). Additionally, green consumerism serves as a tool for environmental groups to pressure industrial corporations to undertake ecologically friendly changes in production processes (Buttel 2003:335). Environmental groups use the argument of a purchasing power of consumers to target polluting industries.

**Green Consumerism and Transport**

With regards to urban transportation, green consumerism can be perceived as an explanatory as well as normative concept. In the first case, green consumerism describes a “green” consumer’s choice of the mode of transport, which can range from public transportation, in the case of a value-driven consumer, and hybrid cars, in the case of a fashion-driven consumer. The second instance also incorporates the supply-side, which highly influences the perception of what should be consumed. The notion “green consumerism” entails a request towards potential consumers to purchase, in order to “save the world”. In relation to transportation, green consumerism is therefore primarily concerned with privately owned vehicles and most likely advocates for what companies advertise as “clean” vehicles, running on alternative fuels and power sources, such as hybrid and hydrogen cars. With regards to the issue of unsustainable urban mobility, the green consumerist perspective only opts for a reform of the existing transport system by rendering cars less harmful for the environment. However, it should be borne in mind that green consumerism is closely linked to marketing strategies that seek to greenwash the image of companies. As shown above, it is proven that “clean fuels” for instance, such as biodiesel, have several negative side-effects in terms of water pollution and deforestation (Greenpeace 2008).

### 3.3 Sustainable Development

Sustainable development is probably the most prominent concept in today’s environmental discourse; at the same time it is the most ill-defined, as it is employed for myriad purposes. It would go beyond the scope of this work to illuminate the extensive debate around this concept; instead, I intend to give a brief overview of the central arguments.

While the concept has entered most policy papers by now, it is also regarded as highly controversial by a number of critics. In this section, the influence of ecological modernisation on sustainable development will become obvious, so that above-
mentioned critiques of ecological modernisation are also applicable to sustainable development (Carter 2003, Foster 2001, Dietz, York and Rosa 2001). However, both proponents and opponents use similar terminologies to defend their personal conviction, so that “sustainability” as such is rarely questioned. Discussions are instead organised around what is to be counted as sustainable and what not, as well as the ways to achieve sustainability.

The term “sustainability” was first used in 1972 in the book *Limits to Growth*, which was commissioned by the Club of Rome – a group of industrialists and humanitarians. Several scientists of the Massachusetts Institute of Technology conducted the research for the book. They analysed basic factors that might limit growth, such as population, natural resources, industrial production and pollution, to come to the conclusion that within a hundred years the limits of economic growth would be reached due to resource depletion, pollution (including high CO₂ concentrations) and the loss of arable land (Meadows et al. 2006:46). Their conclusion, however, implied the possibility of altering these trends “to establish a condition of ecological and economic stability that is sustainable far into the future” (Meadows et al. 2006:46). The authors called for people “…to join us in understanding and preparing for a period of great transition – the transition from growth to global equilibrium”.

With the establishment of the Brundtland Commission in 1987, policy-makers followed the call and produced the most influential report on sustainable development, namely *Our Common Future*, also known as the “Brundtland Report”²³. It pushed the topic into mainstream policy debates and established the most commonly used definition of sustainable development:

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. (The Brundtland Commission 2006:56)

The definition combines the idea of basic needs and human aspirations with the idea of limitation of the environment’s ability to meet these needs and aspirations. Although the Brundtland Commission (2006:56) acknowledges cultural and social determination of needs, it names universal basics, such as food, shelter, clothing and employment. With regards to aspirations the Commission is less specific as it only mentions an improved quality of life. Development is interpreted as “satisfaction” of those needs, for which an increase in production capacity is required. Hence, “sustainable development clearly requires economic growth” (Brundtland Commission 2006:56). In addition to economic growth, the report fosters technological development, increased use of renewable resources within natural limits, and the development of substitutes for non-renewables. Contrary to the previously discussed concepts market environmentalism, ecological modernisation and green consumerism, sustainable development also took social equity concerns on board.

In sum, sustainable development is an inter-generational concept with a future vision on economic growth, social equity and ecological quality.\(^\text{24}\)

Rowlands (2001) summarises different approaches to the concept of sustainability and concludes that all definitions adopt the abovementioned dimensions of economy, society and ecology. Yet the emphasis on each dimension proves to be very different depending on the background of each approach, so that for instance environmentalists tend to favour equity and ecology over economy (Huber 2001:300). Carter (2003:199) describes the flexibility of sustainable development as “chameleon characteristic”, which appeals to a wide range of supporters, but also provokes severe criticism. Above all, Carter (2003:201) criticises the concept’s contestability, which allows anyone and anything to be declared as sustainable, “leaving it as little more than an empty political slogan”. It is therefore the more important to pay attention to the underlying intentions of the user of the concept. Sustainable development foremost targets practical politics, which always incorporates compromises, but as Carter (2003:211) stresses, “(in the right hands) it can still be radical”.

Similar to Carter, Dietz, York and Rosa (2001) are concerned rather with the fuzziness of the concept and the difficulty of measuring sustainable development. According to their perception, sustainable development equals increasing human welfare or quality of life while decreasing environmental impact (Dietz, York and Rosa 2001:8). To measure the quality of life policy-makers tend to use GDP per capita, while for environmental impacts it appears quite common to simply rely on single indicators, such as CO₂ emissions. If sustainable development is to be operationalised and translated into action, the authors require a clear definition as well as methodologies to measure the dynamic and diverse indicators for human welfare and environmental impact.

Once again it is Foster (2001) who opposes the concept of sustainable development on the grounds of a more general critique of capitalism. He accuses sustainable development of remaining “... an economic concept serving narrow economic ends” (Foster 2001:79). Foster (2001) argues that instead of sustaining the environment, the concept rather sustains economic growth. Such unlimited growth will inevitably lead to major environmental catastrophes, which will not be solved through technological advances. Nevertheless, Foster (2001:80) does not reject economic development per se as he acknowledges its need in the foremost poorer regions. However, he emphasises the necessity for discussing conditions of economic development among those who are suffering from its side-effects, namely the general public. A critique on economic development is at the same time a critique of the contemporary form of society, which is foremost influenced by capitalism (see discussion on green consumerism). Borrowing Marx’s words “accumulate or die”, Foster (2001:81) points to the persisting attitude of over-production and over-consumption maintaining economic growth at the expense of the environment and people in developing countries. In conclusion, Foster (2001:81) calls for more em-

\(^{24}\) Also referred to as “three E’s” of sustainable development: economy, equity and environment (Wheeler and Beatley 2006:8).
phasis on social justice concerns within the sustainable development debate, which acknowledges the fact that “... increasing production does not by itself eliminate poverty”.

**Sustainable Development and Transport: Sustainable Transportation**

The sustainable development discourse is integral to urban transportation issues, so that *sustainable transportation* emerged as a likewise widespread sub-concept. Similar to its parent concept, sustainable transportation lacks a clear definition leading to diverse interpretations. Due to its proximity to sustainable development, its definition is formulated as follows:

Sustainable Transportation is an aspect of global sustainability, which involves meeting present mobility needs without reducing the ability of future generations to meet their needs. (The Centre for Sustainable Transportation 2002:2)

To provide a more detailed definition, most proponents use normative principles, which are organised around the three E’s: economy, equity and environment. In most cases, sustainable transportation needs to be cost-efficient, offer access for all, while minimising greenhouse gas emissions (amongst others, The Centre for Sustainable Transportation 2002). The OECD (2000:35) focuses on environmental sustainability and thus defines sustainable transport as one where:

Transport does not endanger public health or ecosystems and meets needs for access consistent with (a) use of renewable resources below their rates of regeneration, and (b) use of non-renewable resources below the rates of development of renewable substitutes.

Sustainable transportation can be interpreted as both a normative aim and a policy approach, which advocates for an integration of environmental concerns into transport policy and planning (European Commission 2003b). This sub-concept is a broadly-based model and includes land-use planning, infrastructure, policy measures and any other measures targeting emissions of all modes of transport. Intermodality forms a crucial part of sustainable transportation policies, although it is not necessarily the best strategy for achieving environmental sustainability. Szyliowicz (2003:187), a proponent of the principle of intermodalism, argues that a transportation system is most efficient and reliable if it is as diverse as possible. However, if I were to choose one mode that fulfils all principles of sustainable urban transportation, I would single out public transport, as it is often cited as being cost-efficient and accessible for a large section of the society while having a relatively low impact on the environment per capita (European Commission 2003b, OECD 2000).

**3.4 Social Ecology**

As mentioned above, social ecology in the sense of the German “Soziale Ökologie” should not be confused with social ecology, which is a radical and dogmatic eco-philosophy by Murray Bookchin based on anarchist and communitarian principles (for a complete discussion see Zimmermann et al 1997). The two concepts are too
different to be converged, so that Bookchin’s (1997) ideas on social causes of ecological problems will be left aside. Social ecology in the former sense is an interdisciplinary field of academic study that investigates the interrelationship between human social institutions and ecological issues. As an academic discipline, social ecology derives from human ecology, which traditionally deals with the way humans adapt to the environment and vice versa (Bailey 1998). At the same time social ecology is a sub-discipline of environmental social sciences, which look upon environmental issues as issues of anthropogenic metabolism, hence resource consumption and emissions deriving from human activities, especially economic activities (Huber 2001:164). Based on Marx’s theory of a metabolic rift\(^{25}\) between society and nature due to resource depletion, Foster (1999) argues that Marx already provided analyses of anthropogenic ecological issues and can therefore be perceived as a starting point for environmental sociology.

Huber (2001:167) identifies five areas of interest of environmental social sciences with their “environmental actors”:

1) *Values and life-styles*: social and cultural groups
2) *Knowledge and education*: scientists, the media and teachers
3) *Politics*: opinion-leaders, decision-makers and interest groups
4) *Economy*: tradesmen, marketers and investors
5) *Production and consumption*: engineers, designer, consumers and producers

Demographic changes comprise a further area of interest, as it is argued that, “…society, as it grows, transforms the environment (positively as well as negatively) and in turn the transformed environment has further impact on society” (Bailey 1998).

Contrary to the abovementioned concepts, social ecology is not a normative concept, it is rather a specific perspective on environmental issues taking social, cultural, economic and political circumstances of particular societies into account. According to Huber (2001:172), ecological principles – a formulation of a desired image versus an actual image – are based on cultural visions of what is thought to be the natural state of the environment. Social ecologists point to the arbitrariness of defining limit values of greenhouse gas emissions for instance, and the risk that such ostensible measures primarily serve as a legitimisation of human activities. While previous ecological concepts were based on the image of nature as something that needs cultivation, today they mainly derive from the sustainable development

\(^{25}\) Marx’s theory of the metabolic rift was developed around capitalist agricultural practices, through which nutrients are taken from the soil at such a pace that natural restoration is impossible. While industry assists agriculture by delivering the tools to exploit the soil, it also delivers fertilisers intending to restore the soil’s fertility. However, with extensive use of fertilisers, the environmental damage caused by modern agriculture grows. At the same time, agricultural products are transported to cities where their remains end up as waste without recirculating crucial nutrients. Therefore Marx argued that capitalism created a rift in the metabolism between humans and nature (for an extensive discussion see Foster 1999, Foster 2002b and Groß 2006).

Bearing in mind the sustainable development perspective, German scholars created the Institute of Social Ecological Research (ISOE) in 1989 aiming to integrate social science approaches into environmental research and at the same time incorporating natural science and engineering into social sciences (Becker, Jahn and Stieß 1999). While it looks at the relationship between humans and their natural and social environment, social ecology aims to provide social and political actors with the knowledge to guarantee a development of a “sustainable knowledge society” (Becker 2001:2). Becker (2001:4) points to a complex network of natural scientists, social scientists and scholars of sub-disciplines such as environmental law, environmental economics, environmental policy and applied ecology, out of which social ecology research emerged.

Transdisciplinary cooperation forms the heart of social ecology, and all different approaches share “… the fundamental assumption that environmental problems must be grasped as (complex) societal caused problems which can neither be understood nor dealt without the aid of well-founded analyses drawn from the social sciences” (Becker 2001:4). The goal to establish a sustainable knowledge society depends on the integration of social, economic and ecological dimensions, as only societies where justice and equity are ensured develop in a sustainable way.

Considering the three dimensions – society, economy and environment – it is obvious that social ecology adopts the concept of sustainable development and is therefore subject to the criticism already discussed above. Yet although social ecology does not reject economic growth per se, as Foster would claim, it frees itself from the criticism of being too techno-centred by emphasising democratic participation and behavioural changes as a path to attain sustainable development. At the same time, social ecologists are aware of the threat of perpetuating common economic patterns including short-term planning, so that Becker (2001:9) warns of an emergence of a dark side of the envisioned knowledge society: “the good old capitalism in new clothes”.

**SOCIAL ECOLOGY AND TRANSPORT: “MOBILITY STYLES”**

Among other areas, lifestyle and mobility is a focus of social ecology, with major focus on traffic behaviour and its motivational background (Götz 2003). The research of the ISOE is based on the concept of “mobility styles” in which “… methods used in attitudinal and lifestyle research are coupled with methods of researching traffic behaviour” (Götz 2003:2). It is hence a combination of sociological, psychological and environmental theories.

According to the social-ecological concept of mobility styles, there is a strong correlation between lifestyle orientations and traffic behaviour, explaining affinities to certain modes of transport. The research reveals that the highest percentage of
cyclists, for instance, are to be found among the “ecological resolute”, “a rather young and technically minded group ...” (Götz 2003:4). Götz (2003) argues that the amount of CO₂ emissions depends on lifestyles, which he groups in clusters ranging from the “fun-oriented” to the “traditional-domestic”. A survey conducted by ISOE and the Öko-Institut (Götz et al. 2002) shows that the fun-oriented group of people emit more than twice as much CO₂ than traditional-domestic people. Götz et al. (2002:6) identified young people, mainly school and college students, but also self-employed people to form the majority of the fun-oriented group, which tends to move more often and cover greater distances by private motorised vehicles than all other identified groups 26.

In addition to lifestyle and travel behaviour, the concept of mobility styles also perceives mobility as social positioning and discloses correlations between social positioning and travel behaviour. It is at this point that Ross (2000) challenges the notion of mobility and opts for the usage of the term “accessibility”. His arguments will be discussed in 3.5.

To mitigate climate change, social ecology does not favour particular modes of transport over others, but rather argues for target group-oriented measures to change unsustainable travel behaviours. The quest for adequate measures requires a deep insight into people’s motivation to choose a particular means of transportation on the one hand and into their perception of ecological issues on the other. The scholars Hunecke et al. (2001) are also involved in social-ecological mobility research and examine travel behaviour from the psychological perspective. They argue that if environmentally friendly behaviour is promoted in general, it will affect people’s motivation to opt for more sustainable mobility. Obstacles and motivations for a modal shift are studied through psychological tests, individual mobility data gathering and in-depth interviews to design policies to achieve environmentally friendly mobility behaviour. Economic incentives, such as low-cost public transportation, and moral strategies, such as communication campaigns, are perceived as being most effective in promoting the use of more ecological travel modes (Hunecke et al. 2001:848). Furthermore, improvements of bicycle and footpath infrastructure, as well as safety policies, encourage the use of non-motorised modes (Grischkat and Hunecke 2006:10).

Social ecology in general, and the ISOE in particular, conclude that “mobility is culture” with complex interrelationships between the transport system, the infrastructure, political discourses on transportation, mobility behaviour and underlying lifestyles (Deffner 2007:7). Mobility culture is therefore a product of interactions between urban actors, infrastructure and technologies, which is also referred to as a “socio-technical system” (Deffner 2007:7). Social ecology acknowledges the diversity of definitions of “culture” and intends to integrate the different viewpoints as to attain an operational concept of mobility culture. It is not a normative concept

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26 Götz et al. (2002:11) identified five lifestyle groups: The fun-oriented, the modern-exclusives, the overburdened family-oriented, the disadvantaged and the traditional-domestics.
instead mobility culture should be understood as encompassing plural forms of urban mobility (Deffner et al. 2006:13).

There exists no single “perfect” mobility culture; however, the ISOE (Deffner 2007:8) determined a number of principles that foster a process of change towards a more sustainable mobility culture. These include:

- Cooperation among urban actors across parties and sectors
- Integration of all modes of transport into town planning
- Targeting all modes of transport to achieve sustainable mobility
- Combination of technical planning and emotional qualities to achieve a quality of urban living.
- Inclusion of residents into planning processes to realise an identification with the city

In sum sustainable mobility culture seeks to combine hard factors, such as infrastructure of concrete and steel, and soft factors, such as communication, campaigns and images. The social-ecological concept of mobility culture favours therefore a holistic approach to sustainable mobility that includes all modes of transport (Deffner 2007:8; see also Deffner et al. 2006:3).

3.5 Ecological Sustainable Urban Mobility

The concept of sustainable transportation inherits a number of shortcomings in truly contributing to mitigate climate change. The concept appears to be a compromise, as it seems to incorporate all previous concepts from economic neoliberalism over ecological modernisation to sustainable development. Like sustainable development, the concept of sustainable transportation is so ill-defined, that economists, ecologists and city planners alike define the concept according to their own understanding. The result is the misuse of the notion of sustainable transport as scientifically safe umbrella under which any transport planning measures are pushed forward. Although there is a lively discussion on acceptable or non-adequate transport plans, there is a lack of critical investigation of the concept of “sustainable transportation”. All parties assume that sustainable transportation is a positive model, which needs to be promoted on all levels. Hereby they oversee the highly contested nature of “sustainability”, which is not necessarily benefiting the general public.

It is Baeten (2000:71) who points to the existence of a socially fragmented perception on sustainable transportation in his paper The Tragedy of the Highway. He argues that the sustainable transport debate will not solve transport problems; on the contrary it is fought out on the backs of the disempowered groups of the society. He insists:

[T]he orthodox sustainable transport vision actually leads to the further empowerment of technocratic and elitist groups in society while simultaneously contributing to the further disempowerment of those marginalized social
3 Conceptual Framework

groups who were already bearing the burden of the environmental problems resulting from a troubled transport system. (Baeten 2000:72)

Baeten (2000:75) accuses policy-markers of adopting highly vague commitments so that “... traditional planning options, including the construction of roads” are not undermined. Sustainable transportation, he goes on, is simply misused to cover up a lack of valuable concepts to truly address unsustainable transport issues.

Hence there is a need for a sincere paradigm shift from the concept of sustainable transportation to a new normative concept that points to desirable future scenarios and offers practical planning advices. It would definitely go beyond the scope of this work to elaborate on such a new concept in detail and to find an appropriate label. Therefore I adopt the already existing formulation of “ecological urban sustainable mobility”, although I am well aware of the contested nature of “sustainability” as well as “mobility”. For the purpose of formulating a normative definition, I take the vulnerability of each term into account as well as abovementioned criticisms of existing concepts. Nevertheless, ecological sustainable urban mobility acknowledges the presence and the crucial role of contemporary concepts in decision making, as discussed in previous sections, above all sustainable development.

Despite Baeten’s (2000:84) justified criticism on the “... harmonizing, conflict-avoiding and soothing vocabulary of sustainability ...”, I hold on to this term. However, I interpret it literally as deriving from Latin “sustenire” which means “to maintain” or “to nourish” something. In relation to ecology, sustainability refers to the responsibility of humans to care for nature in such a way, that its natural equilibrium is maintained into the future with regards to sustainability’s inter-generational dimension. Hereby, nature is perceived as something that has intrinsic values and not just as a mere stock of resources to meet human needs.

Although the term “mobility” is widely used it is similarly contested on the ground of its questionable contribution to human welfare. According to Ross (2000:13), mobility has positive connotations regarding individual rights and freedom, nevertheless, it seems inevitably linked to motorised vehicles, whose effect on people’s quality of life is doubtful, as discussed in section 2.3. The link between mobility and cars is for Ross (2000:13) inevitable as, “… mobility is most effectively provided by the private motor vehicle ...”. Even though he acknowledges possible ineffectiveness of cars in times of traffic congestions, he seems to deny the debate over unbearable traffic volume in urban areas. If mobility is really to be interpreted as people’s spatial freedom, as Ross points out, then it is far from obvious that mobility is best ensured through motorised vehicles. His perceptions of the inevitable link between motor vehicles and mobility may be correct for low-density urban areas, like in North America or Australia, where residents are truly car-dependent. For the geographical scope of this thesis, however, Ross’ critique of the notion of mobility does not hold its ground. European cities usually have a high density, with considerable public transport infrastructure, so that cars are not automatically the best means to ensure mobility. Nevertheless, it should be borne in mind that low-dense urban sprawl is not the sole cause of car dependency, as also the dispersion of locations
of interest force people to travel greater distances, so that in some cases people indeed perceive the car as most adequate mode of transport (section 2.2.1).

Therefore, Ross (2000:17) claims to look at “accessibility” instead, which he defines as “… the ease of access to destinations …”. However, for the purpose of discussing potentials and limits of one mode of transport, namely public bikes, accessibility does not seem applicable. The concept of accessibility is rather applicable to land-use planning, whereas people’s freedom to move is best measured in terms of their mobility. As Ross (2000:17) acknowledges, accessibility is far more difficult to measure, furthermore it entails the need to determine a hierarchy of destinations. Which destinations must be more accessible than others and for whom?

Therefore, I employ the notion of mobility, which seems to me more flexible than accessibility, as it not only includes spatial mobility, but also social mobility thus it takes social justice concerns into account. For the purpose of this thesis, I define mobility literally as “ability to move”, as deriving from the Latin word “mobilitas”. Mobility is integral to human existence because the ability to move the body and to move forward in spatial dimensions is a pivotal precondition for food security, opens up chances of reproduction and thus ensures the survival of human beings (Becker and Jahn 2006:37). In social terms, mobility describes a phenomenon, in which members of a society move up and down across social “classes” through, for instance, the achievement of a socially reputable job. Spatial and social mobility are interdependent, so that a discussion on urban mobility is at the same time a discussion on social inclusion and exclusion.

If all definitions of the abovementioned notions are now combined to the concept of ecological sustainable urban mobility, I derive the following normative definition:

*Ecological sustainable urban mobility* (ESUM) is defined as people’s ability to move freely in urban areas while taking on the responsibility to maintain an ecological equilibrium into the future.

ESUM serves as a benchmark for the evaluation of modes of transport and municipal, national or global policies. In contrast with sustainable transportation, ESUM perceives people as active agents, who participate in decision-making but also take on responsibility for their actions. The role of city planners and policy-makers is to create a suitable framework to facilitate people’s engagement and participation, as well as their ability to choose a mode of transport with the lowest impact on the environment, such as walking and cycling. The question “who should have access to what” has to become obsolete, in order to avoid a hierarchy of destinations, which inevitably leads to social stratification.

As outlined in section 2.1, the issue of climate change is proven to derive from human activities, so that measures should rather focus on people’s behaviour than on technological innovations, for which social-ecological research offers appropriate tools. As mentioned above, the focus needs to be on the creation of a sustainable mobility culture, that integrates technology and campaigns; transport planning and communication; infrastructure and eco-political discourses (Deffner et al. 2006:14).
The shift from sustainable transportation to ESUM is at the same time a shift from a supply side approach to a demand side approach, as instead of focussing on minimizing environmental impacts of transport modes, ESUM is achieved through the empowerment of people to be able to move in an ecological manner. People should not be regarded as objects that need to be transported, but rather as active traffic participants. While their freedom needs to be ensured, they should also be held accountable for their activities. In this regard, I support Amar’s (2007) perception of mobility as an individual right, attribute and ability. Mobility is a way of life, not a technological product, such as public transport. Although technologies are definitely necessary, it is more important to influence people’s way of life, so that they eventually switch from a car-dependent lifestyle to a more active, dynamic and responsible everyday life. However, it must be taken into account that automobile dependency is not necessarily a voluntary choice, as urban sprawl and greenfield development force people to own and use a private car. In addition to unfavourable land use, the automobile industry promotes cars as the most efficient mode of transport and perpetuates car dependency through lobbying to ensure car-friendly policies (Shell 2004:2). A demand-side approach does not mean that the supply-side is out of focus; instead it means that car-dependency needs to be reduced by ensuring appropriate alternatives to personal motorised vehicles.

Furthermore, to achieve ESUM, society needs to address the underlying powers that trigger car dependency, namely the neo-liberal capitalist mindset. As shown above, ecological modernisation, green consumerism and market environmentalism all contribute to capitalism. They only succeeded in forcing capitalism to reform itself and to take new concerns on board; however, capitalism was never challenged as such and hence never forced to change its essence (the “growthmania” attitude). Capitalism is a human disease, which cannot be solved through technological innovations (such as greening production processes). If high urban living standards are to be realised, local authorities have the responsibility to ensure residents’ right to healthy living and free mobility instead of responding to economists’ claims to fulfil their economic interests (see Dekoster and Schollaert 1999). Cost-effectiveness should therefore not be understood as sustaining economic growth, but as ensuring clean low-cost mobility for all, in order to address the exclusion of disempowered groups of the society.

The following Chapter uses the example of bike-sharing schemes in Lyon and Paris, namely vélo’v and velib’ to investigate the contribution of public bikes to ESUM. Do these public bike schemes ensure environmentally sound and affordable mobility for all? Can residents of cities actively participate in urban living through public bikes? Looking at municipalities, do they fulfil their responsibilities by installing public bikes? To go back to Figure 2, where should public bikes be placed: at the stage of sustainable transportation or as ecological sustainable urban transportation? If the former, what remains to be done, to enable their progression to the latter?
4 ADVANTAGES AND LIMITATIONS OF PUBLIC BIKES

The majority of European municipalities are aware of the need to transform current unsustainable patterns of mobility into a more sustainable form, and in fact most of them are already committed to act. A prime example is the Aalborg Charter, which is the outcome of the European Conference on Sustainable Cities and Towns held in Aalborg, Denmark on 27 May 1994 (Beatley 2000:359; see also Aalborg+10 2007). To date, it has been approved by over 500 European cities and initiated the European Sustainable Cities and Towns Campaign “...to facilitate mutual support between European cities and towns in the design, development and implementation of policies towards sustainability” (Aalborg Charter 1994). With this Charter the signatories acknowledged the contribution of their present urban lifestyle to many environmental problems. Transport is mentioned as one of a number of factors that need to be modified. Henceforth, the Charter requires cities to realise “environmentally friendly urban transport” by providing more public transport, fostering lifestyles with less transport needs, promoting low-emission modes of transport such as walking and cycling, and by reducing individual motorised vehicles to a "subsidiary function" (Aalborg Charter 1994).

Each city takes a different path to achieve ecological sustainable urban mobility (ESUM), one of which is the implementation of public bike schemes. As already mentioned in Chapter 2, the bike-sharing idea gained momentum in 2005, when Lyon implemented the system vélo’v27 which today includes 4000 public bikes of the third generation, which dates back to 1998 with the first computerised scheme was introduced by Clear Channel. Since July 2007, Paris has followed Lyon’s example and installed the so far biggest system velib28 with 20,600 bicycles. Using Paris and Lyon as illustrative examples, I will discuss advantages and disadvantages of public bikes from a social ecology perspective. As mentioned above, social ecological research looks at mobility behaviour and its connection to lifestyles, leading to the question of whether public bike schemes influence people’s values and activities in accordance with ecological sustainable urban mobility (ESUM). It should be pointed out up front that it is still too early to evaluate the impact of third generation public bike schemes on people’s way of living; instead this thesis highlights possible tendencies to open up a critical debate.

Due to the lack of social-ecological research on public bike schemes, this dissertation relies heavily on empirical data, which are gathered through qualitative research methods. Following the principles of grounded theory, I have applied the methods of unstructured and semi-structured expert interviews, participant obser-

27 The name vélo’v is composed of vélo and love (bike-love).
28 The name velib’ is composed of vélo and liberté (freedom-bike).
vation and the collection of secondary sources and grey\textsuperscript{29} literature in order to obtain information on vélo’v and velib’, as well as the public bike programmes in Barcelona, Córdoba and Sevilla (Corbin and Strauss 1990; Glaser and Strauss 1967; Danermark et al. 2002; Strübing 2004). To acquire a diverse picture on public bikes, I have approached cycling associations, local authorities, researchers, public bike operators and consultancies working in this field. Newspaper articles, online discussion forums and blogs on bike-sharing in general and vélo’v and velib’ in particular served as supplementary sources to capture the public opinion on the schemes. According to the “selective coding” method, I conceptualised and ordered the data using the conceptual framework and the definition of ESUM (Corbin and Strauss 1990:57; Strübing 2004). As a result of the data analysis, I determined five advantages and three disadvantages of public bikes to achieve ESUM, which will be discussed in section 4.4 and 4.5. A more detailed account on the research methods, as well as the full list of interviewees, and events at which I participated are presented in Appendix B.

According to Deffner (2007:7; Becker and Jahn 2006:43), each city has its own unique mobility culture, which is reflected among other things in the modal split, existing infrastructure, public discourses and people’s travel routine. On the grounds of the social-ecological concept of sustainable mobility culture, ESUM is achieved if the existing mobility culture is transformed into an ecological sustainable mobility culture. Looking at public bikes, it is therefore crucial that they do not only influence people’s choice of transport, but that they also induce a sustainability discourse resulting in a less car-oriented infrastructure and a less car-dependent lifestyle. At the same time, the implementation and the management of public bikes need to involve effective cooperation among local authorities, citizen groups and the traffic participants (Deffner et al. 2006). Before discussing the potential of public bikes to trigger ESUM, the point of departure in Lyon and Paris needs to be understood.

\section{4.1 The Situation for Bicycles in Lyon and Paris}

As the “cradle” of the bicycle and location for the world’s most famous bicycle race, Tour de France, France might seem to have a strong affection for cycling. However, as Osberg and Stiles (1998) point out, in the past decades the affection was related to bicycle racing and, for a long time, did not translate into the adoption of cycling as a form of transportation. Therefore, the point of departure was quite similar for both cities, as the number of trips on a bicycle seemed almost negligible with 3 percent of cyclists, including commuters and recreational cyclists, in Lyon and 1 percent in Paris (Revat 2003; and DREIF 2001, cited in Marie de Paris 2005). However, both cities have experienced an emerging public interest in commuter cycling

\textsuperscript{29} Grey literature refers to documents issued by government, academia and business, which are not commercially published.
since the mid-1990s and an emerging number of cyclists in the past couple of years.

Politically, the City of Paris encompasses 20 urban districts with 2.168 million residents over an area of 105,40 km²; however, the urban agglomeration spans over 2723,03 km² with an estimation of 9.644 million residents (Marie de Paris 2006). The system velib’ is only installed in the City of Paris, so that the following technical data on cycling infrastructure refers only to these 20 districts. It should be taken into account that most of the traffic in Paris consists of commuters coming from the suburbs into town. Despite the fact that most people use public transport, especially the underground and commuter trains, cars and motorbikes still congest the streets and “… choke the city with pollution, producing almost daily air quality alerts” (Osberg and Stiles 1998). The modal split can be illustrated as follows:

The transport department of the City of Paris conducted a survey on bicycle use on the 9th of October 2007, and interviewed 2,052 cyclists on the street and 520 among them on the phone in more depth. The majority of respondents (84%) use the bicycle frequently, everyday or at least three to four times a week, mainly for commuting purposes within the borders of the City of Paris (Marie de Paris 2007c). Most of the interviewed cyclists (71%) previously used public transport, or walked (21%), while only 16 percent of the respondents declared of having commuted by car. The group of cyclists consists mainly of people between 20 and 50 years with a majority of men (60%).

Looking at cycling infrastructure, only 2 percent of the roads’ surface is dedicated to bicycle facilities while the vast majority (93%) is reserved for cars, in particular surface parking. Paris has a total of 370 km of right of way for bicycles, including

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30 The survey does not inform about the frequency of use for the remaining 19 percent.
31 The document does not inform about the land use of the remaining 5 percent.
112 km of bike paths, 45 km of bike lanes and 52 km of shared bus/bicycle lanes (Marie de Paris 2007a; Lambrey 2004). As Fatoux insists, quantity does not always translate into quality, so that in fact cycling associations highlight a number of shortcomings and request adequate infrastructure. In talking to Vivre en Ville à Vélo, Vélorution Paris and Mieux se Déplacer à Bicyclette, as well as riding a bicycle in Paris myself, it is noticeable that many cycling facilities have not been designed in an appropriate manner with lanes or paths that are too narrow, road kerbs hindering cyclists and unsuitable locations of lanes and paths, which are often blocked by parked cars or used as pedestrian paths (Mieux se Déplacer à Bicyclette 2005). Furthermore, Paris has a number of hot spots without cycling facilities whatsoever, such as the squares at Place de la Concorde and Place de l’Étoile, where it is almost impossible for cyclists to cross safely. One of the greatest issues is the lack of bicycle connections between Paris and its suburbs. A motorway around Paris separates the suburbs from the city centre preventing cyclists from entering the city safely. According to the respondents of the abovementioned survey in 2007, the greatest shortcomings for bicycles are related to hot spots and poorly planned junctions, followed by the lack of parking facilities and finally inappropriate cycle ways (Marie de Paris 2008).

The anti-bicycle circumstances in Paris are not unknown to the municipality and the city acknowledges the need to improve the situation of cyclists by having a cycling officer, Didier Couval, who is responsible for all bicycle matters. The transport department is therefore currently testing measures, such as traffic calming, pedestrianisation of certain quarters, co-habitation of busses and bicycles in one lane, and two-way cycling lanes in one-way streets. According to the survey, 65 percent of cyclists acknowledge and appreciate the effort (Marie de Paris 2008). Furthermore, in February 2007, the city of Paris adopted a Plan de Déplacements (traffic plan), in which amongst other things the city commits itself not only to extending the cycling network to 500 km until 2010, but also to installing cycling infrastructure at the abovementioned hot spots to facilitate crossing the squares and to improve inadequate bicycle paths and lanes (Marie de Paris 2007a).

In fact the efforts of the City of Paris regarding the promotion of cycling are embedded in a more holistic approach to create incentives for sustainable mobility. Britten (2007a:4) describes the approach of the municipality as “a clearly announced, carefully articulated, high-priority, all-mode, integrated mobility strategy”. The City of Paris implements the strategy in four steps: first, providing new diversified mobility options; second, re-organising public space to accommodate more space-efficient users, such as busses and public transport, to cut traffic; third, creating a “seamless mobility system” to enable convenient, intermodal transportation; fourth, encouraging the participation of residents through consultation

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32 Paths are separate trails, while lanes are painted on the roadside.
33 François Fatoux (Treasurer, Vivre à Ville en Vélo, VVV) interviewed 30 August 2007
communication measures (Britton 2007:7). The introduction of public bikes is only one of myriad activities, such as car-sharing.34

Looking at Greater Lyon, the current population size is about 1.3 million over 954.19 km², while the City of Lyon counts around 445,000 residents on 47.78 km² (Grand Lyon n.d.). Contrary to Paris, the administration encompasses the whole urban agglomeration of Greater Lyon; however, vélo’v was initially only installed in the City of Lyon and its suburb Villeurbanne, but an expansion to include other suburbs is in planning (Gilles Vesco35). A survey conducted in 2003 revealed that in Lyon and Villeurbanne the majority of commuting trips are undertaken by car or motorised two-wheeler, while trips undertaken on a bicycle are almost negligible:

Looking at the user-profile of cyclists in Greater Lyon it is interesting to note that only 45 percent of bicycle owners actually use their bicycle within the urban area. The majority of the users (69%) ride their bikes for recreational purposes mainly outside the city centres, 21 percent use the bicycle to visit friends or to go shopping and only 21 percent commute on a bicycle (Lambrey 2004:3). Lambrey (2004:1) assumes that the reasons for this weak usage of bicycles for utilitarian day-to-day purposes has no climatic origins, as Northern French cities such as Strasbourg exhibit a much larger share of bicycle use, despite unfavourable weather conditions. Strasbourg succeeded in preserving a bicycle culture over the “car only” period in the 1950s and 1960s; at the same time the municipality is famous for its commitment to bicycle infrastructure. Yet it should also be borne in mind that the phenomenon of urban sprawl, as discussed in section 2.2.1, is far more prevalent in Greater Lyon than Strasbourg forcing people to extensively use private cars to commute to work. Looking at inner-city traffic in Lyon, however, it becomes apparent that urban sprawl cannot be the sole cause of intensive car use, as 37 percent of trips in a car remain under 3 km (Lambrey 2004:2; see also Massin 2005). Time-wise the bicycle is often more effective in city centres for trips under 5 km, so that

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34 In fact the municipality has concrete plans to apply the bike-sharing mechanisms on the use of electric cars in the up-coming years. The system already has its name: autolib’.
35 Gilles Vesco (Vice-President, Grand Lyon) interviewed 29 November 2007.
the question arises why people do not consider bicycles as viable mode of transport (Lambrey 2004:2).

One reason might be the lack of appropriate cycling infrastructure as Lyon and Villeurbanne can claim only a 65 km cycling network, including 30 km of bike lanes and 20 km of bike paths, as well as 15 km of recreational trails (Lambrey 2004:4). As in Paris, cycling associations, in particular Vélorution Lyon and La Ville à Vélo, criticise similar defects of bicycle infrastructures due to the lack of foresight and overhasty planning. Vélorution Lyon (n.d.), for instance, accuses the road and transport department of Lyon of being incapable of providing for adequate cycling facilities and mentions as prime example a two-way cycling path, which is situated on the footpath with posts built on it, forcing cyclists to avoid hitting pedestrians, posts or other oncoming cyclists. La Ville à Vélo (2007) criticises the poor infrastructure on Lyon’s bridges, in particular on the Pont Morand where cyclists seek refuge on the sidewalk hindering pedestrians. However, Lyon’s road and transport department intends to improve the situation for cyclists and showed its commitment by transforming the riverbanks on the Rhône from a surface car parking into a pedestrian and bicycle zone (see Grand Lyon n.d.). It is determined to provide adequate cycling paths and lanes on main roads to accommodate both, experienced and inexperienced cyclists, as well as to address the hot spots. Lyon’s traffic plan envisions an extension of the cycling network to up to 500 km until 2010 (Grand Lyon 2003). However, it is crucial that the city goes beyond mere beauty-related, prestigious projects and finally addresses more pressing issues than creating recreational facilities.

Bearing in mind the bicycle-hostile circumstances in Lyon and Paris, I now proceed to the discussion around public bikes and their potential to change the prevalent unsustainable mobility culture of both cities. To stimulate a general discussion about public bikes, the following sections will introduce and explain vélo’v and velib’, including the process of their implementation and the terms of use. Consistent with the social-ecological research, the discussion draws on a number of sources and voices, namely quantitative surveys, research findings, the media, cycling associations and experts in that field as well as the opinion of the public and users as verbalised in internet discussion forums and blogs.

4.2 The start-up of vélo’v and velib’

The idea to promote bicycles via public bikes was first formulated in Lyon’s Plan du Développement des Modes Doux36 in 2003, which started a process of benchmarking and eventually the implementation of vélo’v in Greater Lyon (Grand Lyon 2003). After looking at the existing schemes in Oslo and Vienna, the municipality decided to adopt the system in Vienna designed and operated by JCDecaux, in a somewhat improved version (Beroud 2007:44). With a preparation period of two years, in which the municipality also added two new cycling lanes along main roads and

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36 Plan of the development of non-motorised modes of transport.
transformed the riverbanks into cycling paths, the city implemented the scheme in three steps: the first 2000 bicycles on around 170 self-service station were installed on the 19th May 2005; then the municipality expanded the vélo’v network geographically by increasing the number of stations up to 340; finally, at the end of 2007, the capacity of each station was increased by doubling the number of bike racks and bikes at each station to 4000 (Grand Lyon n.d.).

Vélo’v is managed by a public-private partnership between Greater Lyon and the outdoor advertising company JCDecaux. The contract between Greater Lyon and JCDecaux can be referred to as a “bikes for billboards” contract: JCDecaux installs and manages 4000 vélo’v bikes while Greater Lyon grants a concession on the installation and administration of 600 billboards to JCDecaux for a period of ten years (Grand Lyon 2006). The municipality presents this contract as a win-win-win situation: JCDecaux receives the major part of revenues for 600 billboards over the next ten years; the city has no actual costs with vélo’v and does not have to run the system, additionally they receive a percentage of revenues for the billboards and half of the advertising space is reserved for municipal communication; the user profits from an affordable service, because the costs of the system do not have to be covered by user-charges (Grand Lyon 2006). Nevertheless, this contract is highly contested on the grounds of an increasing number of billboards on Lyon’s streets and the lack of transparency over actual costs and profits that are involved in this deal (Cheynet 2007). As will be discussed in section 4.4.2, criticisms concerning the contract are mainly voiced by the media, cycling associations, and anti-capitalist groups, in particular Vélorution Lyon, Brigade AntiPub and Politique.

As for Paris, the municipality put out a tender in autumn 2006 on which the two biggest public bike operators took part, namely JCDecaux and Clear Channel Outdoor, both advertising companies. JCDecaux interrupted the bidding process at the end of the year 2006 due to an ostensible formal defect, during which the company found out details about the offer of its competitor Clear Channel (LeCadre 2007). Resuming the competition, JCDecaux tripled the number of bikes and offered 20,600 bicycles against 1628 billboards, convincing the municipality to sign the contract (LeCadre 2007; Bührmann37). The first 10,648 bikes and 750 stations were already installed for the 15th July 2007 and, by the end of 2007, JCDecaux had implemented the complete system with 20,600 bikes, 1451 self-service stations and 35,000 bike racks (Mairie de Paris 2007b).

Compared to Lyon, local authorities in Paris scheduled a period of six months to install velib’. It appears that the decision to implement velib’ in such an ad-hoc manner had a political motif, as the mayor of Paris, Bertrand Delanoë, pushed to implement the system during his mandate, most likely aiming to profit from its success at the municipal elections in March 2008. Looking at his election pledge and proposal for a new mandate (2008-2014), velib’ is presented as major achievement

37 Sebastian Bührmann (Rupprecht Consult) interviewed 20 December 2007.
of his mandate and Delanoë (2008) promises further improvements of cycling facilities:

> Le succès de Velib’ nous conduit à l’engagement d’aménager 200 km de pistes et itinéraire cyclables supplémentaires dans la mandature. Ainsi, en 2014, Paris disposera d’un réseau global de circulation cycliste articulé au-delà du boulevard périphérique avec les collectivités mis en place par les collectivités voisines, permettant de traverser la ville de part en part, mieux fléché et plus sûr.\(^{38}\) (emphasis in original)

The rush to install velib’ in conjunction with the novelty of the system resulted in shortcomings of these public bikes that will be discussed under section 4.5.

The following section will shed light on the mechanisms behind both systems, revealing some technical data as well as instructions for use.

### 4.3 Design of Vélo’v and Velib’, and Instruction for Use

As both systems are designed and produced by JCDecaux, they consist of the same components: a custom-built bicycle with non-standard parts, a computerised terminal and high-tech bike stands for each bicycle. In each case, combined with a unique label, the appearance of the system is consistent with the image of the city, aiming at an identification of residents with their respective bicycles. Public relations and communication are perceived as core component of both systems so that emphasis is put on the design of the logo:

![Velib’ and Vélo’v logos](image)

The bikes are designed for utilitarian purposes with visibility and security as guiding principles, and the frames appear sturdy enough to withstand heavy use and non-stop exposure to all seasonal weather conditions. For aesthetic and maintenance reasons, there are no visible cables and the bike chain is almost completely covered (Marie de Paris 2007b). Technical data on both systems are summarised in Box 2.

In order to use vélo’v or velib’, one has to subscribe to the service and provide the operator with details of the credit card to allow a direct debit authority to the operator to claim a bond of 150€ in case the bike is not returned and to debit the costs of usage. Subscription for short periods of time – one week in Lyon or just one day or one week in Paris – can be accomplished at the terminal of any public

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\(^{38}\) The success of velib’ leads us to a commitment to provide for supplementary 200 km bicycles paths and tracks within the mandate. Thus, in 2014, Paris will dispose of a global cycling network linked across the motorway [around Paris] to the networks created by
bike station using a credit card, which allows both residents and visitors to use this mode of transport. The user receives a smart card and is asked to set a numerical code, which he has to use to collect a bike. The stations are accessible all year at any time of the day. In the case of an annual subscription, the user has to register by regular mail as a proof of residence is required. The pricing is different in Lyon and Paris, and depends on the duration of the registration:

In Lyon one week costs 1€ and one year costs 5€, giving the user the right to “free” access to the bikes within this timeframe. For both types of subscriptions the first 30 minutes are free of charge. For the short-term registration the following hour costs 1 € (0.5 € for the long-term registration) and for each subsequent hour there is a cost of 2 € (1 € for the long-term registration). Vélo’v can be rented for a maximum of 24 hours, if the time elapses a penalty of 150 € applies.

In Paris, the costs are much higher, hence a subscription for one day costs 1 €, for a week 5 € and for the year it costs 29 €. The pricing for the usage of velib’ remains the same for all three options, starting with a free period of 30 minutes\(^\text{39}\) and 1 € for the following 30 minutes. The subsequent half an hour costs 2 € and each supplementary 30 minutes are at a cost of 4 €, which would add up to 7 € for a usage of two hours. This pricing scheme clearly indicates that public bikes are meant for short trips of up to 30 minutes, so that bike-sharing is ensured. Penalties apply in the event that the bike is not returned within 24 hours, if it gets stolen, or if the keys for the bike locks are lost: respectively, 150 €, 35 € and 10 €.

| Weight: | 22-25 kg |
| Comfort: | Unisex frame; adjustable seat; three hub gears |
| Security: | Front and rear lights powered by a hub dynamo; reflectors and reflective strips on the wheels; internal hub brake |
| Features: | Front basket; kickstand; external bike Lock |

The terminal (left) and bike stand (right) are wired up, so that pick-up and drop-off is registered.

| Terminal: | Touchscreen; credit and smart card reader; keyboard for numerical code; map with nearest velib-stations |
| Bike stand: | Bike locking mechanism; smart card reader; pilot light (indicates availability of the bike) |

Box 2: Technical data on velo’v and velib’  
Source: velo’v (2008) and velib’ (2008)

neighbouring communities, allowing to cross safely the city from one side to the other on better illuminated [ways].

\(^{39}\) It is currently discussed whether to extend the free period to 45 minutes, as the average trip is found out to be 23 minutes.
In the event that all bike racks are occupied at the station of destination, the user is granted another 15 minutes free of charge, in order to find a station nearby to drop off the bicycle. The bikes are coded and have an integrated mechanism to lock them at the bike stand of any station, which allows the operator to retrace each bicycle and, if necessary, hold a user accountable for the disappearance of a bike.40

4.4 Potential of Public Bikes to Achieve Sustainable Mobility

*C'est la plus importante innovation des années passées.*41

- Gilles Vesco, Vice-President of Greater Lyon

Public bikes should be evaluated as both transport vehicles and an environmental policy measure of municipalities to provide clean mobility. As vehicles they have the same advantages as bicycles in general, as shown in 2.3.2. These can be summarised as follows: public bikes are a flexible mode of transport and their door-to-door travel time is relatively low for inner-city trips, so that they offer an alternative to private cars; public bikes do not emit greenhouse gas emissions and do not create noise pollution; they take up less space than cars and can reduce traffic congestion considerably; finally, they are an affordable mode of transport offering mobility to people who cannot meet the expense of private cars.

This section will concentrate on advantages that are unique to the public bike programmes as a policy measure to contribute to the achievement of ecological sustainable urban mobility, and will use vélo’v and velib’ as illustrative examples. It is argued that public bikes only partly fulfil the requirements of ESUM as put forward in section 3.5. With regards to the abovementioned advantages of bicycles as an urban mode of transport, the greatest potential of public bikes concerns the promotion of cycling in general. Through media coverage, public campaigns and events surrounding vélo’v and velib for instance, human-powered mobility has become more and more attractive to the urban population. With public bikes, municipalities provide a service that initiates the shift from passive transportation to active mobility by motivating people to use their bodily strength and their mental capacity to reach their destination (Amar 2007). In this sense, public bikes help to empower people and to transform residents from passengers to active traffic participants, as claimed by Baeten (2000).

Advantages of public bikes can be summarised by the following points:

1. Public bikes can sensitise local authorities, the urban population and traffic participants for mobility issues in general and cycling issues in particular.

2. Public bikes have the potential to attract new cyclists.

40 All information on the use of vélo’v and velib’ can be found on their official websites: http://www.velib.paris.fr and http://www.velov.grandlyon.com
41 “It [public bike scheme] is the most important innovation within the past years.”
3. Public bikes can help to build up a cycling culture in which the bicycle forms part of a travel routine.

4. Public bikes can contribute to intermodality and combine advantages of private and public transportation.

5. Public bikes can enhance the image of a city and foster cooperation and networking among local authorities of different cities.

The subsequent sections will discuss these advantages one by one combining the empirical data with the outcome of the theoretical debate around sustainable mobility. The advantages should be understood as stimuli of a critical discourse on public bikes and are therefore subject to modifications.

4.4.1 Vive La Vélorution! – A Public Discourse on Bikes

The implementation of vélo’v and velib’ was associated with awareness-raising campaigns organised on a large scale by Greater Lyon and the City of Paris respectively. Yet it was foremost the overwhelming number of bicycles in Lyon (4000) and in Paris (20,000) and the subsequent alteration of the urban landscape that pushed public bikes to the forefront of public discourse in the two cities. Additionally, the national and international press joined the debate and praised both schemes through headlines such as:

- “La Réussite de Vélo’v à Lyon” 42 (20 Minutes, 12 July 2007)
- “La Petite Reine a Déjà Séduit 60 000 Lyonnais” 43 (Landrin, Le Monde, 14 July 2007)
- “Eine Radrevolution kommt ins Rollen” 45 (Wanzek, Stern, 18 September 2007)
- “Ça roule pour Vélib” 46 (Stratégies, 27 September 2007)

According to Marzloff (2007) it is due to the perceived success of vélo’v and velib’ that urban mobility in general and the bicycle in particular grew into a discourse. The wide media coverage across countries indicates an emerging public interest in sustainable modes of transport. Public bikes hence stimulate a discussion on urban mobility, which in turn has the potential to push the climate change debate forward.

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42 “The success of Vélo’v in Lyon”
43 “The little queen seduces 60,000 residents of Lyon”
44 “Long live the bicycle revolution”
45 “A bicycle revolution emerges”
46 “Everything works fine for Vélib”
Similar to the acid rain debate in the 1980s, the discussion on urban mobility involves divergent actors (Hajer 2005) – in this instance cycling organisations, scientific researchers, politicians, the media and the public alike. Hence public bikes help to place issues of bicycles in cities on the political agenda of municipalities. As Gilles Vesco (Grand Lyon) points out in relation to Lyon, vélo’v reintroduced the bicycle to the agenda of the department of transport. Concerning the scheme in Paris, François Fatoux (Vivre à Vélo en Ville) adds that the implementation of velib’ can be interpreted as the first token gesture of the local authority to state the importance of bicycles as an urban mode of transport. It can therefore be argued that public bikes foster a public discourse on urban mobility, which is essential for a transformation of the existing, rather unsustainable, mobility culture in Lyon and Paris.

In addition to a change in the way of thinking, public bikes can induce a transfer in traffic participants, notably car drivers and pedestrians to bicycles, and raise the awareness of local authorities. According to Beroud (2007:39), the constant presence of public bicycles in the cityscape and their uniform design sensitise the urban population to bicycles in general. He distinguishes between the scheme’s hard and soft information: while the hard information concerns the physical appearance of the public bike on the street, including their self-service stations; the soft information comprises the homogenous design of the scheme combined with a concise logo and distinctive name, as well as communication events around the scheme. The visibility of public bikes is a constant reminder for local authorities to facilitate the use of non-polluting modes of transport and consequently ensure the right of the urban population to a healthy and safe environment (Dekoster and Schollaert 1999). As a consequence, public bikes are believed to motivate municipalities to acknowledge the importance of bicycles and to provide for better cycling facilities.

The sensitisation of traffic participants towards bicycles leads to greater safety for cyclists, as this cannot solely be secured through infrastructure measures. Frédéric Héran47 maintains that the more cyclists there are on the street the better their visibility and hence the greater their safety. Dector-Vega (2007) adds that the availability of public bikes is an incentive for people to try out the bicycle as a mode of transport, which puts previous non-cyclists in the position of cyclists, so that they pay more attention to cyclists when driving a car.

Beroud (2007:28) draws on the “club effect”, as used in the study of consumption to highlight the positive direct and indirect effects of public bikes. The club effect applies when all consumers take advantage of their consumption and of the consumption of others (Curien 2000). With regards to public bikes, the direct effect of “consuming” this service is the increase in road safety, while better cycling facilities would account for indirect effects. Additionally, the principal of bike-sharing is based on the phenomenon that the more people use the scheme, the more people

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47 Frédéric Héran (Associate Professor in Economics, University of Lille) interviewed 29 August 2007
can use it, due to higher fluctuation. In Gilles Vesco’s words “plus que ça partage, plus que ça partage”\textsuperscript{48}.

4.4.2 ATTRACTION OF NEW CYCLISTS

According to a survey conducted in Lyon during December 2006 (Grand Lyon 2007), 79 percent of all polled vélo’v users increased their usage of bicycles after the implementation of the scheme, so that 20 percent among these respondents use their own bicycles more frequently. Considering the travel route at the time of inquiry, the vast majority of respondents, namely 95 percent, would have used other modes of transport, such as public transport, walking or personal cars to reach their destination (Grand Lyon 2007:16). Hence, it can be concluded that vélo’v attracts new cyclists including previous cyclists who gave up riding their personal bikes for certain reasons, such as the lack of secure parking facilities and the need to maintain a bicycle (Beroud 2007:38).

Beroud (2007:40) refers to a dataset on cyclists to prove the increase in the number of bicycles on Lyon’s street (see Fig. 6). The survey is an ongoing procedure in which cyclist numbers have been counted at 16 different locations across Greater Lyon since December 2000. The survey is conducted once a month at major crossroads (for two hours in the morning and two hours in the afternoon) and does not only provide information on the number of passing cyclists but also about the type of bicycle, namely personal bikes or public bikes.

As illustrated in Figure 6, the number of bicycles remained more or less stable between December 2000 and July 2003 at approximately 3100 bicycles. The number then began to rise steadily until March 2005, where around 4000 bicycles were

\textsuperscript{48} “The more it is shared, the more it is to be shared.”
counted. Two months prior to the implementation of vélo’v (19th May 2005) a steep increase in the number of cyclists was found, probably due to surrounding efforts to improve cycling facilities (Beroud 2007:41). From then on, the number almost doubled until December 2007 with 7697 registered bicycles (see Grand Lyon n.d.). Using this survey, Beroud (2007:40) points out that 23 percent of all recorded bicycles in 2006 were vélo’v-bikes. Overall, the use of bicycles went up from 0.5 percent in 1995 to 2 percent in 2006, and it can be assumed that the public bike scheme contributed to this progression (Slimani 2007). However, it should be borne in mind, that the municipality simultaneously improved the cycling facilities, which probably also motivated people to cycle more frequently.

According to a recent survey on cyclists in general and velib’ in particular, conducted in October and November 2007, there has been a clear increase of cyclists since the implementation of the system (Marie de Paris 2008). Hence, 44 percent of the interviewed cyclists started cycling after the installation of velib’, including an increase of 26 percent in the use of personal bikes. However, the trend towards bicycles is not entirely new, as previous surveys of 2002 and 2005 revealed an even greater increase of cyclists of 55 percent, respectively 57 percent (Marie de Paris 2008). This indicates that velib’ definitely contributes to a rise in the number of cyclists, however, it is not the only cause. It should be noted that the public bike programme forms only one part of Paris’ effort to improve mobility and to mitigate the motorised traffic volume. The municipality combined the implementation of velib’ with greening measures, such as traffic calming, bus transit and pedestrianisation (Britton 2007a).

Beroud (2007:27) compared various European public bike schemes and concludes that beside velib’, vélo’v is by far the most successful scheme. In January 2008, notably a winter month, the bikes were rented out 440,370 times within one month, which means that on average one bike went through four users each day (Grand Lyon 2008). Beroud (2007:27) assumes that the success of Lyon lies in the number of bicycles and the density of stations, but also in the broad media coverage and intensive public relations between Greater Lyon and JCDecaux.

According to Bührmann (2007:9) a form of tariffication that enables “free” use for the first half an hour “provides an incentive to try the Public Bicycle service and to see that cycling in the city is a convenient transport option”. As mentioned above, non-cyclists tend to have false preconceptions of bicycles, so that public bikes offer an expedient opportunity for overcoming these prejudices (Dekoster and Schollaert 1999:44).

Gilles Vesco (Grand Lyon) observes that “vélo’v a explosé l’achat des vélos privés”49, leading to an increase in bicycle ownership in Greater Lyon. As indicated in the section on social-ecological research, besides an initial multiplication of bicycles in urban traffic, sustainable mobility culture also involves emotional qualities and attitudes, which are crucial to translating the excitement over cycling into a

49 “Vélo’v boosted the acquisition of private bicycles.”
travel routine (Deffner et al. 2006; Becker and Jahn 2006). The following sources give evidence that vélo’v and velib’ have the potential to transform the bicycle from a mere transport vehicle into a way of life.

4.4.3 The Emergence of a Bicycle Cult

The French have embraced communal bike ownership, according to my informal survey of my fellow Vélibiens [velib’ users], as have other Europeans. A culture of Vélibistes is emerging. The camaraderie — a French word that seems to have been invented in anticipation of this new cult — among the riders is entrancing.


To create a sustainable mobility culture and to achieve ESUM the importance of a cult should not be underestimated. “Cult”, here, does not refer to its religious meaning; instead it should be regarded as a non-spiritual notion describing people’s affection towards an object or an idea. The Compact Oxford English Dictionary defines “cult” as “something popular or fashionable among a particular section of society”. Therefore, a bicycle cult portrays the popularity of bicycles, not just as utilitarian vehicles, but also as an expression of a way of life. Cycling then not only involves the use of a bicycle out of convenience, but also inherits a personal statement and illustrates the emotional connection to the bicycle as an idea. In sum, a bicycle cult combines the soft factors of mobility culture, in terms of mobility styles, with its hard factors in terms of the bicycle as a technological product.

In looking at velib’, the deputy mayor of Paris, Denis Baupin (2007), is impressed by the size of the community of users that emerged in just three months. The existence of numerous online platforms around vélo’v and velib’, approximately 19 for velib’ alone, back-up his observation (see Technorati). The discussion forum “Le vélo dans le Grand Lyon”\(^50\), for instance, represents a lively community of “Véloveur” who share their impressions, frustrations, enjoyment and experiences with vélo’v. Users assist each other in solving problems with the system and exchange the latest news about the state of certain stations or bicycles, which are identified through their numbers. The forum has existed since November 2005 and counts 349 registered members who posted over 2960 messages, read by over 3 million people. Vélo’v is more than a mode of transport it is the “chouchou” (darling) of Greater Lyon, while at the same time being a source of humour and sarcasm\(^51\). This is even more so the case for velib’, which turned into an inspiration for songs, films, performances and other forms of artistic expression\(^52\). The name

\(^50\) See: http://velov.forumactif.com/

\(^51\) The discussion forum Le Vélo dans le Grand Lyon bears the headline “tout sur le vélo à Lyon et surtout Vélo’V le nouveau chouchou de Gd [Grand] Lyon et de JCDecaux” (“everything about the bicycle in Lyon and above all about Vélo’V, the new darling of Greater Lyon and JCDecaux”). The forum organises photo competitions associated with the funniest anecdotes. (see http://velov.forumactif.com/)

\(^52\) The Parisian singer Florent Nouvel, for instance, composed a song around velib’, which is circulated among the urban population and the media. While praising velib’, the song also
“vélib” offers great potential for wordplay, with examples ranging from vélibistes to vépub. No matter whether the association with velib’ is negative or positive, the fact that people adopt the name of public bike systems as part of cultural expressions and colloquial language gives evidence for the emergence of a cult surrounding them.

The Véloveurs and the Vélibiens can be regarded as urban subcultures, which have the potential to become trendsetters and eventually shape the whole society. As Deffner et al. (2006:12) maintain, mobility culture cannot be subject to regulation, but it can be shaped (gestalten) through a combination of external incentives and internal motivations. In the Trend-Report 2008, Horx (2007) identifies public bikes as a key trend for upcoming years. According to him, they emerged as a product of four mega-trends, namely the growing demand for sustainable mobility, the health trend, the want for high-tech, and finally the orientation towards “convenience 2.0” – the need for practicality. Horx (2007) speaks of a “bike-mania” that manifests itself in European cities with the help of public bike schemes. A mega-trend is not as futile as fashion, as it has the potential to induce a transformation of an existing culture, due to its influence upon all spheres of human life. As discussed above, ESUM can only be achieved if existing structures are transformed; however, it is far too early to determine whether public bikes have the potential to develop cycling into a mega-trend. Furthermore, a bicycle cult alone does not render a mobility culture more sustainable, so that the focus needs to be broadened to include all other modes of transport. The following section argues that public bikes indeed facilitate multi-optional mobility, as is claimed by Deffner et al. (2006:15).

4.4.4 Towards Intermodal Mobility

The lack of space in trains and the underground is often mentioned as the “key drawback” of establishing bicycles as an urban mode of transport, in particular for commuters coming in from the outskirts (Noland and Ishaque 2006:72). At the same time, carefully planned intermodality is put forward as the precondition for efficient mobility (Becker and Jahn 2006:38; European Commission 2007:2; Szyliowicz 2003:187). Noland and Ishaque (2006:72; see also Alegre 2007) perceive public bikes as facilitators of intermodality if stations are placed next to public transport centres.

Lensel and Zoubir (2007) conducted a spatiotemporal analysis of vélo’v and concluded that this public bike scheme is complementary than in competition to other modes of transports. People tend to choose the most convenient way of getting around, which involves practicality and rapidity of the travel. Concerning the preferences of the urban population, Lensel and Zoubir (2007) speak of an orientation towards mobility "à la carte" as traffic participants combine different modes of transport according to their needs. The anthropologist Lavadinho (2007) adds that expresses the love for bicycles in general: "Un vélo pour tous, tous pour un vélo, faites passer le mot, c'est le vélib credo!" ("One bike for all, all for a bike, pass it on, that’s the velib credo!"). The song can be heard at: http://www.myspace.com/velibmusique
people do not define themselves as cyclist, motorist or pedestrian anymore; instead she observes a hybridisation process leading to identities consisting of plural mobility styles.

Participants of a survey conducted by Grand Lyon in 2006 highlighted the practicality and rapidity of vélo’v as primary reasons for using this public bike system (2006:18; see also Horx 2007). Contrary to Lensel and Zoubir (2007), the survey of Grand Lyon indicates some competition between vélo’v and public transport, as 28.5 percent would have taken the underground if vélo’v did not exist, and 16 percent would have used the bus. However, according to Beroud (2007:35) vélo’v is only used as an alternative to public transport for inner-city trips of up to 4 km, so the argument for an integration of public bikes and other modes of transport still holds ground.

A similar picture emerges in Paris, where velib’-users cite practicality (46%) and rapidity (46%) as major reasons for choosing public bikes. People tend to use the public bike for rather short inner-city trips, with an average duration of 23 minutes (Marie de Paris 2008). The service is clearly perceived as a complementary mode of transport, as 67 percent of velib’-users switch to public transportation in the case of unfavourable weather, while 75 percent of users ride the velib’ at night, when the underground closes for maintenance reasons (Marie de Paris 2008).

Public bikes not only have the potential to facilitate multi-optional mobility and to respond to the hybridisation process, they are in themselves hybrids of a private and a public mode of transport (Amar 2007:32). As a form of “individual public transport”, public bikes can be seen as a reinvention of the bicycle combining flexible aspects of a private vehicle with sharing aspects of public transportation systems. Amar (2007:28) speaks of “transmodality” through which “old” modes, such as bicycles, are merged with information technology to evolve into a public service. In this sense public bikes are not an invention, but an innovation, which also have the potential to enhance the image of the city, as put forward in the next section.

4.4.5 Promoting an Image of a Sustainable Modern City

Chicago is interested, and so is Moscow. Geneva and Sydney are in negotiations, and the mayor of London has called by twice. ... Paris has suddenly become the world capital of bike rentals.

- Dworschak, Der Spiegel, 2 November 2007

Considering the bicycle-hostile environment in Paris, it might be surprising that Paris suddenly evolved into the centre of the public bike universe. Although the perception of Paris might differ slightly from the reality (see sect. 4.4.1), this positive image has a good influence on Paris’ mobility culture. Sebastian Bührmann (Rupprecht Consult) maintains that public bike schemes shape the image of a city, as their distinct design becomes part of the cityscape. As part of the urban landscape, citizens are believed to identify themselves with their particular scheme, which in turn strengthens the local identity (Bührmann 2007:2). An emotional con-
nection to the city and to public bikes motivates people to care for their urban environment and to take on the responsibilities necessary to achieving ESUM.

Leaving mobility aside, public bikes can also promote a positive image of the city as such and attract more visitors. As for vélo’v, Beroud (2007:42) maintains that the system “contribute au rayonnement internationale de la capitale des Gaules”\(^{53}\). Britton (2007b:36) adds that, according to the media, velib’ evolved into a major tourist attraction and was “... one of the most ‘visited monuments’ of Paris as of summer 2007”. Hence the benefits of public bikes not only relate to matters of mobility, but also include economic implications by serving as good public relations for the city.

Additionally, the usage of public bikes enables residents to attain a new perspective on their city, because the cyclist, as active traffic participant, moves more consciously through the city. According to Jérôme Fenez\(^{54}\), people become more aware of architectural features of their city and get to know the urban landscape much better. He also speaks of a "new citizenship" in which people are more respectful towards one other and more sensitive towards ecological concerns. In relation to velib’, he points to their potential to raise public environmental awareness. The option of cycling as urban transport turns public bike users into actors against climate change, or at least it generates hope that something can be done. With regards to urban coexistence in Paris, Fenez believes that velib’ facilitates greater interaction among Parisians (see also Britton 2007b:38). The abovementioned virtual community translates into face-to-face conversations held at rental stations. With regards to Lyon, Gilles Vesco (Grand Lyon) observes how the Véloveurs assist each other to operate the terminal or to adjust the bicycle seat for instance. Such forms of self-regulation and sense of responsibility empowers citizens and transform them into active agents for urban mobility (Baeten 2000; see also Amar 2007).

As elaborated in section 3.5, cooperation is essential for the achievement of ESUM, because a more sustainable mobility culture is only possible at the local and global level if actors across sectors, parties and boundaries work together. It is the complexity of mobility culture that requires a holistic approach involving citizen groups, local authorities, scientific researchers and transport practitioners (see Becker and Jahn 2006). The quote at the beginning of this section indicates the beginning of a cross-boundary cooperation between cities interested in public bike schemes. This cooperation is still in its earliest stages; however, the plan was consolidated at the First Public Bicycle Conference in Barcelona in November 2007, where representatives of Paris, Lyon, Barcelona, Milan and London founded an international club, which intends to foster cooperation among cities with public bike schemes or that are interested in implementing such a scheme. The club will foremost enable local authorities to join forces in tackling issues related to public bike schemes. A selection of such issues will form the subject of the following section.

\(^{53}\) “[Vélo’v] contributes to the international shining of Gaul’s capital.”

\(^{54}\) Jérôme Fenez (Vélocité) interviewed 14 September 2007
4.5 Shortcomings of Public Bikes to Achieve Sustainable Mobility

Thus far, it is excellent...but not quite perfect. Yet.
- Britton 2007b:37

The hype around public bikes tends to drown out the few critical voices, so that it is the more important to provide them with a platform here. Considering the variety of existing rental schemes, the shortcomings do not apply to the idea of bike-sharing in general, but to a number of third-generation public bike schemes. In most cases, local circumstances are responsible for the failure or success of the system, so that some issues appear in one city, but not in another. Although the assumptions rely heavily on the schemes in Lyon and Paris, they serve to point out potential risks for public bike schemes in general. It should also be noted that the schemes can differ in terms of the design of bicycles and stations, as well as pricing, service and management. Bicycles can be light or heavy, easy or difficult to manoeuvre and can be equipped with different features. Technical and operational shortcomings have already been discussed in numerous studies on public bike schemes (see Beroud 2007; Britton 2007b; DiDonato, Herbert and Vachhani 2002; Santos, Pinaud and Janneau 2006; and Noland and Ishaque 2006), which I will adopt and expand on to include social, ecological and political implications.

In sum, issues were identified in the following areas: maintenance, vandalism, theft, operation system, incommodiousness and availability. With regards to vélo’v, velib’, Bycyklen in Copenhagen and Oybike in London, public bikes were observed to be a relatively vulnerable mode of transport with a number of maintenance problems, notably “… defective tires, chains, seats, gears [and] broken plastics in housings” (Britton 2007b:38). Second, public bikes and rental stations are subject to vandalism resulting in damaged bicycles, racks or terminals. Third, despite improved locking systems compared to second-generation schemes, theft is still a problem leading to economic loss. In Lyon for instance, an average of 700 vélo’v-bikes get “lost” per year (Gilles Vesco, Grand Lyon). Fourth, for first-time users, the bicycles and the terminals can be difficult to operate, especially due to rather complicated software on terminals or poorly designed bike racks. Fifth, the weight and design of some public bikes appear to be uncomfortable for some users. Finally, there is no guarantee that bikes are available when needed, nor is there a guarantee of vacant bike racks, leading to time loss. However, it should be noted that most public bike systems are relatively new for both the operator and the urban population, so that most of these issues are in the process of being solved, for in-
stance, through closer cooperation with the police and the installation of video cameras at public bike stations to control vandalism and theft (Laurette Arriëns\textsuperscript{55}).

Bearing in mind these shortcomings, I investigate here the limitations of public bikes in general and vélo’v/velib’ in particular with regards to ESUM. The points of discussion go beyond mere technical or operational problems and rather look at public bikes as an effort of local authorities to provide clean mobility and to eventually mitigate climate change. The focus will be on travel routines, political and economic interests, social mobility and car-dependency. It is argued that public bikes do not provide sustainable mobility for everyday purposes, nor do they directly reduce motorised road traffic to a considerable extent. The novelty of this scheme only allows for a formulation of assumptions and possible tendencies, which are subject to discussion.

The shortcomings are formulated as follows:

1. Public bikes are not a reliable mode of transport and are therefore not suitable for daily commuting.
2. Public bikes risk serving as a “green curtain” to conceal persistent unsustainable mobility.
3. Public bikes tend to serve economic interests at the expense of ecological concerns.

These are the product of an interpretation of empirical data with reference to social-ecological principles to achieve a sustainable mobility culture. There is no intention to prove the idea of bike-sharing to be wrong, the aim is rather to shed light on critical aspects of third-generation public bikes and consequently to generate a desperately needed debate.

4.5.1 Lack of Reliability – No Option for Everyday Life

\textit{I'm on my way to a vélo’v station, the weather is perfect and I have still enough time to finally try out my first vélo’v. The station is empty, all bikes are gone. I have a look at the map and soon find a second station – empty! At the third station – after 15 minutes walk – I take out the only bike to discover that it has a flat tire. At the fourth station all bike racks are occupied, so I'm left with this defective bike. The fifth station – full! The sixth station is at my destination, where I leave the bike to be 45 minutes late. Once bitten, twice shy – I think to myself.} (Eva Helmeth, 19 October 2007)

This most unscientific and informal observation of mine illustrates the series of issues users might face, which risk discouraging them on their first experience. The problems of poor maintenance and availability on the one hand as well as the lack of parking space on the other are often cited as prime shortcomings (Beroud 2007:38; Britton 2007b:38; Santos, Pinaud and Janneau 2006:44). The lack of bikes at certain stations and the lack of vacant bike racks at other stations are cited

\textsuperscript{55} Laurette Arriëns (Project Manager of SmartBike, \textit{Clear Channel Outdoor}) interviewed on 19
as primary issues by velib’-users. Issues of bicycle or station maintenance contribute to the unreliability of the system. Paris à Vélo, a citizens’ initiative, surveys the numbers and state of all stations each day and reports 972 dysfunctional bike racks of a total of 23063 racks, as of the 18th February 2008. Although 89 percent of users are relatively satisfied with the system, only 37 percent declare themselves completely at ease or satisfied (Marie de Paris 2008). A look at online discussion forums and blogs confirms a degree of frustration concerning maintenance and availability.

Concerning velib’, “Martinor” (emphasis in original) argues, “I enjoy the bike sharing notion but I am tired, some evenings, desperately looking for free spots where to get rid of my Velib”. This opinion is supported by “yvesA” who adds that he has ceased using velib’ for everyday purposes where he is forced to be on time so that he limits the use of the public bike to weekends. The issue of availability is not new to the operator, nor to the municipality of Paris. The official velib’-blog, initiated by the municipality, encourages users to share positive as well as negative experiences and consequently fosters cooperation between the city and its citizens. Céline Lepault, project manager of velib’, actively engages in this blog and gathers complaints and suggestions so as to continuously improve the scheme. The phenomenon of notoriously empty stations in certain parts of Paris versus fully occupied stations in other parts is a frequently discussed topic in this blog. Technological innovations, such as ‘molib’, which includes mobile phones to locate bikes and free bike racks, are put forward as solutions to the issue of availability. However, looking at comments of users, it becomes apparent that such technological innovations are themselves not reliable, as a number of bikes declared as accessible, risk being in dysfunctional condition. According to “Victor” molib might work in theory, yet it does not apply to the reality of velib’-bikes, which are found to be in a poor state, as mentioned above. He insists, “si c’est marginal ça passe; malheureusement suite à dégradations volontaires ce n’est plus marginal”.

Similar comments are to be read in forums and blogs concerning vélo’v where individuals face comparable problems of availability and maintenance. Despite almost three years of existence, these system shortcomings still persist. In fact, “Dury-fifi”, a declared frequent vélo’v-user since the scheme’s inception, notes that the service has deteriorated since Summer 2007.

February 2008.

56 The person responded to an article from the 2 January 2008 in The Times, which points to the maintenance problems. Available online: http://driving.timesonline.co.uk/tol/life_and_style/driving/news/article3118755.ece
57 His opinion was posted on 29 January 2008 at velib-pourri, where a number of other complaints can be found: http://www.velib-pourri.com
59 His opinion was posted on 15 February 2008 at Vélib et Moi
60 “If it [dysfunction of velib’-bikes] is marginal, then it would not matter; unfortunately due to voluntary destruction it is not a marginal phenomenon anymore.”
61 The person posted his comment on 17 October 2007 at Le Vélo dans le Grand Lyon
Despite technological innovations, improvements of the service and the abatement of vandalism, there is a risk that public bikes will remain an unreliable mode of transport. With regard to the comments above, it appears that users are not satisfied with the maintenance service provided by JCDecaux. In the case of Paris, such complaints are somewhat surprising as the company announced in its press release on velib’ its intention to recruit more than 400 staff for service and maintenance purposes (JCDecaux 2007). JCDecaux claims to use ten electric vehicles and 130 electrically assisted bikes for minor maintenance on the spot, as well as 20 pick-ups with trailers, which run on gas, to recover dysfunctional bikes and shift bikes from full stations to empty stations. Whether the service is in fact as good as promised or whether the number of staff and vehicles is too small for such a large system with a total of 20,600 bikes would have to be investigated.

It should be borne in mind that public bikes are not intended to be a substitute for other public transports or for personal bicycles; instead they are meant as a complementary mode of transport to provide mobility when other modes are not accessible. However, if municipalities and operators do not get the abovementioned problems under control, there is a risk that people will refrain from using public bikes for everyday purposes. As highlighted in section 3.4, mobility culture is shaped by travel routines, so that it is crucial to establish public bikes as an everyday mode of transport (Deffner et al. 2006:11). With regard to Paris, only 68 percent of velib’-users ride the public bike on a daily basis (Marie de Paris 2008).

However, a failure of public bikes does not necessarily translate into a failure of the attempt to create a more sustainable mobility culture. The potential of public bikes to attract new cyclists should not be underestimated, so that frustrations concerning the public bike schemes might be an incentive to own a personal bike. The survey on cyclists in Paris shows that 84 percent of users of personal bikes ride their bicycle everyday (Marie de Paris 2008). As a complementary mode of transport, public bikes have still the potential to form part of a sustainable mobility culture. Then again this depends highly on the genuine efforts of municipalities to create a suitable framework for the use of human-powered vehicles and for intermodality. The following section highlights the risks of an ad hoc implementation of public bike schemes.

4.5.2 Green Curtain Concealing Unsustainable Mobility

The popularity of public bikes among municipalities risks provoking system failures as there is a tendency toward ad-hoc implementation of the schemes, leading to predictable flops. Sebastian Bührmann (Rupprecht Consult) observes a rush in the procedure of installing public bikes. Without mentioning concrete examples, he maintains that in many cases municipalities proceed as follows: convinced by the political benefits of public bikes the mayor charges transport and traffic planners to install the scheme as soon as possible, preferably in the timeframe of his mandate.

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62 In Paris, for instance, the underground service shuts down for maintenance reasons.
The municipality puts out a tender for a certain amount of bicycles and stations and a few months later the first bikes are put in place in a joint effort of traffic planners and public bike operators.

In such cases public bikes are misused as “green curtains” to conceal the lack of appropriate and genuine measures to solve the issue of unsustainable mobility. Alfonso Sanz\(^{63}\) uses the expression “cortina de humo verde”\(^{64}\) to refer to bicycle policies in general, when they are not integrated into sincere environmental commitments and only serve as an ostensible “green” policy. The rush of some cities to implement public bikes can be interpreted as evidence for misuse of the scheme for political purposes. In the case of Paris, it is no surprise that velib’ was installed just six months after JCDecaux won the tender. As already mentioned, the Mayor Delanoë had a political interest in pushing for implementation before Summer 2007, as he thought to profit from the success of velib’ at the municipal elections in March 2008 (see Delanoë 2008). Although velib’ is integrated as part of a broader mobility plan including car reduction strategies, encouragement of intermodality and an overall promotion of cycling, the contribution of public bikes to reducing greenhouse gas emissions is questionable.

As for Sanz (2007), the number of motorised vehicles in urban traffic does not necessarily reduce if more bicycles are introduced. He argues that the increase of cyclists is associated with a decrease in pedestrians and users of public transport while the number of car drivers in urban traffic remains relatively high. The surveys on velib’ and vélo’v support his observation to a great extent: in the case of velib’ only 12 percent of users previously drove their own car, while only 6.7 percent of vélo’v users switched from the car to public bikes (Marie de Paris 2008; Grand Lyon 2006; see also Beroud 2007:31). The vast majority of public bike users usually walk or take public transport to effectuate the trip. With regards to vélo’v, 63 percent of public bike users never drive a car anyway (Grand Lyon 2006:14). It should be borne in mind that quantitative results are only partially meaningful, as these numbers do not account for individual motifs. There is no indication of whether public bike users stopped driving cars completely or only for certain trips, nor does it inform on the frequency of public bike use. It is difficult to discern whether the respondent became a regular user or whether he or she simply tries out the service and thereafter may switch back to the car.

Furthermore, it is questionable whether public bikes solve the issue of social immobility and exclusion. It is difficult to come to a conclusion at this early point in time; however the surveys indicate that the service is not used by all members of society in equal measure. Looking at the gender division, 64 percent of velib’ users are men, respectively 60 percent for vélo’v users (Marie de Paris 2008; Grand Lyon 2006:6). In both cases, the majority of users are students, executives and freelancers between 20 and 30 years. Concerning vélo’v users, only 3.6 percent are unemployed persons and only 1.2 percent are workers (Grand Lyon 2006:6). One

\(^{63}\) Alfonso Sanz (Grupo de Estudios y Alternativas) interviewed 30 November 2007
reason might be that both public bike schemes are only accessible through credit cards, however more in-depth research is needed to elaborate on the link between public bikes and social exclusion. The question arises as to whether public bikes are yet another product of the sustainable transport rhetoric, which empowers “technocratic and elitist groups” maintaining their way of life, while perpetuating the dis-empowerment of the already “marginalized social groups” (Baeten 2000:72). Due to time constraints and the scope of this dissertation, I will leave the question open, as more detailed and in-depth qualitative research is needed to determine the reasons for these social discrepancies among public bike users.

As Laurette Arriëns (Clear Channel) rightly points out, if city mayors use public bike schemes to enhance their political image, they have an interest in the success of the system because their reputation depends on its outcome. However, sustainability depends on a long-term vision that goes far beyond a mayor’s mandate, so that the popularity of public bikes when first introduced does not automatically lead to a more eco-friendly mobility culture that is sustainable into the future. The case of Cyclocity in Brussels demonstrates that a public bike scheme alone cannot be a panacea for a city’s transportation misery.\(^5\) According to Alter (2008), Cyclocity, operated by JCDecaux, is rarely used by Brussels residents and tends to serve no purpose but to take up public space. While the traffic volume remains high, the bicycle-hostile environment of Brussels discourages people from using Cyclocity. In addition, Alter (2008) observes a lack of commitment from the municipality and JCDecaux to expand the service and to improve the cycling infrastructure. Bührmann (2007) claims that public bikes can only contribute to a sustainable mobility culture if they are implemented together with cycling strategies, including hard factors, such as cycling paths, and soft factors, such as public awareness raising campaigns. Unless municipalities follow an integrated transport policy, public bikes risk being a short-term fashion, ending up as “bike cemeteries”.

4.5.3 Commercial Tool Perpetuating Over-Consumption

As argued above, the neoliberal mindset and the phenomenon of over-consumption in Europe account for extensive use of fossil fuels and consequently contribute highly to climate change. Public bikes are often presented as one remedy among others to the issue of global warming, and it is true that the very use of these systems does not emit greenhouse gases, and can so be classified as a clean mode of transport. However, public bikes are not just transport vehicles; they are in fact a complex service embedded within a web of political and economic interests and strategies. Therefore it is crucial to look at the deal between municipalities and public bike operators leading to potential negative side-effects of public bike programmes.

\(^6\) Literally: ‘curtain of green vanity’

\(^5\) Urban transport misery, as pointed out in section 2.3, is marked by a high traffic volume consisting of motorised vehicles, emitting large amounts of greenhouse gas and effecting air pollution and noise pollution in a city.
In most cases, public bike schemes are implemented and operated in a public-private partnership. After municipalities accept the tender of a public bike operator, the company installs its own patented hardware and software so that it imposes a natural monopoly over the scheme during the term of the contract (Beroud 2007:63). Alternatively, if the equipment were standardised, notably the bikes, stations and so forth, then some form of competition could be achieved. Furthermore, if a suburb – belonging to another administrative unit than the city – intends to install public bikes to connect to the city centre, it has no choice but to accept the same operator.

In some cases, the contract between the operator and the city is inflexible so that the municipality is unable to modify the system if its initial form is inadequate. Gijón and Córdoba in Spain, for instance, are bound for ten years to the Cyclocity scheme of JCDecaux as installed in 2003. The company JCDecaux finances both public bike schemes through revenues of contractually defined advertising space, preventing both cities from expanding the system, unless the city finances the upgrading costs (Ferrando and Anaya 2007:104). According to Ferrando and Anaya (2007:104), Gijón and Córdoba are left with an inappropriate system, which is rarely used and hence contributes to the pollution of the urban landscape by taking up public space. In the case of Córdoba, the failure of the public bike scheme has also political reasons, as the local government has no sincere interest in the promotion of bicycles. The scheme was perceived as an “extra” of the advertising contract with JCDecaux and a “cosmetic” act to prove the municipality’s commitment to ecological concerns (Hastings 2007:20).

Gijón is a different case, as the municipality seems to have a more genuine interest in promoting sustainable transportation. As an attempt to revive the idea of bike-sharing, Gijón implemented a manually-operated scheme (Gijón+B) in March 2007 including 276 bicycles at 24 rental points. This is an interesting phenomenon, as manual public bike programmes, technically belonging to the first generation, might end up showing the way ahead. So far, there is no data available on the performance of Gijón+B, hence study of the potential of manual bike-sharing programmes should be encouraged.

Concerning the cooperation between multinationals and cities, Beroud (2007:63) claims that municipalities have the right to intervene in terms of pricing and provision of the service. With reference to Bicing in Barcelona, Laurette Arriëns (Clear Channel) confirms that the operator needs to report to the municipality daily regarding the status of the system. However, according to Bremner (The Times 2008), cooperation between the city of Paris and JCDecaux does not seem to work well, as “Mr Delanoë [Mayor of Paris] is threatening penalties against JCDecaux ... because so many are out of service or in disrepair from overuse and vandalism”.

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66 Gijón has implemented a public bike scheme with only 64 bicycles on eight stations.
67 Córdoba has implemented a public bike scheme with only 34 bicycles at four stations.
Beside the problems of cooperation that might arise from this public-private partnership, the fact of multinational involvement points to a different issue. As Beroud (2007:51) points out, for the majority of operators, in particular JCDecaux and Clear Channel, public bikes are just a side-activity, which is used to promote their main business, notably outdoor advertisement. To gain access to the urban advertisement market, both companies “offer” street furniture to cities, one of which is the public bike system. The municipality has no actual expenses and even receives a percentage of revenues from advertisements, while the company is granted a monopole over a certain period of time, mainly between ten and 15 years, to exploit advertising panels (Fietsman 2007). In Paris and Lyon, the contract with JCDecaux links public bike schemes with the installation of new, mainly illuminated, billboards of 2 m² and 8 m², which have direct and indirect negative effects on urban mobility and the environment (Politique 2007). This link between the bike rental scheme velib’ and outdoor advertisement gave birth to the derogatory nickname “Vépub”, where “pub” stands for “publicité”, French for “advertising”.

JCDecaux (2007) describes its street furniture in Paris, including velib’ stations and billboards in the following way:

We took our inspiration for this furniture from plants and movement. ... This curved furniture, installed on the pavements and brushed against by passers-by, doesn’t hurt or offend the eyes or the body.

The cycling association Vélorution Paris (2007) has a different point of view on JCDecaux’s installation of illuminated, drop-down billboards: these billboards consume a considerable amount of energy; the light and the rolling motion of the advertisement lead to a visual pollution, as it attracts attention; the fact that one drop-down billboard contains more than just one advertisement space, leads to an even higher increase in advertising. Illuminated billboards not only attract attention, but rather distract traffic participants, as most billboard are installed along main roads (Dekoster and Schollaert 1999:40). As JCDecaux’s billboards are installed on the pavement, they can indeed hurt the body, as they form obstacles for pedestrians and cyclists.

The issue of over-consumption is a complex one, which cannot be fully discussed in this thesis however many voices agree that advertisements fuel the phenomenon of over-consumption (see Clark 2005; Durning 1992; Hofmann 2002). If advertisements “fail to sell a particular product, they sell consumerism itself by ceaselessly reiterating the idea that there is a product to solve each of life’s problems” (Durning 1992). Unsustainable consumption, as pointed out at the beginning of this section, equals unsustainable exploitation of natural resources and high greenhouse gas emissions. Hence the concept of financing public bikes through commercial advertising, a popular concept which seems to be mushrooming throughout European cities and even overseas, inherits a critical paradox: while the principal idea of the scheme is to reduce greenhouse gas emissions in urban areas, it is associated with an increase in advertising space, which fuels unsustainable lifestyles. The paradox culminates in the claim of multinationals, notably JCDecaux (2007) declaring to be “always at the leading edge of innovation and sustainable development”. It is due
to such statements, that Carter (2003:201) criticises the ill-defined concept of sustainable development, as it invites polluting multinationals to abuse it for commercial reasons. Byrne et al. (2006:93) warns, that, "... contemporary urban industrialism seeks sustainability as a facilitator of technological and economic advance" and consequently disregards ecological concerns. Hence the ostensible "free" public bike service comes at a high cost for the environment.
5 KEEPING THE BALL ROLLING

My wheels no longer touch the ground,
They’re floating on passionate effort,
a whole hearted singleminded effort,
the rhythm of a perfect circle,
a pulsing rhythm that rises above the world’s woes.

Movement brings freedom.

- Carlo Castelvecchi

The purpose of this dissertation was to look beyond the green curtain of public bikes and to open up a debate on their feasibility to contribute to the solution of unsustainable mobility in European cities. At the same time, the intention was to elaborate on their potential to transform persisting unsustainable mobility cultures. The vision of green urbanism, promoting a more healthy and sustainable urban way of living in both ecological and social terms, guided this research. For those living behind the times, the dissertation aimed to provide substantial arguments for the bicycle as a viable mode of transport, and for those blindly following the public bike crowd, the dissertation aimed to open their eyes by raising various critical aspects. Both are encouraged to engage in the debate on sustainable urban living, in order to put the vision of green urbanism into practice.

To derive a synthesis from theoretical and empirical findings and to provide an outlook on future developments in the public bike universe, this chapter will begin with a summary of the elaborated points.

The public bike schemes illustrate a local effort of municipalities to contribute to the mitigation of the global issue of climate change. The thesis embedded the discussion on public bikes within the debate surrounding climate change, by highlighting the latest findings of the Fourth IPCC Assessment Report. The origins of climate change science introduced the evolution of the climate change discourse leading to a discussion on international agreements, notably the Kyoto Protocol. The dissertation engaged critically with the mechanisms of the Kyoto Protocol, namely the CDMs, JI and emissions trading and concluded that they risk perpetuating problem displacement rather than initiating problem solving.

It was further elaborated that cities, as centres of human activities, account for greenhouse gas emissions, and thus contribute to climate change. Urban trends in Europe consist of urban sprawl, the retreat of basic services out of neighbourhoods to green fields and a more car-dependent lifestyle. The dissertation examined the
link of road transport and climate change to conclude that individual motorised vehicles emit an increasing share of Europe’s greenhouse gas. Based on Dekoster and Schollaert’s (1999) statement, “the car is the victim of its own success”, the section went on to scrutinise various negative impacts of car use on human health and the urban environment.

Considering that cities are also hubs of innovative solutions for curbing climate change, the dissertation highlighted proposed solutions, notably the EU Green Paper. Two principal approaches have been identified, namely the technological approach advocating for the reduction of greenhouse gas emissions through technological innovations, and the lifestyle approach promoting zero-emission mobility through inducing behavioural change. The thesis went on to introduce bicycles as a viable mode of transport, including their benefits for the environment, health and urban living conditions. Using DeMaio’s (2003) generational categorisation, the study familiarised the reader with the crux of this research, namely public bike systems. The focus lies on the third generation, which uses computerised renting mechanisms, such as the smart card.

The dissertation established a conceptual framework based on the mapping method of Hopwood, Mellor and O’Brien (2005), and derived a normative definition of ecological sustainable urban mobility (ESUM). It was argued that today’s approach to sustainable transportation planning is influenced by the principles of neoliberal economics, market environmentalism, green consumerism, ecological modernisation and sustainable development. A critical engagement with these concepts revealed that a paradigm shift is needed from the “orthodox sustainable transport approach” towards sustainable mobility (Baeten 2000:72; Amar 2007). The definition of ESUM was established based on a social-ecological approach to mobility culture. It is argued that ESUM combines social equity and environmental concerns and requires a transformation calling for a radical change by questioning underlying mechanisms that perpetuate unsustainable mobility.

Using ESUM as benchmark, public bikes have been studied according to their influence on the modal split, eco-political discourses, people’s travel routines and their overall environmental and social impact. The dissertation drew on the examples of vélo’v in Lyon and velib’ in Paris, due to their key positions in today’s public bike world. To set the scene, the current situation for bicycles in Lyon and Paris have been described, and found to be relatively bicycle-hostile compared with Strasbourg, and even more so with Amsterdam. However, the increasing efforts made by the municipalities of Lyon and Paris have been noted. To enter into the discussion on public bikes, the thesis highlighted the implementation processes of vélo’v and velib’, and provided information on both the technical data and terms of use.

With the abovementioned advantages of bicycles in mind, the greatest potential of public bikes in general, and vélo’v and velib’ in particular, is the promotion of cycling as a feasible means of urban mobility. The popularity of vélo’v and velib’ pushed the bicycle into the public and eco-political discourse, and sensitises municipal representatives and traffic participants alike. It is further argued that public bikes at-
tract new cyclists, as the permanent presence of the system in public spaces is an incentive for people to try out cycling and eventually develop an affinity for bicycles. One outcome has been identified as an emerging bicycle cult, which becomes apparent in the manifestation of a public bike community and the adoption of the scheme - in particular its various labels - into cultural expressions. The emotional relationship to public bikes transforms the bicycle from a two-wheeled vehicle into a way of life and hence has the potential to develop cycling into a mega-trend (Horx 2008). Based on the assumption that mobility culture is most sustainable when the transport system enables multi-optional travels, it is argued that public bikes are a complementary mode of transport facilitating intermodality. Finally it is supposed that public bike schemes strengthen the local identity and motivate citizens to care for their urban environment.

However, the research revealed another side of public bikes including its surroundings, which lead to the formulation of risks that are likely to occur if the idea of bike-sharing is either exploited for political and economic reasons, or if it is not designed to serve the needs of the urban population. In looking at vélo’v and velib’, issues of availability and poor maintenance have been observed, which weaken the potential for public bikes to be adopted as part of people’s travel routines. Although it is acknowledged that public bikes are not meant to substitute for other modes of transport, its complementary function and consequently its status as a public transport system can only be ensured when the scheme is reliable. Considering the almost three-year existence of vélo’v it appears that the issue of unreliability is likely to persist.

It is further argued that due to the popularity of public bikes, they risk being misused as ostensible “green” policies of municipalities. If public bikes are not part of an integrated sustainable transport policy and a serious commitment of municipalities to address ecological issues, they solely serve as a “green curtain” concealing persistent unsustainable mobility. Municipalities need to formulate a future vision for public bike schemes, in order to avoid the creation of “bicycle cemeteries”.

Finally the thesis encouraged a critical perspective on the public-private partnership between municipalities and above all advertising companies, such as the multinationals JCDecaux and Clear Channel. Beside issues of cooperation, the focus lies on the linkage of public bikes and advertising, which leads to a paradox: on one side public bikes are introduced and promoted as means to solve the issue of local air pollution and to contribute to the global problem of climate change; on the other side the public bike package, as it is mushrooming in a growing number of cities worldwide, involves a “bikes for billboards” contract, expanding advertising space in the city. The advertising industry, as Durning (1992) argues, is the greatest promoter of over-consumption, which is believed to have a prime role in the depletion of natural resources and anthropogenic greenhouse gas emissions. In conclusion, public bikes risk to foremost benefit multinational companies at the expense of environmental and social concerns.
Throughout the past months of research and in the course of this paper it became evident that climate change is a pressing issue that does not allow for procrastination. Nevertheless it is being noted that in many cases the transport planning and environmental policies of European municipalities are still being guided by principles of market environmentalism, green consumerism, ecological modernisation and sustainable development, seeking to reconcile ecological concerns with economic interests. Henceforth, they are stuck in the reform approach, as put forward by Hopwood, Mellor and O’Brien (2005), and need to actively pursue the paradigm shift from sustainable transport to sustainable mobility, in order to better involve citizens in decision-making rather than satisfying interests of private companies that operate in the mindset of growthmania. If the mobility culture in European cities is to be shaped in a more sustainable fashion, a transformation needs to take place, which touches upon all spheres of life and tackles underlying causes of unsustainability. In conclusion, the very idea of bike-sharing possesses great potential for solving the problem of mobility in urban areas, however, its realisation in the form of third-generation public bikes involves risks, which need to be addressed.

The end of this dissertation marks the beginning of an open discussion on urban mobility in general and public bikes in particular. As pointed out in the introduction to this thesis, the development of public bike systems into public transportation is still in its early stages, and its evolution can still be shaped. More in-depth research is needed in order to elaborate on the opportunities and improvements necessary for public bikes to achieve a sustainable mobility culture. Through transdisciplinary studies, involving methods of social sciences, environmental research and urban planning, the following selection of issues should be investigated: the contribution of public bikes as a complex system to the reduction of a city’s ecological footprint; the link between public bikes and social inclusion; the potential of public bikes to evolve from a fashion to a mega-trend; and the feasibility of public bikes to solve mobility issues worldwide. The boom of third-generation schemes should not distract from the existence of hundreds of other bike-sharing systems, notably small-scale manually operated projects. It is crucial that research also engage with the potential of such schemes. Furthermore, there is a need to understand public bikes as part of the greater picture of urban mobility, in all its complexity involving myriad modes of transport, but also social, mental and communicational aspects.

People are full of surprises, so that some of the advantages pointed out above may turn into disadvantages and some shortcomings may evolve into opportunities. The crux is to keep the ball rolling and to accept new challenges that might arise on the way to a sustainable mobility culture.
Figure 7: Map of Lyon including Bicycle Paths and Lanes
© Grand Lyon, 2007
Figure 8: Map of Paris including Bicycle Paths and Lanes
© Marie de Paris, 2007
APPENDIX B: A NOTE ON RESEARCH METHODS

METHODOLOGICAL FRAMEWORK

For this research, I drew on multiple data sources in order to embrace the complex nature of mobility. Consistent with social-ecology approaches, I used mainly social science methods to gather the data. Taking the complexity of social reality into account, I employed “critical methodological pluralism” and hence combined divergent qualitative approaches, namely semi-structured interviews and participant observation (Danermark et al. 2002). Such combination is also called the "pragmatic approach", in which the research question determines the methods irrespective of their paradigmatic relationship (Tashakkori and Teddlie 1998).

In order to evaluate the potential and limits of public bikes, I collected and analysed primary data as well as secondary data within the methodological framework of “grounded theory” (Corbin and Strauss 1990; Glaser and Strauss 1967; Danermark et al. 2002; Strübing 2004), which describes a practice to induce conclusions from empirically gathered data. Considering the fact that there are no social-ecology researches of public bikes so far, testing of already established theory is impossible. Therefore, grounded theory seems to be an adequate approach to this new field of study. Martin and Turner (1986:149) support this view and suggest:

Frequently when no relevant theory exists and even when theories concerned with a topic do exist, they may be too remote or abstract to offer much detailed guidance and assistance. Under such circumstances, the researcher will want to develop a theoretical account that facilitates the discussion of general features of the topics under study and is firmly based or grounded in the data collected – a grounded theory.

According to Corbin and Strauss (1990:23) grounded theory encompasses “systematic data collection and analysis”, which involves supplementary steps, such as sampling, coding and literature comparison. Bernard (2002:473) adds, “data do not speak for themselves”. Coding contributes to the research’s validity and reliability. The coding procedure is being discussed in more detail below.

SAMPLING

Due to the novelty of public bikes as a research field, I relied on what Bernard (2002:185) calls “snowball sampling” to select interviewees (see Table 1). I located individuals and experts who in turn named others who were likely to share their knowledge and opinion on public bikes. As I was investigating answers to specific questions and hence looking for experts in specific fields, such as transport planning, I conducted non-random sampling (Neuendorf 2001).

To find cycling associations in Paris and scholars working in the field of bicycles I used the internet and contacted individuals by email. Additionally, I participated at two conferences, namely 17e Congrès du Club des Villes Cyclable in Lyon (17-19 October 2007) and 1as Jornadas de la Bicicleta Publica in Barcelona (29-30 Novem-
ber 2007), where I had the opportunity to meet a number of experts working in the field of public bikes.

<table>
<thead>
<tr>
<th>Interviewee</th>
<th>Affiliation</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frédéric Héran</td>
<td>University of Lille</td>
<td>29/08/2007</td>
</tr>
<tr>
<td>François Fatoux</td>
<td>Vivre à Vélo en Ville</td>
<td>30/08/2007</td>
</tr>
<tr>
<td>Norma Mashaal</td>
<td>Mieux se Déplacer à Bicyclette</td>
<td>13/09/2007</td>
</tr>
<tr>
<td>Jérôme Fenez</td>
<td>Vélocité</td>
<td>14/09/2007</td>
</tr>
<tr>
<td>Florence Larcher</td>
<td>EFFIA Vélossimo</td>
<td>18/10/2007</td>
</tr>
<tr>
<td>Alberto Carrillo Arranz</td>
<td>JCDecaux Spain</td>
<td>28/11/2007</td>
</tr>
<tr>
<td>Gilles Vesco</td>
<td>Vice-President of Grand Lyon</td>
<td>29/11/2007</td>
</tr>
<tr>
<td>Alfonso Sanz Alduán</td>
<td>Grupo de Estudios y Alternativas</td>
<td>30/11/2007</td>
</tr>
<tr>
<td>Sebastian Bührmann</td>
<td>Rupprecht Consult</td>
<td>20/12/2007</td>
</tr>
<tr>
<td>Jutta Deffner</td>
<td>Institute of Social Ecology</td>
<td>05/02/2008</td>
</tr>
<tr>
<td>Eric Britton</td>
<td>EcoPlan/ New Mobility Agenda</td>
<td>19/02/2008</td>
</tr>
<tr>
<td>Laurette Arriëns</td>
<td>Clear Channel Outdoor International</td>
<td>19/02/2008</td>
</tr>
</tbody>
</table>

Table 1: List of Interviewees

**Data Collection**

As a result of snowball sampling I identified 13 interview partners from cycling associations, municipalities, research institutes, consultancies and public bike operators. To collect useful information on public bikes, I conducted interviews (face-to-face or over the phone), (grey) literature reviews, and to some extent participant observation. Finally, I took notes at discussions and presentations of both conferences in Lyon and Barcelona.

**Interview**

I conducted various types of interviews ranging from informal to semi-structured interviews, depending on the participant. For most interviews I arranged meetings (either in person or on the phone), but some were conducted spontaneously without preparation, especially when I met experts at the conferences. As I knew that I would not get the time to interview a person more than once, semi-structured interviews seemed most convenient to gather as much data as possible. I always encouraged open-ended responses in order to learn how my interview partners reflected upon the topic and what they regarded to be the core issues (Hall 2003). Some questions were sent via email – to Paul DeMaio (Metrobike Ltd), Haritz Ferrando (Bicicleta Club de Catalunya) and Didier Couval (Bicycle Officer of Paris). By drawing on interview partners of divergent backgrounds I was able to obtain insights into my topic from various points of view. I am well aware that the inter-
viewees do not describe phenomena “as they are” as their perception of cycling issues depend on their occupational, social and cultural backgrounds. In this regard, I refer to Berger and Luckman (1997) and their theory of the social construction of reality.

*Participant Observation*

In order to familiarise myself with public bikes, I observed and/or tried out the following schemes in France and Spain:

- Vélib’ in Paris (August 2007)
- Vélo’v in Lyon (October 2007)
- Vélocité in Mulhouse (October 2007)
- Bicing in Barcelona (November 2007)
- Ambicia’t in Terassa (November 2007)
- Cyclocity in Cordoba (December 2007)
- Sevici in Sevilla (December 2007)

As a temporary resident of Paris from May 2007 to September 2007 I commuted daily on my personal bicycle, so that I could get a good picture of cycling facilities and the situation of cyclists in the city. Additionally, I could observe the transition before and after the implementation of Vélib’.

To attain a picture of the bicycle activists in Paris, I participated at the following events:

- Monthly Meeting of *Vivre à Vélo en Ville*: 05 September 2007
- Eco-film festival including a public debate around cycling in Paris: 18 September 2007
- Cycling demonstration organised by *Vélorution Paris* at the Place de l’Étoile: 22 September 2007

However, it should be noted that the qualitative method of “participant observation” here is only employed in a limited manner, as I was far from “immersing [myself] in a culture”, and I did not aim to “grasp the native’s point of view” as would be the case in an anthropological study (Bernard 2002:324). According to Bernard (2002:329), real participant observation is an ethnographic method and requires extensive fieldwork over a period of at least one year.

*Other Sources: (Grey) Literature and Online Sources*

Not only for the theoretical framework, but also for the purpose of obtaining supplementary information and to back up comments of interviewees I referred to secondary sources, such as brochures, books, newspapers, e-journals and discussion-forums and blogs. Due to the novelty of the field of public bikes, there are very few published articles, so that I mainly relied on the willingness of individuals to send me informative material. While media articles help to determine the popularity
of public bike schemes and act as mirror of public discourses, discussion forums and blogs deliver a picture of the trend of public opinion.

**ANALYSIS**

The world of public bikes is relatively new and highly dynamic, so that data gathering was a continuous process up to the very last day of writing, so that the analysis had to be flexible according to new facts and new information. Nevertheless, data analysis followed a certain methodology. For the purpose of analysing the data, the interviews were coded using key statements, namely the advantages of public bikes:

- Public bikes can sensitise local authorities, the urban population and traffic participants for mobility issues in general and cycling issues in particular.
- Public bikes have the potential to attract new cyclists.
- Public bikes can help to build up a cycling culture in which the bicycle forms part of a travel routine.
- Public bikes can contribute to intermodality and combine advantages of private and public transportation.
- Public bikes can enhance the image of a city and foster cooperation and networking among local authorities of different cities.

And disadvantages:

- Public bikes are not a reliable mode of transport and are therefore not suitable for daily commuting.
- Public bikes risk serving as a “green curtain” to conceal persistent unsustainable mobility.
- Public bikes tend to serve economic interests at the expense of ecological concerns.

This process is also called “selective coding“ and is described by Corbin and Strauss (1990:57) as “operations by which data are broken down, conceptualised, and put back together in new ways.” It is selective because I select those categories according to the conceptual framework of ecological sustainable urban mobility. It is only through ordering and conceptualising data that a conclusion can be drawn from the data and recommendations can be given. The coding is crucial for the process of data analysis, which is not only a one-time activity at the end of the research, but actually goes along with data gathering and the formulation of the concept. Along the lines of grounded theory, coding enables the researcher to develop indicators and categories, as the ones listed above (Strübing 2004). Secondary sources are used to back up or to reshape our argument.

The data were analysed using the comparative analysis method, as suggested by Glaser and Strauss (1967), which is believed to ensure the validity of the research (see also Strübing 2004). However, the circumstances of this research as conducted by a single researcher prevent me from fulfilling all the requirements of a
grounded theory approach. Contrary to Glaser and Strauss (1967), Strübing (2004) suggests that data analysis should involve a discourse among researchers, ideally through teamwork. However, Strübing (2004:92) acknowledges changing circumstances of research and supports an adaptation of grounded theory to contemporary social research as, “auch Methoden unterliegen einem permanenten Wandel und – hoffentlich – einer Weiterentwicklung”68.

68 “Methods are also subject to permanent change and – hopefully – to an evolution.”
# Appendix C: 3rd Generation Public Bike Schemes

<table>
<thead>
<tr>
<th>Country</th>
<th>City</th>
<th>Name of Scheme</th>
<th>Operator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Brisbane</td>
<td>To be determined</td>
<td>In planning</td>
</tr>
<tr>
<td></td>
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## Table 2: Cities with 3rd Generation Public Bike Schemes in Place or in Planning

© Eva Helmeth

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The greenhouse effect

1. Solar energy
   The sun’s rays pass through Earth’s atmosphere. Much of this energy is absorbed by the surface and atmosphere.

2. Reflected energy
   Some of the radiation is reflected back toward space.

3. Trapped warmth
   Reflected energy has longer wavelengths that cause molecules of greenhouse gases in the troposphere, the lowest layer of the atmosphere, to move more rapidly.
   The rapid movement of these molecules traps heat in the troposphere warming the planet. This is called the greenhouse effect.

4. Greenhouse gases
   The gases that are affected this way are called greenhouse gases. The main ones are:
   - Carbon dioxide (CO₂)
   - Water vapor
   - Methane
   - Nitrous oxide

5. Global warming
   The higher levels of CO₂, methane, and other greenhouse gases accumulating in the atmosphere enhance the natural greenhouse effect, raising the global temperature.

Figure 9: Graphic of the Greenhouse Effect
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World City Bike: http://www.citybike.newmobility.org