A thesis submitted to the Department of Environmental Sciences and Policy of Central European University in part fulfillment of the Degree of Master of Science

Sustainable Transport in Hungary and Norway

-

A comparative study of environmental considerations in the national transport policies of Hungary and Norway

Bjørnar ERSVIK

July, 2007

Budapest

Notes on copyright and the ownership of intellectual property rights:

(1) Copyright in text of this thesis rests with the Author. Copies (by any process) either in full, or of extracts, may be made only in accordance with instructions given by the Author and lodged in the Central European University Library. Details may be obtained from the Librarian. This page must form part of any such copies made. Further copies (by any process) of copies made in accordance with such instructions may not be made without the permission (in writing) of the Author.

(2) The ownership of any intellectual property rights which may be described in this thesis is vested in the Central European University, subject to any prior agreement to the contrary, and may not be made available for use by third parties without the written permission of the University, which will prescribe the terms and conditions of any such agreement.

(3) For bibliographic and reference purposes this thesis should be referred to as:

Ersvik, B. 2007. *Sustainable Transport in Hungary and Norway – A Comparative Study of Environmental Considerations in the National Transport Policies of Hungary and Norway*. Master of Science thesis, Department of Environmental Sciences and Policy, Central European University, Budapest.

Further information on the conditions under which disclosures and exploitation may take place is available from the Head of the Department of Environmental Sciences and Policy, Central European University.

Author's declaration

No portion of the work referred to in this thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

Bjørnar ERSVIK

Table of Contents

List of Tables

List of Figures

List of Abbreviations

ATAG – Air Transport Action Group

BAA – Budapest Airport

COM – Commission of the European Communities

ECF – European Cycling Federation

ECMT – European Conference of Ministers of Transport

EEA – European Economic Agreement

ENCE – European Network for Cycling Expertise

FEN – Friends of the Earth Norway

GKM – Hungarian Ministry of Economy and Transport

IEA – International Energy Agency

KTI – Hungarian Institute for Transport Sciences

LSC – Logistics Support Centers

MLSZKSZ – Association of the Hungarian Logistic Service Centers

OECD – Organization for Economic Co-operation and Development

PFI – Paper and Fiber Research Institute

SD – Norwegian Ministry of Transportation and Communication

SHT – Accident Investigation Board Norway

SOE – State of Environment in Norway

SSB – Norwegian Central Bureau of Statistics

T&E – European Federation for Transport and Environment

TEN-T – Trans-European Transport Networks

UITP – International Association of Public Transportation

UNEP – United Nations Environmental Program

WHO – World Health Organization

THE CENTRAL EUROPEAN UNIVERSITY

ABSTRACT OF THESIS submitted by:

Bjørnar ERSVIK
for the degree of Master of Science and entitled: Sustainable Transport in Hungary and Norway – A Comparative Study of Environmental Considerations in the National Transport Policies of Hungary and Norway.

Month and Year of submission: July, 2007.

The transport sector is an increasingly large contributor to the rising levels of CO_2 in the atmosphere and source of other environmental problems, such as local air pollution, noise nuisance and destruction of natural habitats. It is increasingly important for countries today to have a sound national environmentally friendly transport policy that can contribute to a sustainable society. This thesis focuses on Hungary and Norway, two European countries which are quite different in their geographical characteristics, social development and transport structure. This research has attempted to look at these two countries as equal in terms of their goals to achieve a sustainable transport policy and to see what future environmental considerations they should include or improve in their national transport policy.

Both the Hungarian and the Norwegian transport policy have outlined a focus on reducing environmental damage from the transport sector and describe their respective situation. The Norwegian National Transport Plan 2006-2015 goes more in depth about every aspect concerning the environment than the Hungarian Transport Policy 2003-2015. However, overall they are both not concrete enough in giving priority to measures that would either reduce private car use or that would give the necessary support to the most environmentally friendly modes of transportation for changes in the modal shift. Nevertheless, some transport related aspects show to have a better environmental focus in one country than in the other, and the other country should be able to learn from that experience in the end.

Keywords: environment, transport policy, Hungary, Norway, sustainable transport

1 Introduction

1.1 Background and objectives

Transport policy has always been an important guidance instrument made by governments in order to set up the national transport structure. Environmental degradation in relation to transport has been an increasing problem over the last decades and environmental considerations are gaining more and more attention in national transport policies. To create a sustainable transport system is the goal that all transport policies should pursue, but the current trends of an economically growing society are making it hard for decision makers, who will have to use creative measures in order to make more environmentally friendly transport policies.

This thesis focuses on the environmental considerations that have been made in the Hungarian National Transport Policy for 2003–2015 and the Norwegian National Transport Plan 2006-2015 and discusses what the current considerations and measures are and how effective they are in the transport system. The aim is then to find out what priorities should be established and what measures should be used in order to minimize the environmental impacts of transport activities and, also, whether there is anything that Hungary and Norway can learn from each other that will work as useful recommendations in order to improve their sustainable transport policies in the future.

Hungary and Norway were chosen as case studies for being two quite different European countries with different geographical and social characters. The approach has been to try erasing all the differences and look at the transportation systems as they are and with equal opportunities. The Hungarian and Norwegian national transport policies are very different in their descriptions of backgrounds for their priorities and in their overall length, but in terms of sustainable transport solutions they are both trying to explain and achieve the same.

1.2 Structure

Following the introductory section, chapter 2 provides the literature review which first focuses on the overall issue of creating a sustainable transport policy and on the transport sectors' contribution to the changing global climate. The relevant literature has been identified and used to explain what environmental considerations a transport policy should include in order to be sustainable. This section starts with a focus on urban issues, such as an integrated land use and transport planning, together with parking management and economic incentives, public transportation and alternative modes of transportation. Further on the improvement of the modal shift is the important issue, with regard to road, rail, water and air transport. The importance of intermodality is also described before looking at operational practices and technological improvements as measures to help make progress for the overall transport system.

Chapter 3 describes why this thesis is a comparative study in policy research and what methods where used in the process, the period of preparation, the research and the recommendations this should lead to. In the end it describes the delimitations and limitations that have shaped this thesis. Chapter 4 gives a brief outline of the Hungarian and Norwegian transport structures, presents the two countries' geographical position and topography and provides a glimpse into their different transport mode networks. Chapter 5 discusses the environmental considerations of the Hungarian and the Norwegian transport policy, following the same structure as does the literature review, while chapter 6 provides conclusions and gives recommendations based on the research findings.

A list of references and a list personal communications with representatives of the organizations that were interviewed can be found as a last part of this thesis. Annex I contains maps of Europe, Hungary and Norway.

2. Sustainable transport policy

Effective transportation systems are a necessity in the contemporary world and very important for human development, but they are also causing a lot of environmental externalities. (Feitelson and Verhoef 2001)

Environmental externalities from transport have long been recognized and, according to Feitelson and Verhoef (2001), transport has been seen as a major source of pollution, even though it did not receive much attention in the 1970's environmental policies. Improving awareness of the transport sector's impacts on the environment has been a process that has been rising since the early 1970's. As Masser *et al*. (1992) point out, this can be seen in the growing number of rules and regulations related to transport systems over the years and also by the importance environmental issues have gained in transportation analysis. Nowadays though, the trend is to change from focusing on regulative measures to using more market based economic instruments. (Feitelson and Verhoef 2001)

During the last 30 years, the transport related policy making has also shifted from focusing primarily on growth issues to focusing on equity issues and sustainability. This has broadened the policies' assessment of environmental impacts and the possible solutions identified in order to deal with them. (Masser *et al*. 1992) In the 1970's, the environmental impacts addressed were the physical effects of transport such as air pollution, noise, vibrations, aesthetic nuisance and energy consumption and policy measures were described to mitigate these problems. (Feitelson and Verhoef 2001)

The later broadening of environmental impacts being addressed is in line with the overall shift in environmental policy which is focusing on sustainable development. This generally means to use long term perspectives and a larger selection of goals to achieve. Sustainable transport has become the most important keyword in describing modern transport policies. (Feitelson and Verhoef 2001) The criticism of sustainable development, hence sustainable transport, is laid down by Dryzek (1997) in terms of its ambiguity, as the author thinks that it is hard to take that concept and integrate it into tangible policies. Its wide variety of definitions makes it easy for

policymakers to declare their policies to be sustainable. The concept is referred to in almost any transport and environment related policy.

The question regarding the practical implications of sustainable transport are today at the forefront of the policy discourse regarding the transport – environment interface. There are a wide range of objectives for the policy makers to keep in mind. According to Feitelson *et al*. (2001), many policies only try to use a small set of measures to target a limited set of objectives and that this is in many ways insufficient for dealing with transport related environmental problems. Many studies reach the conclusion that the most successful approaches are to make policy packages where a lot of measures are being used to target a wider specter of objectives. (Feitelson *et al.* 2001)

2.1 Global warming

One of the main global environmental problems is the release of greenhouse gases leading to global warming. According to Whitelegg (1993) and Veen-Groot and Nijkamp (2001), the transport sector accounts for around 20% of the total amount of the world's total release of greenhouse gas emissions. The main greenhouse gas is CO_2 and various sources state that the contribution of CO_2 emissions to the atmosphere from the transport sector is significantly high. (Whitelegg 1993; Veen-Groot and Nijkamp 2001) In Europe, the European Commission's (2000) green paper on security of supply to the energy sector showed that the transport sector was responsible for 28% of the CO_2 emission and the emissions are expected to grow with as much as 50% until 2010 if the current trends in the transport sector continue.

The increased traffic leads especially to congestions of urban areas, which in turn leads to more air-pollution. Frequent short journeys with the engine cold require a lot more fuel consumption per kilometer compared to longer travels. (COM 2001) According to the Commission of the European Communities (2001), emissions from short urban travels are three to four times higher than from longer travels, while the traffic speed is three to four times slower. From the transport sector the urban transport accounts for 40 percent of the CO_2 emissions. (COM 2001)

Reduction of CO_2 emissions from the transport sector relies heavily on the regulation of road transport. According to the International Energy Agency (2001), if one of their member nations, such as Hungary and Norway, reduce fuel consumption in the road passenger and freight sector with 10 %, this would account for a total reduction of 9-11% in the entire transport sector of that respective country. Reducing fuel consumption with 10 % in the water and rail passenger or freight transport would only reduce the total consumption with around 1%.

2.2 Land use planning

There is a great need for integrated transport and land use planning. In the last fifty years there has been an increased urban sprawl in most of the developed countries and later also in transitional countries. Suburban construction of roads and a mass availability of private cars have led to a greater personal mobility, as people are now working and having their leisure activities farther away from their homes. (McEldowney *et al*. 2005) The urban sprawl has led to a rising demand for mobility at the expense of the environment and livability of cities. The governments' responses have often been to increase the road infrastructure, which in turn, generates even more traffic. (Maat 2001) Land use planning should instead be aiming at reducing the need to travel and to shorten the distances people need to travel to carry out their daily activities. (McEldowney *et al*. 2005)

The Commission of the European Communities' Green Paper on the Urban Environment (1990) focused on building more compact cities with a mixed use of the land and denser development. A compact city strategy will contribute to sustainable transport by creating less need for travels by car, which will reduce fuel consumption, creating support for public transportation, walking and biking by ensuring that people live closer to their activities and services needed and a renewal and restoration of the inner urban areas. (McEldowney *et al*. 2005) However, as Maat (2001) show from a study in Netherlands, the implementation of this compact city policy is difficult and there are a lot of obstacles. The rising number of people who can afford to live in suburban areas will prefer to do so, which means a longer travel to work and leisure activities, as a tradeoff for being able to live in a nicer home and environment. The typical suburban people travel ever more complexly and have a greater need for individualized transportation. (Maat 2001)

Even though a change in the land use planning would not make any big sudden improvements for the environment, it is important to keep it in mind and land use change has maybe the greatest potential for reductions of CO_2 emissions from transportation in the long term. (IEA 2001) The overall objective for urban transportation should be to increase the ratio between the average kilometers traveled per person and the average kilometers driven per vehicle. (Feitelson *et al*. 2001) This is an objective that will need numerous different measures to act together with the land use planning.

According to Gwilliam *et al*. (2004), in a study for the World Bank, the demand for individual traveling is often dependent on the cost of movement. More subsidies for private or public transportation will increase the length of trips, because it makes it affordable for people to reach new destinations. It is essential to define the place of the car in the urban environment and limit the car use, especially by shifting from individual transport to more sustainable modes of transport. (Maat 2001)

2.3 Economic incentives

There are a number of ways to limit private car use by using economical incentives. The direct forms would be to introduce road congestion pricing by collecting tolls at the cities suburban/urban boundaries. This will both generate revenues to cover for some of the externalities that traffic causes and reduce the numbers of vehicles traveling between the suburban areas and the urban areas. (Gwilliam *et al*. 2004) An indirect economic incentive to limit car use is to set the fuel prices high. This would create more awareness among car owners about choosing their number of trips and length of travel more carefully. (IEA 2001) The cost of parking in the city is also an expense for car users that will influence their choice of transportation means. Therefore, these costs define the economical attractiveness of the private car travel versus choosing other modes of transportation. (Gwilliam *et al*. 2004)

2.4 Parking management

Parking policies can also mean limitation of parking spaces in the city centre in order to limit car use. In addition, time limits and high charges for long time parking can be implemented to avoid

commuting, as well as high fines for parking violations. (Gwilliam *et al*. 2004) Employers in the urban centers should be encouraged to come up with incentives for their employees not to drive their car to work. For example, as a cash-out system where employees get money not to drive solo to work. Employers would then earn money from the government for leasing out parking spaces that can be parked at for a higher fee by other people. (IEA 2001)

The limitation of parking spaces in the city centers often needs alternatives like "park and ride" facilities at inter-modal stations outside the urban centers. To be attractive they need to be well accessible from larger roads. Through these "park and ride" facilities, private cars become an important feeder into the public transportation system. (UITP 2000b) The "park and ride" facilities can especially reduce the number of commuting cars going into the city centers. But there is of course the need for a good quality public transportation system in connection with these facilities. (McEldowney *et al*. 2005)

2.5 Public transportation

Improvement of the quality of all aspects of public transportation is crucial for maintaining a sustainable urban environment. A good public transportation system can function as a backbone for the urban community and be influential in the design of both the urban areas and the settlement as a whole. (Marshall 2001) There should be a maximum walking distance of 800 meters between new developments and the closest public transportation station. (McEldowney *et al*. 2005) As Marshall (2001) states, "the attractiveness of public transport is determined as much by the quality and convenience of access to and from it as by the quality, frequency and reliability of the services themselves."

The quality of the public transport service depends a lot on the frequency and reliability of the systems carriers. For trams and buses there is often congestion on their routes and a number of options are possible to make them preferred in the overall traffic. Physical blockage to stop cars from driving on the tram tracks or parking too close is one measure that can help eliminate delays. (UITP 2000a) The development of public transportation lanes for buses both inside and outside the city on congestion affected roads is one way to make the public transportation more attractive in terms of reduced time travel, especially during traffic peak hours. These public

transportation lanes can also be transformed to high occupancy lanes which taxis and cars with two or more riders can use during the peak traffic times. (IEA 2001)

One approach for improving the quality of public transportation used by the Commission of the European Communities (2001) is ticket co-ordination, which makes the system more integrated, together with transparent pricing for the users. In some cities the number of people taking public transportation has risen with 10 percent over just a few years by having integrated tickets and by providing better inter-modality for the system. (UITP 2000a)

The location and visual design of the stations for busses, trams, light rail and metros can boost the attractiveness of traveling by public transportation. (Marshall 2001). For the "park and ride" facilities the location should be secure and well managed, offer access to fast and frequent public transport services, have comfortable waiting areas, and provide good information. (UITP 2000b) In many cities around Europe investments in architecture have led to decoration of public transportation stations with art to enhance the attractiveness of the system and to create a modern dynamic environment for the passengers. (UITP 2000a)

2.6 Alternative modes of transportation

In sustainable urban transport terms there is a potential for biking, especially as an alternative for the shorter car travels. (ENCE 2003c) The bicycle is, according to the Commission of the European Communities (COM 2001), too often neglected as a mode of transportation in national policies. This is often because the use of the bicycle as functional transportation is limited to travels over shorter distances. (Asperges 2003) However, according to European statistics, half of the urban car travels are less than 6 kilometers. Therefore, the potential of car travels that can be switched to biking should be huge. (ECF 2007)

Biking is, however, dependent on getting a strong position in the national transport policy and on having good quality local biking policies. Asperges (2003) explains that bicycle use and biking policies are very much interdependent on each other. When nobody bikes or feels the need to bike there is little demand for good quality biking policies and biking gets a low priority in the national and local transport strategies. But with a continuous strong position in the transport

policy, trends in Europe show that bicycles keep a growing place on the streets, in the collective memory, in the culture and in the policy. (Asperges 2003)

As noted with biking, pedestrians also tend to be neglected in transport policies. (DETR 2000) In fact, taking into account that around 10 percent of all car travels are less than 1 kilometer (ECF 2007), there should clearly be a mission to get the shortest car travels over to more environmentally friendly modes like biking and walking. The shorter a car journey is the more pollution is emitted per vehicle kilometers. (ENCE 2003a) Walking contributes to a more vibrant community and if more people walk on the streets, the latter become safer for everyone. Walking can also improve people's health and, in that way, contribute to a healthier society. But there is a need for transport policies to take into account all the positive effects of walking and make it a higher priority to make the streets clean, comfortable and safe for pedestrians. Today the trend is that cars are dominating the urban society, emitting more pollution and creating a stressful environment that does not encourage walking and this trend has to be reversed. (DETR 2000)

2.7 Improving the modal shift

The transport sector has been dominated by road transport in the last decades in both personal and freight -transport. The economic growth in Europe has given a rapid increase in road transport and the pressure has led to huge spending on road infrastructure compared to other modes of transportation like railways and waterways. This has given competitive advantages for road transport which is now causing the transportation sector a lot of congestion problems, which creates extra pollution especially in urban areas. But road transport is also causing other external costs to the society and environment by depletion of fossil energy sources, air pollution, noise nuisance and fragmentation of the landscape. (Twaalfhoven and van Ham 2001) This is in line with the Commission of the European Communities (2001) assumption that Europe will also lose economic competitiveness due to congestion. Their findings show that the price structure of transportation fails to reflect all the costs of infrastructure, congestion, environmental damage and accidents and this has led to a larger growth in road transport over other modes. (COM 2001)

One of the main ways to make transportation more environmentally friendly for the future is to have effective charging of the different transport modes based on their external costs. (COM 2001) The European Federation for Transport and Environment (T&E 2004) is in favor of users paying an exact cost of what their transport use costs are to society. This means "that every user pays a variable amount, based on distance traveled, mode of transport used and its environmental performance, time of day and place of travel". (T&E 2004) This level of accuracy would need a lot of information and resources and is very hard to implement and is, therefore, one of the most debated topics in the transport sector. (T&E 2004)

2.8 Railways

The Commission of the European Communities (2001) stresses that railways have a major potential in transportation and that a revitalization of the railways will be the key to a modal shift towards more environmentally friendly transport. Nevertheless, there are a lot of problems that are holding back railway developments that need to be resolved. The infrastructure needs to be modernized and made suitable for interoperability between networks and systems, transparency of costs and more reliable services. More room for competition between railway operators will also make railways more competitive compared to other modes of transportation. (COM 2001)

According to the Commission of the European Communities (2001) the share of freight transport by train has fallen from 21 percent in 1970 to presently being around 8 percent. Though the volume in freight has not grown very much, during this period there has also been a large increase in the length of the transportation of goods; consequently, overall the road transport has taken over a much bigger share of the freight market. (ECMT 1991) The European Union's target is to increase the overall goods traffic on rail from 8 percent to 15 percent by 2020. (COM 2001)

2.9 Waterways

Transport by sea and inland waterways has a history going back several centuries, but has lost its competitiveness due to being more expensive than rail and road. Some criticism for inland waterways and sea transport is also that it creates fewer jobs, due to the fact that it can carry

more loads in one shipment than road transport, in particular. (ECMT 1999) But as the round table discussion at the European Conference of Ministers of Transport (ECMT 1999) notes, this sector cannot simply wait for the cost of other modes to rise. Policy initiatives are urgently needed, together with the efficient promotion of the use of waterway transportation.

Apart from the economic aspects of making the more environmentally friendly modes competitive compared to road transport, there is a need to turn intermodality between the modes into reality. (COM 2001) The Commission of the European Communities emphasizes the importance of technical harmonization and interoperability between systems. This is primarily a responsibility for the authorities, who are to stimulate co-operation between waterways operators, between transport modes, and between carriers and charters. (ECMT 1999)

For inland waterways the ports are by far the most expensive aspect of shipping. According to the European Conference of Ministers of Transport (ECMT 1999), the decisions of construction and need of multimodal facilities should be in the hands of the private sector and investors. There is a need for a better network of ports and, especially on the Danube there is an urgent need for improvement of technical operating conditions. (ECMT 1999)

2.10 Air Transport

Air transport has had the most remarkable increase of all the transport modes over the last two decades and is still increasing rapidly. It is predicted by the Commission of the European Communities (2001) that the growth in air traffic can be expected to double every ten to fourteen years. This growth in importance as a mode of transport has brought aviation more into the debates of environmentally friendly transportation. (Button 2001)

Traditionally there have mostly been concerns about infrastructure related problems, such as noise, local air pollution and groundwater contamination, but presently, air transport is also seen as an increasing contributor to global air pollution and global climate change. (Button 2001) Air transport is globally responsible for 12 percent of the CO_2 emissions coming from the transport sector, which represents around 2 percent of the global CO_2 emissions. (ATAG 2000)

Air transport has always been one of most heavily regulated transport modes. However, considering this impressive sector growth, the regulations are becoming more relaxed. The opening for privatization of airline companies and more relaxed economic regulations have made the sector more driven by commercial considerations and the concern is now that the wider social interest will be neglected in decision making about aviation. (Button 2001)

The growing number of aircrafts has led to problems of saturation in the skies and congestion at the airports. Air traffic also suffers from having to adapt and make flights longer than necessary due to individual national rules of the countries they are flying over, such as the position of military zones, or simply by lack of coordination between countries regarding the vertical position over different areas of land. (COM 2001)

This is the most significant problem that needs to be solved within the air-transport sector. It is one of the European Union's top priorities to try and create the Single European Sky, so that more efficient paths can be made for both short and long distance air-travels. (ATAG 2000; COM 2001) According to ATAG (2000), savings of 8-18 percent of fuel could be achieved if governments cooperate and manage to establish the necessary institutional frameworks, to improve operational procedures and air traffic management.

To deal with noise nuisance from air traffic, it is especially important to ban so called hushkitted aircrafts, which are aircrafts that have been improved, but still do not live up to the acceptable standard. (COM 2001) Other incentives that have been tried, according to Button (2001), are to give airline companies permits for noise emissions, enabling them to then trade these permits amongst each other. Money earned by charges should be used to further improve noise isolations for affected areas. ATAG (2000) says that aircrafts have become 75 percent quieter during the last 30 years, due to technical advancement. There should also be curfews at airports to minimize the noise during evening and nighttime depending on how close the airport is to settlements. If necessary to fly at night, there should be stricter limits for noise levels and the flight paths should be directed so as to cause the lesser nuisance. (Button 2001)

Emission charges are a flexible incentive to use and therefore seen as the best way to limit pollution. They would also encourage the industry and airline companies to perform better in

environmental terms. Nonetheless, in order to set the charges, one also needs to know how sensitive they are in order not to break down the current aviation structure. (Button 2001)

Fuel taxation can also keep the airline companies and the industry more environmentally conscious. (Button 2001) Still, so far, the growth in air-traffic is predicted to be larger than the technological improvements of fuel efficiency. ATAG (2000) states that the fuel efficiency has doubled during the last 30 years and it is now improving by 3 percent each year, however the growth in air-traffic is around 5 percent per year.

2.11 Intermodality

Shifting the modal balance needs good quality inter-modality between the modes. The biggest missing connections are between sea, inland waters and rail in order to make them more competitive. Good railway access to ports is especially important for making the modal shift in freight transport. (COM 2001)

In freight transport the logistics centers are one very important factor for linking up the modes. They can also increase the volume of vehicle loads and, with better logistic systems that ensure more effective transport, huge savings in emissions could be achieved from reductions of vehicles traveling without goods. (IEA 2001)

For freight transport there will be an increasing importance of raising the volume per kilometer driven. Telematic logistics systems will be a tool to improve this and to calculate better routes for the shipping of goods to make it more efficient. (IEA 2001)

Integrated ticketing is also an option for linking up the modes of transport for passenger travels. The biggest airports should rely on commuting most of their passengers to the nearby cities by high speed trains instead of motorways. This is in place in a lot of major cities in Europe. The efficiency of this service is also dependent on being practical for passengers carrying a lot of luggage, thus being close to departure and arrivals terminals. (UITP 2000a) Some airline companies are currently also offering a discounted ticket for trains in their flight offers at certain destinations with other cities not so far from the airport city. (COM 2001)

2.12 Operational practices

The Commission of the European Communities (2001) talks about making transport policies that put more emphasis on the users and their well being and that reduce the numbers of accidents. Road transport is by far the most dangerous and costly when it comes to transport related accidents. In Europe, the death tolls from road accidents are comparable to a medium size airplane crash, every day. Therefore, road-safety should be a prime priority in any transport policy. (COM 2001)

The fear of accidents is a major obstacle for the promotion of biking. Surveys referred to by the European Network of Cycling Expertise (2003b) show that half of the people questioned would choose to bike on short distance travels if the roads were to be safer for cycling. For bikers, the highest reduction of accidents comes from creating own bike-lanes. Increasing the number of bikers in urban areas also creates more awareness from the drivers, so that it becomes safer to bike. Studies show that accidents per biker are far lower in high density biking countries like Denmark and the Netherlands, compared to low density biking countries like the United Kingdom. (ENCE 2003b)

The management of speed limits is gaining more and more importance as the traffic increases, in order to reduce accidents, tackle congestion and, thereby, reduce greenhouse gas emissions. (COM 2001) Lower speed limits are also important for pedestrians and bikers, making the risk of high speed impact accidents reduced. (ENCE 2003b) Unfortunately, public pressure for faster mobility tends to increase the speed limits. Lowering the speed limits is something that can both save lives and have environmental benefits, but this is one of the hardest operational measures to implement due to the heavy opposition. (IEA 2001)

Better enforcement of the existing speed limits is usually a more politically accepted measure. In many countries the problem is often that 70-80 percent of the vehicles travel above the set limit. Studies show that better respect of existing speed limits can decrease fuel use by 5 percent. This can be dealt with by harshening traffic control measures, such as traffic radars or laser controls. Automatic traffic controls that do not require manual labor have also become an attractive method for law enforcement on roads known for a lot speed violations. (IEA 2001)

Another important aspect that can reduce both accidents and congestion is represented by technologies for communication with the drivers. These display boards on the side of the road can provide information to drivers about the current speed limit, determined by the flow of the traffic, road features, and weather conditions. (COM 2001) In the longer term there will be possibilities to get this information directly to the driver on board the vehicle through on-board communication systems. Projects funded by the European Commission are working on so called urban drive control, which would make it possible to control the cars' upper speed limit by transmitting information to the vehicles' cruise control. (IEA 2001)

Downtown centre areas are particularly sensitive to the increasing traffic and congestion is a big problem due to numerous road intersections. These intersections are usually guided by traffic lights and the co-ordination and timing of traffic lights intersections is a very crucial measure to reduce congestion. (IEA 2001)

Better education of drivers is, of course, also something that should be mentioned as a factor for reducing accidents. Many drivers need to learn how to drive more defensively and to better handle difficult situations, e.g. driving in bad weather. (COM 2001) Better education of drivers can have environmental benefits as well. In some countries drivers, and particularly young drivers, have the possibility to participate in course aimed at educating people in what to look for while choosing a car, how to drive more economically and how to maintain the car while keeping low fuel consumption in mind. (IEA 2001)

2.13 Noise

Transportation is the main cause of noise as environmental pollution. What constitutes the annoyance level of noise varies based on people's perception, since there are groups of people that are more vulnerable to noise than others. (WHO 1999) The World Health Organization's Guidelines for Community Noise (1999) set 50 dB as the level of annoyance for humans. The recommended night time noise for an undisturbed sleep is no more than 30-35 dB on an average and it should not exceed 45 dB at its maximum. (UNEP 2007)

For all type of vehicles, the bigger and heavier they are, the more noise they make. For road vehicles, the engine and the friction between the vehicle and the road and the air are the main sources of noise. (WHO 1999) According to WHO (1999), the level of noise from railways are mostly generated by the speed of the train, but it also depends on the type of engine, the cargo and on the state of the rails that it is driving on. For urban areas, the problem with railways is often related to the curving of the tracks that make a loud and very high frequency squealing sound. At train-stations, as well, there might be excessive levels of sounds from running engines, whistles and loudspeakers. (WHO 1999)

A reduction in speed from 60 km/h to 50 km/h would reduce noise pollution by 2 dB. Friction noise for new cars is also exceeding engine noise at 60 km/h. (WHO 2007) There is clearly a need for regulatory instruments to control speed limits in areas affected by traffic noise. Bigger fines would make the drivers behavior more careful at keeping speed limits. In addition to speed limits, the friction between the road and the car is generated by the tires. More research on noise reducing tires could be given through economic subsidies. The same should apply for less noise generating porous asphalt that is being developed. (Stortinget 2007)

2.14 Technological improvements

Passenger transport has the biggest saving potential for CO_2 emissions. (IEA 2001) Many cost-effective technologies to reduce fuel consumption in light-duty vehicles are available on the market at the moment. Newer cars are overall more fuel efficient than older cars, but even in new cars there are differences and there should be policy incentives to affect the consumers' choice to favor the most fuel efficient cars instead of heavy fuel consuming cars. (IEA 2001)

One of the most direct incentives is to apply extra tax fees on high consumption cars and to offset this by giving rebates to the tax of low fuel consuming vehicles. This could also be applied in the case of registration fees and yearly road taxes. The average prices for cars overall and the tax burden on consumers would then stay the same. (IEA 2001) This would favor cars with new technology, such as hybrid cars. Another economic incentive to make people choose more fuel efficient cars is to set the fuel prices high. This would encourage people to choose more cost efficient cars. (IEA 2001)

It is, however, important to regularly organize good official national inspection programs of the vehicle fleet and to have a good retirement program for old vehicles that are performing much worse than the average in fuel economy. (IEA 2001)

Policies for more energy efficient technology in vehicles should be encouraged. One of the main areas for improvement is in the deceleration and acceleration rate. Cars with automatic gear shift are usually optimized for low engine revolutions (rpms), but cars with manual gear shift should also be limited to lower rpms. Cruise control is a feature that helps the car keep an even speed on motorways. Lots of cars now also have the possibility to display the fuel economy to teach the driver how to maintain an optimum driving. Tire pressure is another technological feature than can be included in most cars today (IEA 2001)

2.15 Alternative fuels

Alternative fuels are getting increasing attention in the work of reducing emissions from the transport sector. R&D work is continuing to come up with new solutions for alternative fuels, but there is still a long way to go. (COM 2001) In OECD countries, conventional fuel from crude oil represents 99 percent of all fuel (69 percent gasoline and 30 percent diesel). And this has not changed much during the last 50 years. (IEA 2001)

Many European cities have already started to run their urban public transportation buses on natural gas or bio-diesel and several European countries have started developing refueling infrastructure for alternative fuels. (COM 2001) However, not all alternative fuels reduce CO_2 emissions when we consider the fuels path from "well to wheel". (IEA 2001) This is due to the energy intensity in the manufacturing process and the transport of the fuel. The most promising alternative fuel in terms of reducing greenhouse gas emissions is hydrogen, while used in very efficient fuel cells. This technology is still very expensive and not ready for the commercial market. Bio-diesel, methanol and ethanol from cellulose plants can reduce CO_2 emissions with more than 50%. (IEA 2001)

The European Union wants a stable and gradual increase of alternative fuels onto the European market. The objective is to require a minimum of bio-fuel consumption of 2 percent and then

increase this to 6 percent by 2010. (COM 2001) The most efficient way to increase the bio-fuels' share into the market is to blend alcoholic fuels, methanol or ethanol, with regular gasoline. Most of the engines today can handle a percentage of up to 15 percent ethanol mixed with the gasoline. (IEA 2001)

Longer term targets for alternative fuels are to increase the percentage of consumption to 10 percent or 20 percent, which is the European Unions target. (COM 2001) Currently, the price of alternative fuels is not competitive with the price of conventional fuels and it is therefore hard to get good shares of the market for bio-diesel and other bio-fuels that can not be blended into gasoline. (IEA 2001) The European Union proposes tax reductions for bio-fuels to make it competitive. (COM 2001) But there is also the need for the adjacent refueling infrastructure in order to start to create a demand for cars with alternative fuel technology. On the one hand, alternative fuels will not be a viable option if people have to search too much and too far for an adequate refueling station. On the other hand, refueling stations also need customer demand before they invest money in setting pumps fr alternative fuels, so the policy obstacle is to figure out this "chicken and egg" problem. (IEA 2001)

Electrical vehicles have been on the market for quite some time, but it has not become a very big success. It is also dependent on good re-charging infrastructure and better battery cells than can increase the length of travel. Electrical vehicles have a great potential and if they run on electricity coming from nuclear power or renewable sources, the overall emissions are almost zero. (IEA 2001)

2.16 A perfect sustainable transport policy?

The environmental considerations mentioned in this chapter describe what is needed to make a good sustainable transport policy, but no two countries are completely similar, so every transport policy has to focus on the countries' own characteristics of the transport structure and their own social and economic development. In order to make a very good transport policy, it is necessary to conduct many studies of the specific potential of every country, as they have to decide for themselves what their best possible strategies are. This thesis attempts to find out what Hungary and Norway can improve in their transport policies in order to take better care of the environment and if they can learn from each other.

3 Methodology

This chapter provided details about why this thesis is a comparative study in policy research and identifies what methods were used in the process, the period of preparation, the research and the recommendations this should lead to. In the end it describes the delimitations and limitations that have shaped this research.

3.1 Comparative method

This thesis is a comparative study of environmental considerations in the most recent national transport policies and strategies of Norway and Hungary. Comparing countries can, according to Teune (1990), be "a way of understanding the 'best' forms of political organization to realize general values, such as achieving secular goals of […] designing policies to solve problems".

In public policy studies, qualitative research of case studies is one of the most common methods used. (Stake 2000) The research is an in-depth analysis of the topics comprised in the transport policies of Hungary and Norway that concern the environment. A qualitative research into these topics would be the best way to look into the different countries' policies to find out what the alternatives might be. It should then also be possible to achieve the goal of providing recommendations for future policy decisions based on the outcome of the qualitative research. (Majchrzak 1984)

3.2 Policy research

Policy research, as used in this thesis, is defined by Majchrzak (1984) as "the process of conducting research on, or analysis of, a fundamental social problem in order to provide policymakers with pragmatic, action-oriented recommendations for alleviating the problem".

In table 1, Majchrzak (1984) presents four different types of research processes. They are divided according to their low or high action orientation and their technical or fundamental focus. The policy research process has a high action orientation, meaning that the outcome should be useful recommendations for decision makers, who should deal with these results as soon as possible.

The focus of such research is placed on a fundamental issue, which is a broad topic and has consequences for many people. All actions regarding fundamental issues such as environmental problems should undergo critical examination and this makes it more probable that the most appropriate measures are up for recommendation. (Majchrzak 1984)

Table 1. Research process affecting social problems (Majchrzak 1984)

		Focus	
		Technical	**Fundamental**
Action – Orientation	**Low**	Policy Analysis	Basic Research Policy Analysis
	High	Technical Research	Policy Research

3.3 Research preparations

In order to prepare for a policy research, it is necessary to acquire a satisfactory understanding of the topic to decide how the research process should be conducted to get useful findings. (Majchrzak 1984) This was achieved here by writing the literature review, in order to get an idea of what the best transport policies should be like and to identify which issues need more research in relation to the effects on the environment.

The Central European University (CEU) library was the main source for book literature and the university's access to databases such as, EBSCO and JSTOR was useful in finding relevant journal articles. Internet has also been a useful source for this thesis, especially in obtaining official documents from the Norwegian government, the Hungarian government and the European Unions databases. Other internet sources have also been helpful and the credibility and authenticity of the internet sources have been examined very carefully. The list of books, journals, publications and internet sources used can be seen in the list of references.

3.4 Interviews

Transport related environmental problems are complex social issues and, as Majchrzak (1984) points out, the policy making process related to social problems is often as complex as the social problem itself. The reason is that it involves a lot of different actors operating at various policymaking levels and using different policy mechanisms.

To further deepen the understanding of the current policy and strategy in both countries, personal interviews were conducted with experts on transport related environmental problems. To try get the best view of the policies, sampling of interview objects was done on the basis of having both environmentalists and policymakers heard. The interviewees belonged to environmental organizations, transport sector authorities and transport science institutes.

The interviews were semi-structured. They were conducted by asking open-ended questions, to allow interviewees to express their views freely, and they focused on the same topics and involved the same similar issues in every interview. This interview structure also allowed the person being interviewed to lead the discussion in the direction he/she wanted and to go as in depth as wished. (Punch 1998)

The interviews were personal communications, conducted face-to-face at the interviewees' preferred location. The interviewer took notes and used a Dictaphone to record every interview, whenever the permission was given to do so. The people who were interviewed in Norway were questioned and gave their answers in Norwegian. The interviews in Hungary were conducted in English. The interviewees were answering on behalf of their organizations and more people in the same organization gave answers. Some answers could also be found in unpublished or internet material referred to by the interviewees and this was also used in addition to the interview answers in the discussion. The referencing in the text is to the organization of the interviewees, and all these and links to their sources can be found separate from and after the reference list, in a list of personal communications.

The information gathered from the interviews is used in the discussion of this thesis as something close to what Majchrzak (1984) referred to as "focused synthesis". The policy research using focused synthesis is close to writing a literature review by using already existing

research material relevant to this thesis. But the main difference is that the synthesis method "might include discussions with experts and stakeholders, congressional hearings, anecdotal stories, personal past experience of the researchers, unpublished documents, staff memoranda, and published materials." (Majchrzak 1984)

3.5 Recommendations

As earlier mentioned, the policy research outcome should be giving useful recommendations for policy decision makers. The conclusions of this paper are structured in a similar fashion to the content of the literature review and the discussion and the recommendations are written in each paragraph where appropriate.

3.6 Delimitations and limitations

The Hungarian and the Norwegian transport policies have not been in force longer than respectively 2003 and 2006, so the research and discussion in this paper are mostly concerned with statements and recent related trends based on the findings rather than actual statistics and effects from this period. The economics of transport policy is a very important aspect, but, due to time constraints, this paper is not going in depth with monetary values of budget spending and is only focusing on funding in a very overall way. Pipelines are also considered a mode of transportation, especially for natural gas and petroleum, but this mode of transportation is not given any attention in this paper as it is very sector specific.

A limitation when writing the thesis at CEU is the time constraints on the writing period laid down for the master program. The research during summer has sometimes been conflicting with various wanted actors' holidays. The environmental policy focus on a topic like transportation is quite recent and it is a topic that changes fast, therefore the selection of literature from the library has been limited. A lot of the information found on the internet about Hungary has only been in Hungarian, which has made it difficult for a non-Hungarian speaker to interpret.

4 Country profiles

The two countries that were chosen for this research, Hungary and Norway, are quite different in geographic positions, area covered, topography and socio-economic structures. This chapter aims at giving a description of the two countries, of their transport structure and the recent changes and trends in their transport policy and politics in order to better understand the discussion.

4.1 Profile of Hungary's transport structure

Hungary is located in the central region of Europe. The maps of both Hungary and Europe are to be found in Annex I of this thesis. Hungary became a member of the European Union on May 1, 2004 (GKM 2004). There are approximately 10.2 inhabitants (Joo 2004) living in a country covering 93.030 square kilometers. Apart from a few mountainous areas, covering around 5 percent, the country is relatively flat. The highest peak is 1014 meters above sea level. (Hungary.hu 2007) Hungary is neighboring 6 countries (Austria, Croatia, Serbia, Romania, Ukraine and Slovakia) and does not have direct access to any sea. The river Danube, however, gives access by inland water-transportation directly to the Black Sea and to the North Sea through the Danube-Rhine-Main (DRM) canal. (Joo 2004)

The Hungarian branch of the Danube is 417 kilometers long. The total length of inland waters in Hungary is 1.373 kilometers. (Fleicher 1998) The other main river in Hungary is the Tisza River and some inland water transportation takes place on Lake Balaton which has several harbors. (Joo 2004)

The roads in Hungary cover 30.460 kilometers at present. (Joo 2004) Around 28.000 kilometers of these roads were built already during the 1920's. Back then most of the network was made up of dirt and gravel roads. Since the 1950's until today, paving of these roads has been taking place. (Fleicher 1998) 7.092 kilometers are national main roads and 633 kilometers are highways. (Joo 2004) These highways were built during the 1970's to better support the transit traffic to Budapest, both to/from other cities and abroad. Today, the discussions about Hungary's roads revolve around whether to build more highways, for better transit roads through Hungary,

as part of European Networks. There is however a need for better capacity on some main roads and bypasses around settlements. Also, many settlements still do not have paved roads. (Fleicher 1998)

Hungary's railway network is 7.729 kilometers (Joo 2004) and it was more or less completed during the Austro-Hungarian Monarchy in the beginning of the 1900's. Due to its efforts in developing a good rail network, Hungary's quantity and density of railway lines by far exceed the European average today. (Fleicher 1998) The problem is however that only 1.292 kilometers are double tracks and only 2.628 kilometers of the tracks are electrified. (Joo 2004) Therefore, in qualitative terms the Hungarian standard falls short of the average western European countries. (Fleicher 1998)

Air transport does not have a very significant position in Hungarian domestic transport. There are only a couple of airports (Debrecen and Sarmellek) with regional importance and some international traffic. Hungary has only one large international airport, Ferihegy, with two terminals just outside Budapest. (GKM 2004) According to Joo (2004), there are 72 small airports in Hungary, with 34 of them having solid runways. Many airports' future depends on whether the local governments can make them profitable. (Fleicher 1998)

The transport sector is presently governed by the Hungarian Ministry of Economy and Transport lead by Minister Janos Koka. (GKM 2007) The current Hungarian Transport Policy 2003-2015 (GKM 2004) was finalized in 2004 by the Ministry of Economic Affairs and Transport led by the former minister Dr. Istvan Csillag. The transport policy was made during Hungary's accession process to become a member of the European Union and it was necessary to change the former transport policy from 1996 to be more in line with the European Unions transport policy (COM 2001), issued in 2001 for the period ending in 2010. This is a quite difficult task since the Hungarian transport system and its economic development are still lagging a bit behind average levels in Europe. (GKM 2004)

The European Union's White Paper on transportation was revised after a mid-term review in 2006 and the current Hungarian Ministry of Economy and Transportation said that it will be necessary to reconsider the national transport policy in light of this. (GKM 2007) However, the Europeans Union's revised transport strategy has been highly criticized by various

environmental organizations and by the European Federation for Transport and Environment (T&E) for conflicting with the White Paper's own main ideas of modal shift, infrastructure building and economic funding. (T&E 2006; Green10 2006)

In economic terms, the transport sector is very important for the Hungarian economy and for Hungary's position in the international market. The average household in Hungary spends around one fifth of their income on transportation and related expenses. (GKM 2004)

4.2 Profile of Norway's transport structure

Norway is located on a long stretch of land at the outskirts of Europe, close to the Atlantic Ocean. A map of both Europe and Norway can be found in Annex I of this thesis. Norway has a population of 4.5 million inhabitants, the region around the Oslo-fjord is the most densely populated and growing, while the three northern counties have the lowest population density and that is in decline. (SSB 2006) The mainland in Norway is 323 802 square kilometers without the islands of Svalbard and Jan Mayen or any other territory belonging to Norway. The Norwegian mainland's coastline is 25 148 kilometer long (Statkart 2006). Norway aslo shares small borders with Russia, 196 kilometer, and Finland, 736 kilometer, in the northernmost parts of the country and a 1.630 kilometer with Sweden for the rest of the mainland. (Statkart 2007)

The main proportion of the population and businesses in Norway are located near the coast. Transportation by sea has therefore great importance, but later transport policies have shown that sea transports and the ports' position in the overall transport system have not gotten much attention. (SD 2004) There are 57 big ports in Norway. Most of the ports were built during a time when the need for ports was greater than today. Therefore, only 10 of these 57 ports are now declared national ports and 5 ports have been declared regional ports. These ports get more attention, but they only get a very modest amount of attention in the overall transport system. (SD 2004)

The total length of public roads in Norway is 92.863 kilometers. Only 717 kilometers are motorways with 2 or more lanes in each direction. (Vegvesen 2005) The backbone road network which is binding the Norwegian regions together and that is connected to roads abroad is around

8.600 kilometers. The quantity of this main network is sufficient and only improvements of the quality standard are needed. The main discussion today between authorities and environmental organizations is whether to change more of this network to multilane motorways and increase traffic, but hopefully also decrease congestion. (SD 2004)

Most of the railways in Norway were built between 1850 and 1945 and the tracks go no farther than the city of Bodø, not reaching the two northernmost counties. Later building of railway infrastructure has been concentrated around the area of Oslo. (SD 2004) The railway network is around 4200 kilometres and 95 percent of this is represented by single tracks. Only 3 percent of the network can handle speeds greater than 150 km/h. (SD 2004)

Because of outspread population, climatic and topographic conditions and a lack of alternative means for long distance travels, air transport has a more important role in Norwegian transportation than in any other European country. (SD 2004; Avinor 2007) Both domestic flights per inhabitant and the share of goods transportation is five times the European average. (Avinor 2007)

The Ministry of Transportation and Communications is today the governing body of Norway's different transport sector authorities and is lead by Minister Liv Signe Navarsete. The Norwegian National Transport Plan for 2006-2015 (SD 2004) was made during the Bondevik II government in the end of 2003 and beginning of 2004 and the Ministry of Transportation and Communication was then led by former minister Torhild Skogsholm. (Regjeringen 2007)

Norway's membership in the European Economic Agreement (EEA) gives Norway the same rights as EU countries to transportation in the EU. This means that EU regulations also become important for Norway to follow. Around 70-80 percent of Norwegian import and export trade is with EU countries. (SD 2004)

5 Discussion

The main environmental priority of the Hungarian Transport Policy is mentioned as: "developing an environmentally friendly transportation system through environmental measures and preferences for environmentally sensitive approaches". This should also help improve transport safety and minimize environmental damage such as greenhouse gas emissions and noise. (GKM 2004) These issues add to the Hungarian policy's main priorities of completing the infrastructure construction of the Trans-European Transport Networks (TEN-T) in Hungary according to plans and of following the EU transport regulations. (GKM 2004) The building of more motorways in Hungary will require significant funding and these two main priorities strike many as conflicting with each other. (Kazatsay 2003)

The European Union's policy focuses on correcting regional disparities, clearing bottlenecks, reducing congestion, making a shift in the modal balance, in order to place the users at the heart of transport policy and to manage the effects of transport globalization in a way that is socially, economically and environmentally sustainable. (COM 2001) Even though Hungary has a transport system that is a bit unlike the average of Western European countries, the nature of the challenges are acknowledged by Hungary as similar in the long run. The Hungarian Transport Policy identifies its objectives as to create a transport system that is: "economically efficient, modern, safe and easy on the environment". (GKM 2004) According to Kazatsay (2003) the tasks set out by the Hungarian Transport Policy in light of the European Union policy will need much more capital than ever before.

The further statement in the Hungarian policy regarding priorities for operation and traffic management is of an environmental character and states: "Preference for mass transportation over individual means; encouragement of bicycle use; improvement of pedestrian safety and comfort." (GKM 2004) The second statement reads: "In goods traffic, incentives for rail and water transport as well as combined/multimodal shipping methods." (GKM 2004) Rezessy *et al*. (2004), however, criticize the Hungarian transport policy in practice, as being less supportive of road and air transport than it is says it wants to be. The influence of the EU transport policy is believed to have an overall positive effect on the Hungarian transport policy making in

environmental terms according to Hungarian environmental non-governmental organizations. (Levegó 2007)

There has been a lot of liberalization and privatization in the transport sector during the last decade and the market does not voluntarily address environmental considerations, so the state needs to keep strict environmental regulations and enforcement. The Hungarian transport policy lays down that it will continue to hold a leading role in "the regulation and supervision of environmental protection, transport safety, public road transport services and the transportation of hazardous materials." (GKM 2004) The transport policy tries, according to Levegó (2007), to please all actors involved in the decision making process and this has made a weaker policy which is not built on enough concrete measures.

The Norwegian National Transport Plan 2006-2015 (SD 2004) further develops the previous National Transport Plan from 2002-2011. The Norwegian National Transport Plans are usually renewed every four years, so the process of a new transport policy is already under development by all the actors involved with the process. (SD 2004)

The government lays down four main priorities in the current National Transport Plan and two of these are of an environmental character. The first is to ensure fewer deaths and serious injuries from road traffic and maintain high security in other transport modes as well. The second is to get more environmentally friendly urban transport with reduced car travels and increased use of public transportation. (SD 2004)

Norway has many national environmental targets and commitments that are related to the transport sector. The Kyoto commitment is only a 1 percent increase of CO_2 in the period 2008-2012 compared with 1990 levels. The transport sector has increased its CO_2 emissions with more than 25 percent since 1990. (SD 2004) The transport authorities claim that it is not possible to reach the desired national environmental targets with measures that the transport sector can apply and with the current transport policy. Both Bellona (2007) and Friends of the Earth Norway (FEN 2007) acknowledge this, but insist that the government could place more emphasis on reaching this target by stating more concrete measures. Also, targets for local air pollution, such as the Gothenburg protocol, where Norway has made a commitment to reduce NO_x emissions by 29 percent between 1990 and 2010, are not accompanied by as description of how to fully

achieve this. The target for reducing noise is to decrease the 1999 levels with 25 percent by 2010 and the National Transport Plan will not manage this either with the current policy measures. (FEN 2007)

5.1 Land use planning

Around two thirds of all citizens in Hungary live in cities and are dependent on an efficient urban transportation system. For urban transport, the Hungarian government (GKM 2004) states that "we need a strategy of urban transport development that will lean more emphatically on community transport than on individual transport modes." So far, only one third of all travels in Hungary's cities are done by private car, but the numbers are rising all over the country (Figure 1), even though the government wants to increase the role of public transportation. (Levegó 2007)

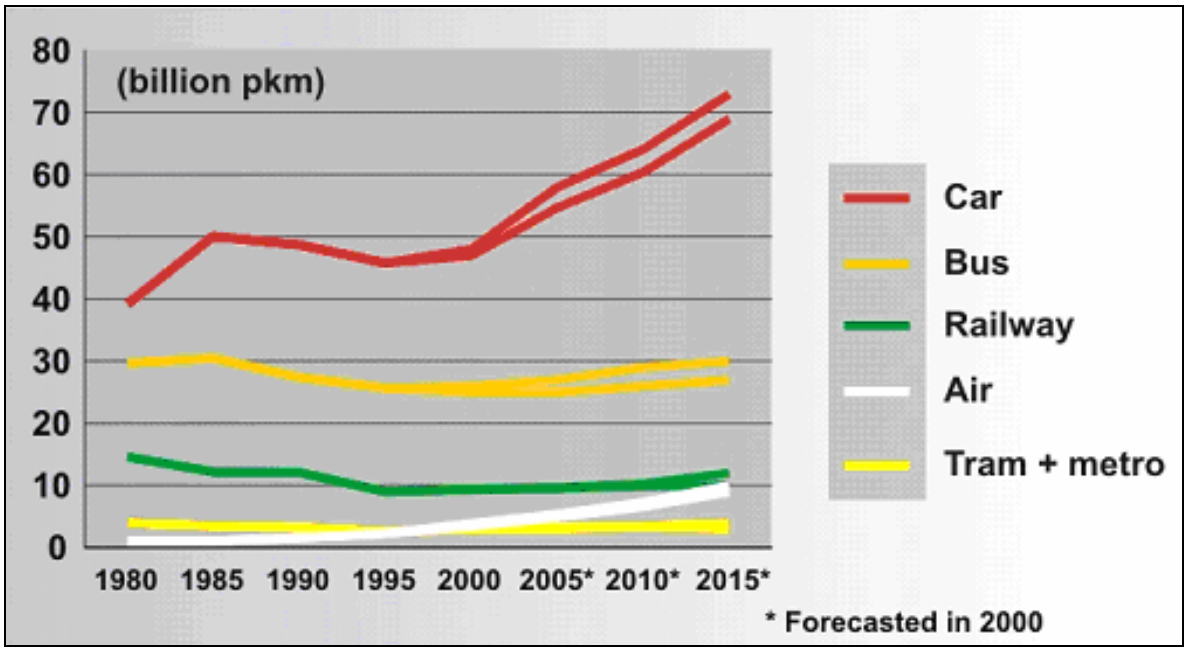


Figure 1. Change in passenger transport mode performance in Hungary since 1980 and forecasted until 2015. (KTI 2007)

It is believed by the Hungarian government that urban transport policy must be developed centrally. The priority should be on urban intermodal nodes that connect local and intercity transport and "park and ride" facilities. (GKM 2004)

Budapest and its surroundings are recognized as the most important urban area and need extra attention to make the Hungarian Transport Policy harmonize with the Budapest Transport System Development Plan. (GKM 2004) The overall plan is to create a more environmentally friendly transport network. In order to achieve this, an expansion of the metro network is needed, together with enhancing the quality of the inter-modal intersections and suburban commuter travel. (GKM 2004) Environmental organizations do not regard this as sufficient measures to reduce the growth of car use and want more severe measures targeting car users directly, such as higher registration tax, higher annual tax, higher parking fees, higher road pricing etc. (Lukacs 2004)

The focus of urban land use planning in the Hungarian transport policy is mainly for infrastructure construction and maintenance. Little is spoken about measures to reduce the urban sprawl, which is making public transport harder to operate and less efficient. (Rezessy *et al*. 2004) Rezessy *et al.* also point out several institutional flaws that foster urban sprawl in the Hungarian society. One case in particular refers to the housing policy, where there is a lower interest on loans for building new houses than for renovation or purchasing of existing buildings or apartments. Another example is that of building large out-of-town shopping malls instead of redeveloping "brownfield sites" for new business, thus showing a failure in the integration of transport and land use policy. (Rezessy 2004)

The integration of transport and land use planning is mentioned in the Norwegian National Transport Plan (SD 2004), as is that a more concentrated urban development is needed to relieve the pressure on open public spaces, agricultural land, nature reserves and cultural landscapes. Integrated land use and transport planning is believed to contribute to more walking and biking and use of public transportation. These are healthier alternatives to using the car and this is a positive recognition by the government, but authorities need to take a stronger responsibility in this process. The area planning is made by the municipalities and for them to coordinate with the different transport sectors is difficult. A solution could be to institutionalize the local transport plans with the area planning and for the government to set strict obligations for funding. (FEN 2007)

In Norway, the capital Oslo, is the urban area with most transport related problems and lack of road and railway capacity. Environmental and safety problems can be dealt with much more

effectively here than in any other urban area. (SD 2004) The toll roads are one of the most important measures to use to make sure that not more car traffic is congesting the city's roads and that more money can be spent to develop better infrastructure. The area planning becomes very important too in making sure that people can get where they want as easy as possible with public transportation and preferably just by walking or biking to their destination. (FEN 2007) To use incentives against private car use is a very challenging policy task, due to the resistance of the public in their demand to be more mobile. In most of the local governments there are no or very little will to use restrictive measures against private car travels. (SD 2004) As Lukacs (2004) points out, measures against private car use that will help increase the public transportation can be very unpopular. What is needed is good public information about benefits of public transportation and what the real costs of car use really are, including external cost to the environment and the society.

5.2 Road pricing

At present, in Hungary there is only a fee for using motorways, but the transport plan does not exclude the possibility to also have road fees on other roads than motorways in the future. (Kazatsay 2003) Motorway taxes are paid for through a vignette system. (Zecca *et al*. 2005) An earlier attempt to implement toll roads in Hungary has only directed the traffic over on smaller roads going through villages, which has presents numerous disadvantages for both the local environment and the extra maintenance cost for the public village roads. (Levegó 2007) It is almost impossible to set up a perfectly correct infrastructure charge, because the price would simply be too high for anyone to use the roads. There is already a tax for petrol, so, together with a road charge it will mean that drivers are subject to double taxation. (Kazatsay 2003) There has also been strong public opposition against previous toll road plans for Budapest and they have been cancelled. (Zecca *et al*. 2005)

A significant portion of road infrastructure building in Norway is funded by road pricing and this will continue according to the Norwegian transport policy. (SD 2004) The fact that road pricing is used to fund the construction of more roads is not very popular amongst Norwegian environmental NGOs, because it leads to even more road building than the government is

planning and it increases the overall private car traffic. Railway infrastructure improvements are needed instead and more money should also go to that. (FEN 2007)

Toll roads in the big cities are used in Norway to fund both new road infrastructure and alleviating congestion, but they are also used to financially support public transportation and the development of biking and walking networks. Toll roads and their taxes is something the government wants to keep in force. However, the plan is to remove the toll roads in Oslo in 2007 if the political will is there. (SD 2004) This has not been seen as a good thing by neither environmental organizations, nor the transport authorities, but in the end it is up to the local politicians and the task will be decided at a time coinciding with the local elections. (Aas 2003) As earlier mentioned, the politicians hesitate to go against public will and this could mean favoring more car use. (FEN 2007) Road pricing and other incentives, such as reducing parking availability, are necessary to decrease road traffic in the largest cities. But for them to be effective, they have to be combined with the existence of a high quality public transport system. (Fen 2007; Vegvesen 2007)

5.3 Parking facilities

The Hungarian government wants to encourage more "park and ride" facilities. (GKM 2004) According to Levegó (2007), there are around 3000 "park and ride" spaces around Budapest. And with developments of new facilities, the number of spaces will at maximum triple. Nonetheless, the number of travels and commuters from the city outskirts is more than 300 000 per day; therefore "park and ride" facilities will not be a very good measure to reduce car traffic in the city. (Levegó 2007) The Institute for Transport Sciences (KTI 2007) is however worried that the number of "park and ride" facilities has declined around Budapest during the last decade. Now there is not likely that any new one will be built any time soon due to lack of space and money. (KTI 2007)

The task for Budapest especially is to build more parking garages, underground parking and "park and ride" facilities. This would allow the construction of more pedestrian only streets and squares that are car free. (GKM 2004) Budapest is currently confronted with a parking problem, due to the increased numbers of private cars. Sidewalks are supposed to be 1.5 meter wide, but in

many places people can barely walk on the sidewalks because of parked cars. (Levegó 2007) In Budapest, a part of the parking fee is earmarked for the use of public transportation. (Krzywkowska 2004)

In Norway, one of the problems is that most parking spaces are privately owned and the government, in the National transport policy, transfers the responsibility of parking management to local governments. (SD 2004) The parking policies are therefore weak, but the government wants to have stricter parking regulations, to increase the role of public transportation and also, to materialize the need for "park and ride" facilities at intermodal centers. (FEN 2007) At present, the majority of the "park and ride" facilities are around the most populated areas in the south of Norway. In Oslo there are 3 publicly owned facilities, which are free to use and are located outside the toll ring, which should be a money-saving incentive for the users. (Vegvesen 2007)

Studies in Norway show that free parking at the workplace is a decisive factor for people to choose their car. 9 out of 10 workers in the city have access to free parking at their workplace and 75 percent of these choose to drive their car to work, while from the people with no free parking at work, only 25 percent choose to drive their own car. (SD 2004) This is a serious problem that determines more people to take their car to work, rather than commute with public transportation. A possibility would be to charge a tax for people taking advantage of free parking, especially in cities where there is a shortage of space. (FEN 2007)

5.4 Public transportation

The public transportation network in Budapest is generally very good and particularly in the first half of the last century it was considered one of the best in Europe. But decentralization and privatization has made it weaker and the number of passengers has dropped in the last two decades. (Krzywkowska 2004) In Hungary the operation and management of urban passenger service is the responsibility of local governments. According to the Hungarian Transport Plan (GKM 2004), the government allocates funds for the public transportation from the annual budget through various channels. Since there are various actors operating the public transport, the Hungarian state plans to take an increasing role for regulating and monitoring the terms of

competition in the public transport services. (GKM 2004) However, in order to increase the competition and levels of service, it is believed by the Regional Environmental Center's work group (Krzywkowska 2004) that greater financial responsibility is also needed for the government to attract more private investors, who now fear the financial risks.

Of course, the drop in the number of public transportation customers is also a result of the increase in car ownership, which is recognized in the Hungarian Transport Policy. The government states that they want to make public transportation more attractive than individual car travel by implementing traffic control measures. (GKM 2004) The use of parking management in Budapest has been a good measure so far in regulating the movement of cars in the city by charging more in the city centre and less the farther from the centre one is parked. However, in order to get more effective control over the motor vehicles in the city, measures such as road pricing would probably be needed. (Krzywkowska 2004)

The public transportation network in Budapest is very good and the use of public transportation for passenger travel is still above 60 percent, even though it has declined during the last decade. Therefore, what is required in the long term perspective is to maintain a good quality service. (Krzywkowska 2004) A top priority until 2006 has been to ensure the quality of public transportation, especially by introducing a new pass system so that passengers could travel with different operators in the city and the surrounding areas with the same kind of ticket. (GKM 2004, Zecca *et al.* 2005)

It is stated by the Hungarian government (GKM 2004) that "it is unfeasible to make the traveling public pay for the full actual costs of public transport" and, therefore, the domestic public transportation should be partially financed by the revenues of the state and local government. There is, however, some critique against the government's spending of money for public transportation. The government is funding 80 percent of a new metro line in Budapest, but, at the same time, there are annual increases in fare rates for the use of the public transportation network, due to a lack of support from the government. (Joó 2004) The construction of the new metro line is using up almost all resources for maintaining the rest of the public transportation network in Budapest. (Levegó 2007)

The Norwegian government is also trying to place more emphasis on public transportation and wants to reward those communities that succeed in strengthening the public transportation as compared with private car use. This is a measure that has been very well received by environmental organizations (Bellona 2007; FEN 2007) The government also wants to redirect more of the road sector funding toward public transportation and toward increasing the construction speed of railway lines in the big cities and to provide more resources for the development of biking and walking networks. (SD 2004)

Several of the big cities and their surrounding regional areas in Norway are currently testing a cooperation project in which a centralized investment bureau governs the funding and decisions regarding public transportation and transport policy in the region. This is to enhance cooperation between public transportation companies, to introduce common ticketing services, and to improve the quality of information delivered to passengers. (SD 2004) The best public transportation possibilities are in the biggest cities, where studies show that 80 to 90 percent of the people have access to good public transportation. In smaller cities, that rate drops to around 65 percent, while it is only 20 percent in the outer districts. This means that, on average, 38 percent of the population lack a good public transportation service and find it necessary to use private cars. (Nielsen and Lange 2007)

The Norwegian Ministry of Transportation and Communication (SD 2004) claims that it is not enough to just strengthen the quality of public transportation to slow down the growth of car travels. There is also a need for more incentives in cooperation. Bellona (2007) agrees with that and points out that as long as the traffic is still growing, we also need to focus more on cleaner technologies and alternative modes of transportation.

5.5 Alternative modes of transportation

Since the former transport policy in Hungary came into force in 1996, biking has gained more attention. The Hungarian Bicycle Transport Programme was launched in 1997 and aims to create a bicycle road network of 3400 kilometers. The current Hungarian Transport Policy does not include any new measures regarding biking and wants to simply continue the construction of the bicycle network as it has already been laid down. (GKM 2004)

Norway too has its own bicycle policy, which is a few years old: the National Bicycle Strategy. Its goal is to make biking safer and more attractive for people. One step of the strategy is to increase the share of travels by biking from between 4 and 6 percent up to 8 percent.

Around half of the trips that are no longer than around 1 kilometer are done by car transport in Norway. According to the Norwegian Ministry of Transportation and Communication (SD 2004), these might also include trips that are part of longer journeys, for example, dropping kids off at kindergarten or school on the way to work. On average people make 3 trips from home every day and one fourth of all these trips is done by walking or biking because they are relatively short and it is on these shorter travels of up to 3 kilometers that walking and biking are important to focus on for the national transport policy. In the cities and towns with 5000 inhabitants or more the biking strategy is most viable and it is believed by the Norwegian government that an increase of 50 percent of biking is possible in these places. (SD 2004) An important aspect of the policy is to increase the bicycle network in the cities and to also create more bicycle paths alongside the main roads. Presently there are around 3.000 kilometers of bicycle and walking paths alongside the main roads, which represents around 12 percent of the total main road network. (SD 2004) Bellona (2007) is positive about the government's biking initiatives and especially about the fact that they will increase the biking network in cities.

It is believed that on shorter distances there is a possibility to also convince people to walk instead of driving. The safety of both bikers and pedestrians will also be enhanced by the government's plans to reduce speed limits in cities down to 30 km/h. (SD 2004; Bellona 2007) Pedestrians are little mentioned in the Hungarian Transport Policy. The only task mentioned in this regard is to keep car parking off some streets and to create more car free squares and pedestrian-only roads. (GKM 2004)

5.6 Modal shift

To improve the modal shift is an important element of the European Union's transport policy and Hungary also wants to put a lot of emphasis on sustainable development through a coordination of rail, road, water and air, as best as possible. (GKM 2004) As figure 2 shows, the modal share in passenger traffic will be very much decided by the efforts to reduce the growth of private car

use. The current development tendency is predicted to increase car use on the expense of bus and railway usage. Air traffic is expected to grow with more or less the same speed. (KTI 2007)

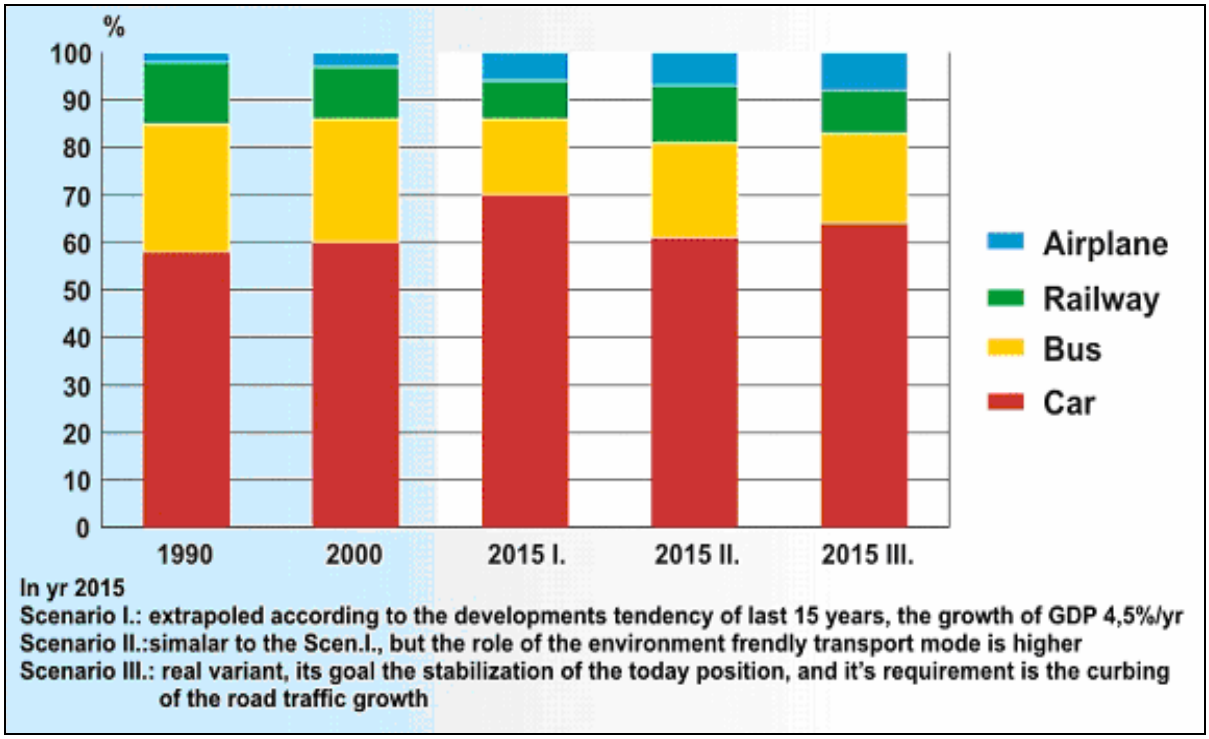


Figure 2. Modal split in passenger traffic in Hungary with three different predictions for the future share of transportation. (KTI 2007)

In Norway, 88 percent of personal transport is done by roads, 6.5 percent by air, and only 4 percent by rail and 1.5 percent by waterways. For travel distances longer than 300 kilometers, aviation dominates with over 80 percent of all travels. (SD 2004)

In the share of freight transport in Hungary as well (Figure 3), railways are loosing ground to road transport and the trend is expected to grow further if nothing serious is done to reverse it. (KTI 2007)

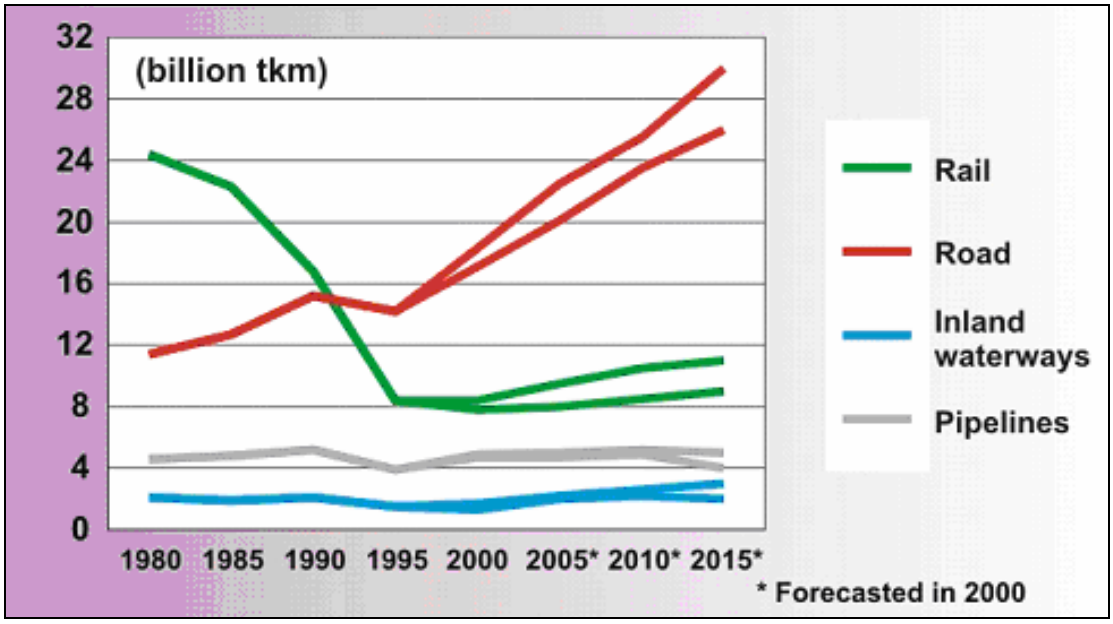


Figure 3. Freight transport performance in Hungary since 1980 and forecasted until 2015 with the current trends. (KTI 2007)

Domestic freight transport in Norway is dominated by sea and road transport with almost 50 percent shares each, as shown in figure 4. However, the average distance traveled for sea transport is three times that of the road transport. Measured in volume of goods alone, road transport is leading. The share for railway freight transport is only a few percent. (SSB 2007)

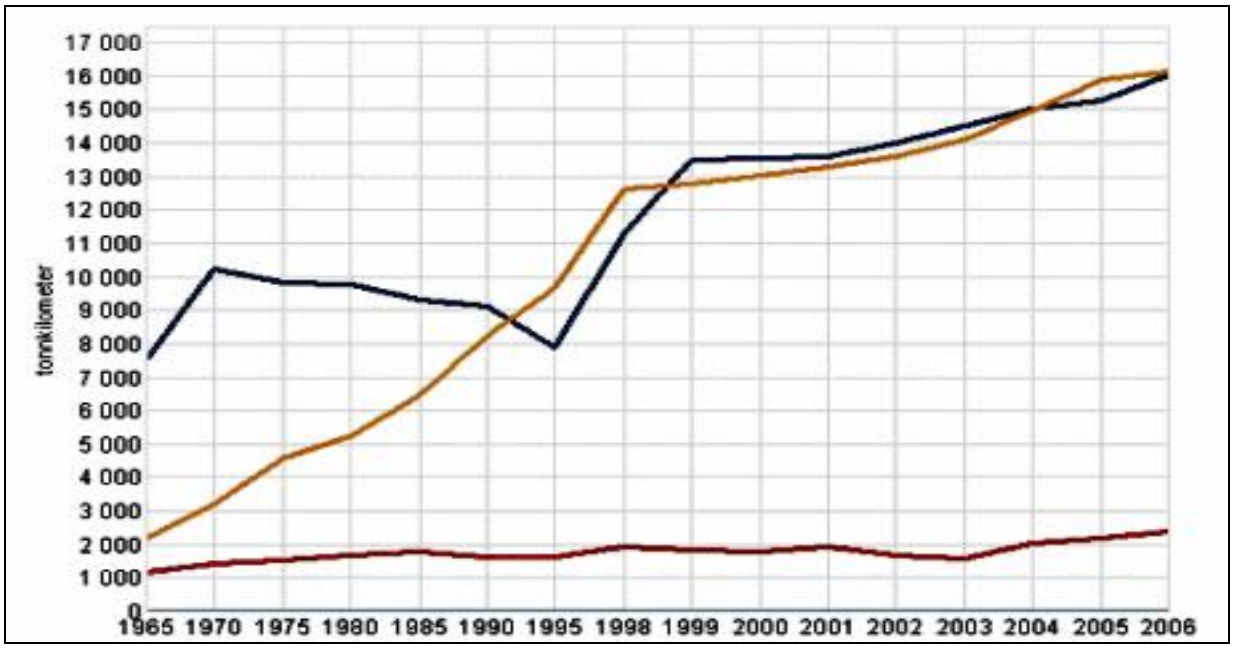


Figure 4. Share of freight transport in Norway measured in ton kilometers. Blue line is sea transport, yellow line road transport and red line railway transport. (SSB 2007a)

The Marco Polo funding program is one of the measures used in Europe to change the modal split from road to rail, costal seaways and inland waterways. Norway joined this program in 2004 and contributes with financial support, as well. (SD 2004) In the EU, the Marco Polo program funds projects to overcome financial barriers in getting companies to prefer waterways and rail transport. This should also be done in Norway to encourage more frequent short shipping solutions that will shift the short shipping market from road transport. (FEN 2007)

5.7 Road infrastructure

A big discussion in Hungary has been focused around the development and location of a ring-road around Budapest. The Hungarian Transport Plan (GKM 2004) laid down as a priority until 2006 to construct a freeway ring around the capital with a bridge over the Danube, north of the city, and another bridge south, at Dunaújváros. The objective of this by-pass is to relieve stress on the main urban roads of Budapest and to make regional connections easier. (GKM 2004) Most other main roads also go through settlements elsewhere in the country and it will be a challenge to make the necessary adjustments of infrastructure to both improve the quality of life and keep a sustainable transport development. (Zecca *et al.* 2005) Levegó (2007) find the construction of these bypass roads to be highly unfriendly to the environment. It has been shown that new bypass roads which are meant to reduce traffic congestion in the city and thereby reduce pollution, are only generating more traffic around the city and congesting these roads, while the traffic in the city does not improve either. (Levegó 2007)

To construct the missing parts of the European motorway networks is also a top priority for the Hungarian government, together with the adoption of laws that guarantee that environmental considerations and social conflicts are avoided when developing infrastructure. (GKM 2004) The motorway construction has received many complaints from national and international non-governmental organizations for being in conflict with environmental protection. The motorway going from Budapest towards Ukraine will split an ancient forest with many precious habitats in two. (Joó 2004) Other motorway developments are also a cause for concern for precious birdlife habitats and Natura2000 areas. The NGOs call for the Hungarian government to choose alternative routes that would reduce the impact on the environment. (Birdlife et *al*. 2003) A significant problem is also that the share of railway traffic is rapidly declining on the routes

where new motorways are being constructed. Many motorways are built without economic justification and the money should be spent on maintaining existing roads and road safety measures instead. (Levegó 2007)

Most of the roads in Norway were built with a lot lower standard for security than what the standard is today. As a result, there is need to enhance road quality. Especially high traffic roads need urgent attention and remodeling into motorways with physically split driving directions. (SD 2004) Friends of the Earth Norway (2007) are strongly against the four lane motorways that are planned. This will only increase the traffic, have much higher costs than making small safety improvements on existing roads and set preference to other modes of transport on the same part of the network. The price to make physical barriers between lanes is only a small percentage of the development for a new motorway. Motorway construction also delivers a competitor for the railways traffic on the same corridor. (FEN 2007)

It is essential to use the precautionary principle to preserve biological diversity when constructing new infrastructure for transport. The Norwegian Ministry of Transportation and Communication encourage each of the transport authorities to take responsibility and care for the environment. (SD 2004) Damage to protected areas or areas of cultural importance should be avoided and the possible impacts should be considered carefully before any construction project is initiated. (SD 2004)

5.8 Railways

Intercity public transportation is the responsibility of the national government and funding of the intercity travels is obtained through various channels from the annual budget. (GKM 2004)

MÁV is the Hungarian State Railways. It receives funding from the national government for investments of national importance and for covering their financial losses. (GKM 2004) The Hungarian government proudly acknowledges (GKM 2004) that the modal share of both passenger and goods traffic with rail in Hungary is higher than the EU average and wants to keep this ratio by all means. This translates especially into enhancing the quality of both infrastructure and service. The standard of the trains is outdated and it is necessary to buy new trains, engines,

passenger wagons and goods wagons as soon as possible. (GKM 2006) The problem so far has been the lack of funding for the renewal of the vehicle fleet. (Joó 2004) The quality of rail transport services should be enhanced by privatization and increased competition. (Zecca *et al*. 2005)

One of the development projects of top priority for Hungary until 2006 was to develop a railway backbone network. This network should be a part of the European and international trunk routes. The standards should be in accordance with the rest of the European railway system. High-speed railway connections have also been on the priority list. (GKM 2004) The trains can now travel between Budapest and Vienna, Austria, with speeds of up to 160 km/h on the majority of the lines. The train only needs to slow down around a few settlements. (KTI 2007) There has still not been much improvement in quality on the rest of the railway network. (Zecca *et al.* 2005) While parts of the European networks are being built at rapid speed, the problem is that there is almost no funding for secondary railway lines. (Joó 2004)

To relieve car traffic between the suburbs and the urban areas, the first priority for the Hungarian government is to modernize the suburban railway transport. (GKM 2004) New and improved trains and wagons have been recently bought for the suburban HEV railways, which operate around Budapest. (Joó 2004; KTI 2007) For Budapest, the plan is to "integrate MÁV's railway lines within the capitol with local public transport networks." (GKM 2004)

Considering the increasing traffic at Ferihegy airport's two terminals, there are plans to construct a high-speed railway link from downtown Budapest to the airport. (GKM 2004) The passenger traffic at Ferihegy airport has grown fast during the last couple of years and there is expected to be an increase between 25 and 50 percent in passenger numbers until 2010. This will mean even more traffic on already congested and rapidly deteriorating roads between the city center and Budapest. A fast high capacity and environmentally friendly railway link is the best solution at the moment. (GKM 2006) MÁV did open up a possibility to travel between Nuygati train station in downtown Budapest and Ferihegy Terminal 1 this summer. The service is a good choice for people traveling with low-cost airlines to Terminal 1, but for travelers with MALEV or international flights from Terminal 2, the service has not improved much. However, there still are no clear plans for a fast railway link to the airport and this has not been a priority so far. (Levegó 2007)

The Norwegian government lays down that the railway sector is one of their main priorities and that the aim is to increase passenger-traffic with trains by gradually enhancing competition in the railway sector. The passenger should also be ensured of getting at least as good or even better quality service. (SD 2004) In most of the places where the government plans to build motorways there are possibilities to improve the quality of the railway network. There are mainly one-track lines on the Norwegian railway network and construction of double tracks along the most traffic intense corridors would increase the capacity for the railways. (FEN 2007) The development and performance of the airport express train between Gardermoen airport and Oslo and its surroundings are high and that is why the passenger transport to the airport is mostly done by railway. (Jernbaneverket 2007)

Inland freight transport in Norway also needs to be shifted from road to railways. Road taxation for heavy trucks should be implemented as is the case in many other European countries. A fully loaded truck causes the same damage to the infrastructure as several thousand smaller cars. (FEN 2004) Infrastructure development for railways in Norway is taxed, while road infrastructure development is not. This is something that should be removed. (FEN 2004) The government has acknowledged in the transport policy (SD 2004) that railways have more benefits for the society and they state they want to make the competition fairer and divert more money from the road budget over to railways. This is also in line with the position of transport authorities and environmental organizations. (FEN 2007; Jernbaneverket 2007; Vegvesen 2007) Safety measures in any transport sector should be high, but presently the safety measures for railways are much stricter and could give competitive advantages for road transport. Better monitoring of the rules and improved environmental regulations should be implemented. (FEN 2007)

5.9 Buses

The Volán bus service is the state-owned intercity bus service in Hungary. It receives passenger support from the government in order to keep selling discounted tickets for preferred groups of frequent travelers, students and senior citizens. In addition, as earlier mentioned, providing subsidies to keep the public from paying full fare for the domestic public transportation is seen by the Hungarian government as an important task. (GKM 2004) The problem with the Volán buses is that the service is split into numerous regional companies. This involves a lot more

administration structures, extra costs for vehicle management, and service operation as compared to having only a few more centralized Volán bus companies. (KTI 2007)

The Hungarian government sees it as an obligation to ensure universal public bus service for every citizen. The privatization of the scheduled bus services means that the government must regulate the competition to ensure that the liberalization of these services does not make the costs for the public too high. (GKM 2004)

For the sake of the environment and for increased safety, a renewal of the vehicle fleet for the Volán buses has been carried out. (KTI 2007) This was achieved with strong financial support from the Hungarian government who wants more efficiency in operation and for the overall road vehicle fleet to be in line with the latest European standards. For private public services this means that no company without a satisfying vehicle fleet will be allowed to operate. (GKM 2007)

The Norwegian government has liberalized the intercity bus-market in the last decade and created more and more opportunities for competition between bus and train. Bus travels in Norway have seen an increase on distances of over 150 kilometers. Timeekspressen, an intercity bus company, and other bus companies have shown that competitiveness in quality has determined more people to choose public transportation over individual car transport. (SD 2004) Even though this is not the most preferential mode of public transportation, it is a step in the right direction. The focus should also be on achieving a better coordination of buses and trains operating on the same line, as it happens in the other Scandinavian countries. (FEN 2007)

5.10 Waterways

The number one priority in Hungary is the Danube, especially the northern part, which is on the border between Hungary and Slovakia, and the area south of Budapest. There are efforts by the Hungarian government to come to agreements with Germany, Austria and Slovakia to seek EU funding to develop the Danube further, so that it can handle “vessels with a draught of 2.5 m to navigate without restrictions 300 days a year.” (GKM 2004; Zecca *et al.* 2005) According to the Ministry of Economy and Transport (GKM 2006), the preparations for this project have started

and the project will be implemented between 2007 and 2013. The project in itself will be required to be done in the best environmentally and ecologically sustainable way. (GKM 2006)

The second priority of the Hungarian waterways is to establish better international agreements for the use of the river Tisza for transit traffic. There are efforts by the Hungarian government to come to agreement with Ukraine, Romania, Slovakia and Serbia. (GKM 2004) The demand for using the Tisza River from neighboring countries and other EU member countries has increased in the last few years. The focus now is to secure the international traffic, by enhancing safety of navigation and guaranteeing accessibility on both the Tisza and contributing rivers for both passenger and goods traffic. (GKM 2006)

Inland water passenger traffic is not mentioned much in the Hungarian Transport Policy. The international passenger traffic coming to Hungary on the Danube is fast growing, but the Budapest International Passenger Ship Station has reached its maximum capacity and there is a need for more harbor developments in the south of Budapest. (GKM 2006) Inland waterways, as a mode of transportation, have not reached their full potential for Hungary, but this is not seen as a very effective way to make the modal shift. Environmentalists in Hungary agree, as well, that it should not get too much attention. (Levegó 2007)

In Norway, sea transport does not have a big share of the modes in terms of passenger transport. However, for a lot of regions and local communities the ferries are vitally important. (SD 2004) In freight transport, on the other hand, sea transport holds a 48 percent share, but still, sea transport is not receiving much attention or funding from the government. More high frequency freight passages by sea should be made and this would also require better safety measures. (FEN 2007)

The enhancement of security in Norwegian waters also has environmental benefits. Many major accidents cause leakages of dangerous substances and spilling of oil. In order to prevent these accidents from happening, the incentives provided by the government will be to further extend the use of automatic identification systems, sea traffic centrals, and reporting mechanisms. (SD 2004) The European Union's new satellite navigation system, Galileo, is in effect from 2008 according to plan. (COM 2001) Together with the American GPS system, this system will give better signals for navigation in Norwegian waters. (SD 2004)

Due to a lot of international traffic in Norwegian seawaters, it is necessary to be part of international agreements for prevention and assistance of major accidents at sea. Due to a lot of oil transport along the Norwegian coast, the Norwegian coastal authority is discussing the possibilities of having agreements with Russian authorities regarding information and positioning of oil transportation, a mutual use of emergency harbors in case of problems, and cooperation if oil-spill accidents along either the Norwegian or Russian coast. (SD 2004)

The source of around 25 percent of Norway's NO_x-emissions is the domestic sea transport. The measures to reduce NO_x emissions refer to using new fuel technology, like natural gas or hydrogen or to renewing the boats and replacing them with more efficient ones using diesel. The emission-release standards for both domestic and foreign boats traveling in Norwegian waters will also be stricter. The government will also make sure that in the privatization of the ferry services, the companies with the most environmentally sound fleet will get the rights to operate. (SD 2004)

5.11 Air traffic

Ferihegy's two airport terminals are the main priority of the Hungarian aviation. Further development of the Ferihegy airport and the airport of Kiskunlacháza has been initially cancelled due to environmental considerations. This has given Debrecen and Sármellék airports regional significance, which means that they will be under more governmental control and get more support. (GKM 2004) Currently, however, the increasing traffic at Ferihegy, over the last few years (figure 5) has made a demand for the Terminal 2 to undergo further extensions of aircraft and passenger capacity. New cargo and logistics centers will also be built. It is expected that the air traffic will increase by 50 percent until 2010 and further double until 2020. (GKM 2006)

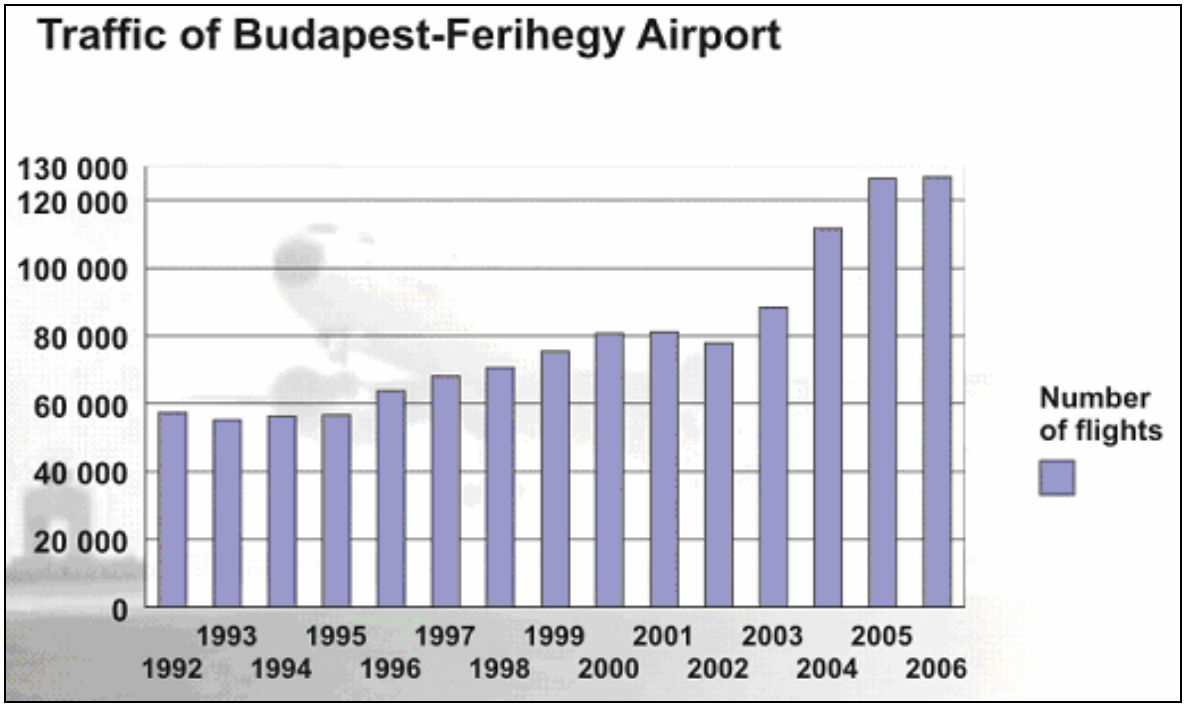


Figure 5. Showing the increasing traffic at Ferihegy Airport from 2002 up until 2006. (KTI 2007)

In the work to reduce emissions from air traffic there is a need for European cooperation and Hungary will take its part in the commissioning of a Common Airspace Air Traffic Center that will be developed between 2007 and 2010 as a part of the European Unions strategy to implement the Single European Sky concept. (GKM 2004) Hungary has become a full member of the Joint Aviation Authority in Europe which is a positive step towards getting a single European sky. (Zecca *et al*. 2005)

The current legislation on limitations of sound emissions from air traffic dates back from 1999. (Zecca *et al.* 2005) A part of the landing tax at airports is earmarked for noise mitigation. In 2005 this money was directed to be used in addition to other funding for building a second runway at Ferihegy airport. A second runway was necessary to deal with increasing traffic and, also, to decrease the noise burden from the other runway imposed on nearby residences. (BAA 2007)

Even with the increase of air traffic, in Hungary there are still no taxes targeted for environmental protection. (Zecca *et al.* 2005) However, all member countries of the European Union must comply with air emission standards by 2010. (BAA 2007) Norway, on the other hand, was one of the first and few countries to introduce a CO_2 tax on domestic flights and the

Norwegian government is working internationally to get this implemented on international flights as well. (SD 2004) However, as Friends of the Earth Norway (2007) points out, taxes for airplane fuel are a lot lower than taxes for car fuel and this should be harmonized. Taking into consideration that CO_2 emissions have greater consequences higher in the atmosphere, the taxes for air traffic should be three times higher than those for road traffic. (FEN 2007)

Domestic air traffic has a very high share in Norway compared to other European countries. Therefore, there should be more focus on the negative consequences of air traffic and implementation of higher taxes to stop the current trend of air traffic growth. (FEN 2007)

5.12 Intermodality

An important part of the Hungarian inter-modality plans to ensure more environmentally friendly transport will be its policy priority until 2015 of developing a series of logistic service centers and inter-modal shipping terminals. (GKM 2004)

The Logistics Support Centers (LSC) have been under construction for the last decade. When the current Hungarian Transport Policy entered into force, there were 13 such centers in 11 regions. Each of these centers has an obligation to have a railway link and 4 of them should have port access. The ports for inland waterways are important for good inter-modality and the Hungarian government wants the infrastructure to these ports to be accompanied by good railway and road links. This will hopefully divert some of the commercial freight traffic onto alternative modes. (GKM 2004)

The priority of the Hungarian government is to build 5 new Intermodal Logistic Centers, which will need significant government support to be operational, due to slow returns in investments. (GKM 2004) There are now 7 intermodal Logistic Centers in Hungary and, according to the Association of the Hungarian Logistic Service Centers (MLSZKSZ 2007), a total of 17 logistics centers are built or under development at present (see map in Annex I). Most of these logistics centers are underway of getting railway connections or improved rail infrastructure. Developments are in place at 3 national ports, with necessary freight terminals, logistics centers

and connection to rail and road in Györ, south of Budapest on the Danube and in Szeged, on the Tisza River. (GKM 2006)

Multi-modal freight transport is given support in line with the EU's transport policy. Combined goods transport by road and rail (Ro-La) serves at present 8-9 percent of all transit freight traffic in Hungary. Multimodal freight transport with containers and swap bodies should also receive extended incentives and benefits. (GKM 2004) To promote more multimodal freight transport the Hungarian government gives tax exemptions to international freight transport vehicles that utilize the rail or inland waterway pasrts of the combined freight transport routes. (Rezessy *et al*. 2004)

The development of effective logistic terminals at ports and railroads are described in the Norwegian Transport Plan as an important factor to establish a modal shift in freight transport. (SD 2004) More effective logistic terminals are especially important in and around big cities. In the areas around Oslo there is a lack of a common strategy for the logistic terminals. There is supposed to be large benefits in the localization of terminals for a common logistics strategy and effectiveness in the local distribution of goods. Intercity cooperation is also important to ensure that environmentally friendly transport is preferred. Ports in particular have a great potential for more effective area use and good transport solutions. (SD 2004) Most of the goods coming to Norway from abroad at the moment are coming by sea transport. In order to minimize the domestic freight transport, it is important to have geographically good positioned ports and logistic centers with necessary infrastructure. (Bellona 2007)

5.13 Operational practices

Similar to other Central and Eastern European countries, the number of traffic accidents in Hunagry has increased sharply between 1985 and 1995, but it has dropped a bit since. (Fleicher 1998) Still, at present Hungary has one of the worst rates in Europe of persons killed per inhabitant in road traffic every year (figure 6). (KTI 2007) Safety is supposed to be a high priority, especially regarding transport on public roads. Compliance with traffic regulations is something that is required from the users. The government also recognizes their task to provide training, preventative measures and monitoring. (GKM 2004) Better education of young drivers

is especially important since it is in the age group 18 - 25 that one finds the highest numbers of accidents and deaths. (KTI 2007)

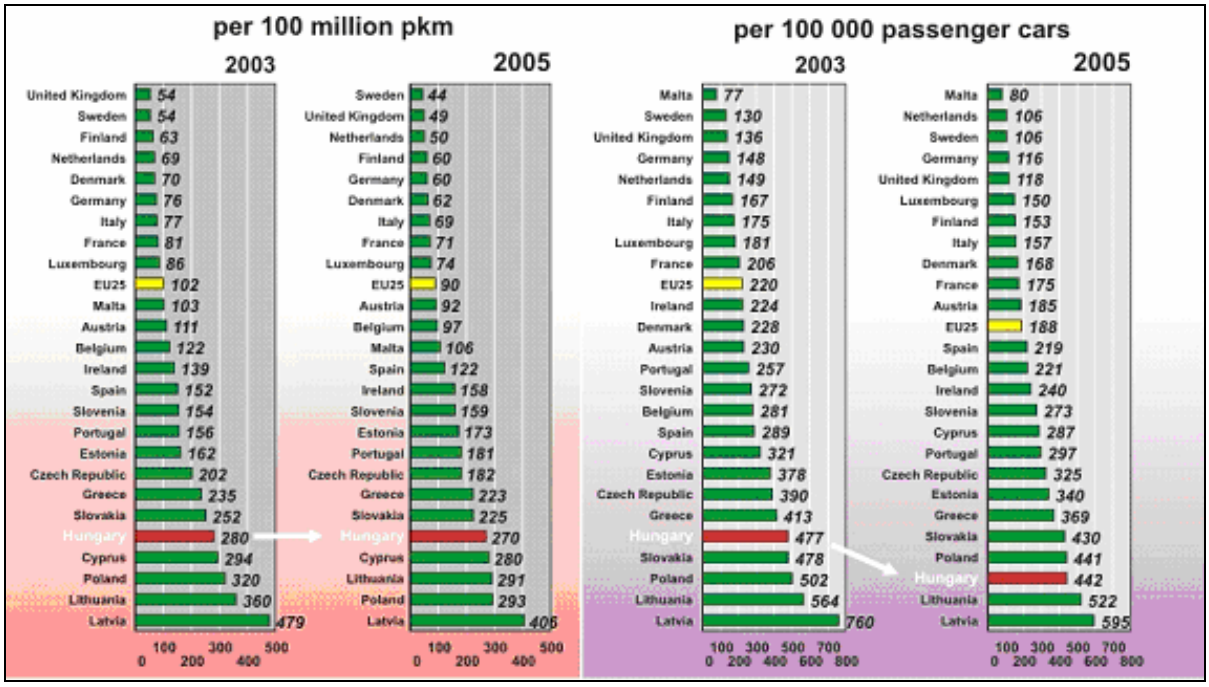


Figure 6. Road fatality ranking for EU25, showing a small decline for Hungary, but still far behind the EU average and progressing slower than most of the other. (KTI 2007)

There are more than 1400 deaths per year in Hungary due to traffic accidents. The target is to drop the rate of deaths and fatal injuries by 30 percent between 2001 and 2010 and by 50 percent until 2015, in accordance with the European policy. (GKM 2004; Zecca *et al.* 2005) This is going to be a challenging target to meet for Hungary if nothing is done. Speed limits were increased in the year 2000 and since then the number of deaths has gone up again, after having declined during the 1990's. (KTI 2007) In Norway, the number of people killed on the road in 2002 was 310 and in 2005 it was down to 224. Also, the number of accidents has decreased in the last few years despite a growth in road transport (figure 7). The number of deaths per 100,000 inhabitants is 5 for Norway (SSB 2007b), while it is as much as 14 for Hungary. (KTI 2007)

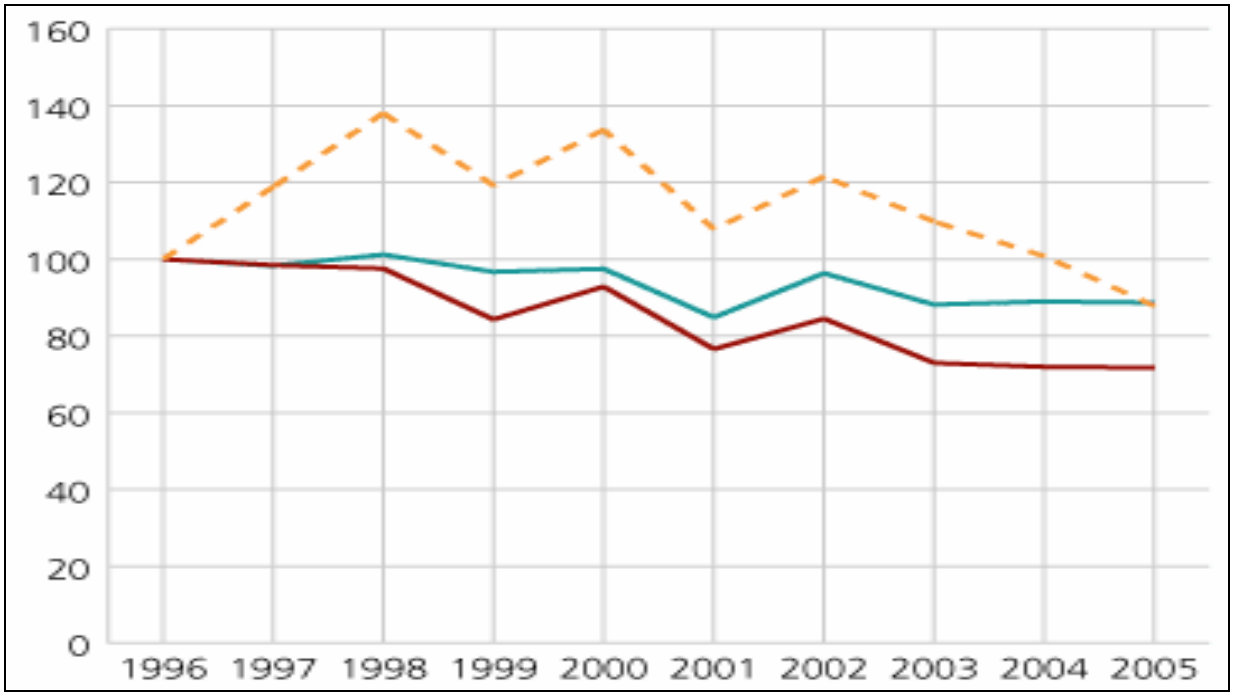


Figure 7. Index of people injured or killed in road accident in Norway between 1996 and 2005. 1996 equals 100 percent. Yellow striped line is deaths, red line is serious injuries and the blue is lighter injuries. (SSB 2007b)

The Norwegian government has a zero-death and life-threatening accidents vision when talking about traffic safety in the transport sector. Norwegian roads have one of the lowest death tolls worldwide, but still, there is most to gain by increasing safety measures in road transport. New and improved driver license education and development of better traffic learning for children and youths in school is one way to enhance safety at the source. (SD 2004) Safety belt locks, alcohol locks and systems for automatic speed limit control are technological improvements that can help increase safety for both the drivers and other participants in the traffic. (SD 2004)

Other transport modes have quite high safety standards and the main issue for all transport modes is to avoid big accidents. (SD 2004) In Norway there has been a common investigation board for aviation accidents since 1989. The purpose of this accident-board is to investigate the serious accidents and make sure that similar accidents do not happen in the future. After a larger passenger train accident in 2002 this board was extended to also include railway accidents. (SHT 2007) In this Transport Plan, the Norwegian government intends to extend the accident investigation board further to also include road accidents and later, also accidents at sea and

inland waters, to gather all the transport sectors under one common Norwegian Accident Investigation Board (SHT). (SD 2004)

The old Sea Investigation Board in Norway will be closed in 2008 and a sector for sea investigation will be included in the SHT. (SHT 2006) The necessary adjustment to the Norwegian Road Traffic Act was carried out by the parliament in 2005 to include road accidents in the accident investigations by this commission. (SHT 2007) Since road traffic accidents happen more frequently than with other modes of transportation, the SHT should primarily focus on major accidents and incidents, especially accidents involving freight vehicles and buses or any transportation of dangerous goods in tunnels. (SHT 2007) The objective is, however, not to find the one to blame for the accident, but to look at the operational practices and prevent similar accidents from happening. (SHT 2006)

The potential positive effect from gathering all sectors together for accident investigation is to gain knowledge from each other. Many of the transport modes are using similar advanced technologies these days and interaction between man and machine is especially a field where there could be an advantage to create a common expertise. (Aas 2002) During the first years in operation regarding the road accident section, the Accident Investigation Board (SHT 2006) has received a positive response on its conclusions and recommendations regarding traffic safety measures from road transport organizations.

Local pollution in the form of particulate matter smaller than 10 micrometers (PM_{10}) is an ever growing problem in Norway, due to the winter climate and the use of spiked tires which create more dust by eroding roads with no snow, especially in urban areas. A fee for using spiked tires is in place in a few cities to increase the number of car owners to buy spike free winter tires instead. (SD 2004) This is a step in the right direction, since these tires are much less polluting and damaging to the roads and it is only a minority of car users who actually need spiked tires. (Bellona 2007) A reduction of the speed limits in inner cities to 30 km/h and the use of lower speed limits on high traffic roads on critical days are other alternatives that help lower the PM_{10} values and also increase the safety of cars, bikers and pedestrians. (SD 2004; Bellona 2007)

5.14 Noise

Transport noise has not yet become a top priority in Hungary. The worst conditions are seen within the city limits of Budapest where there are daytime levels of around 71-77 dB and nighttime levels of 66-72 dB. In a lot of other densely populated areas around the country there are also noise levels around 70 dB during the day and around 65 dB during the night (GKM 2004) This is far above the levels set by the World Health Organization (1999) with an average of 50 dB during the day and 35 dB during nighttime for an undisturbed sleep. They are also far above the levels the Hungarian government considers to be acceptable maximum standards, i.e. 65 dB during the day and 55 dB during the night. (GKM 2004)

Railway transport is responsible for only one tenth of residential complaints in Hungary concerning noise pollution. Research carried out in populated areas in Hungary with railway traffic show that noise levels are 57-66 dB, but that the characteristics of the noise emitted from the railway traffic is sensed by humans as lower. (GKM 2004)

Regarding the construction of new roads, the Hungarian Transport Policy states that; "preference is given to durable, noise-absorbing surfacing materials". (GKM 2004) The maintenance and new infrastructure development presently uses more modern technologies and there is also good recycling of the used asphalt. (Zecca *et al*. 2005)

The Hungarian Transport Policy refers to a "comprehensive environmental program" that is supposed to include a "sophisticated noise monitoring system", which will ensure that flights are to take paths that protect residential areas from unnecessary noise, so called "noise gates". (GKM 2004) The set up of designated Zones for air traffic has been done before, but considering the increasing traffic at the new Terminal 1 and the new runways at Ferihegy, it is necessary to monitor the areas around the airport again and that was supposed to be done in 2006. (BAA 2007) In cooperation with the Ministry of Economy and Transport, Budapest Airport will give penalties to airline companies which do not comply with noise emission standards. (BAA 2007) The regulations at the airports are in line with the EU regulations regarding average noise values and the restrictions of aircrafts. (BAA 2007)

In Norway, around 1.7 million people are said to be exposed to average noise levels above 50 dB and almost half a million of these are annoyed or highly annoyed. Around 80 percent of the noise is caused by road traffic. (SOE 2007) The national goal is to reduce indoor noise pollution to less than 42 dB. This is done by setting up physical barriers between the source and the residences or by having better insulation of the residences. (SD 2004)

A goal set by the government in 1999 was to reduce the noise by 25 percent by 2010. Therefore, in order to reduce noise more effectively, it is necessary to implement measures at the source. Noise absorbing surfacing materials and the use of less noisy tires are some solutions, together with reducing speed limits in certain places. (SD 2004) The reduction of speed limits in cities to 30 km/h is expected to help reduce the noise. (Bellona 2007) This has, however, proven to be a really difficult target to accomplish and in 2007 the government revised this target to 10 percent of 1999 levels by 2020. The target is also to reduce the number of people exposed to noise nuisance above 38 dB with more than 30 percent from 2005 to 2020. (SOE 2007)

5.15 Technological improvements

The Hungarian government (GKM 2004) wants to replace all "environmentally stressful vehicles" from the Hungarian roads by using benefits and tax incentives as policy instruments. Hungary establishes the annual vehicle tax for cars based on the cars weight, and sales taxes are lower for cars with catalytic converters and smaller engines. However, there are no taxes reductions for fuel efficient cars with environmentally friendly technology. (Rezessy *et al*. 2004) To convince more drivers to choose safe and environmentally friendly cars, the Norwegian government wants to implement a regulation that requires car retailers to inform about the cars collision and safety standards in their marketing in the same way as they are obliged to inform about the cars' environmental performance. (SD 2004)

Automatic traffic control is used in various places on the Norwegian main roads. This has resulted in a reduction in serious accidents on these roads. The system works today with an exact location measuring of the car and only from its front. The government discusses the possibilities to also control cars from the back, which will make it possible to also measure the speed of motorcycles, or whether to use an average measuring of the vehicles speed between two points. (SD 2004)

5.15 Alternative fuels

There is absolutely no mention of alternative fuels or biofuels in the Hungarian Transport Policy, even though the European Union has set targets for its member countries to substitute conventional fuels with biofuels. The first target of the European Union required member countries to reach 2 percent share of biofuels by the end of 2005 (COM 2001). Hungary's share according to the mid-term review of the European White Paper was only 0.5 percent. (Carlier 2005) The next target that Hungary is supposed to meet is 5.75 percent by the end of the White Paper period in 2010. (COM 2001) There might be reluctance to introducing these biofuel shares due to the loss of tax income. (Carlier 2005)

Since Norway is not part of the target plans set by the European Union, having a share of biofuels is not set as a target in the Transport Plan. Nonetheless, the Norwegian government has announced that it will require the biofuel share for oil companies to be 2 percent by 2008, 5 percent by 2009 and 5.75 percent in 2010 to keep up with the rest of Europe. (PFI 2007) Both biodiesel and gasoline mixed with ethanol (E85) enjoy tax exemptions in Norway. The governments' plan seems to be successful and the number of pumps is rapidly increasing. (PFI 2007)

The Norwegian Ministry of Transport and Communication (SD 2004) has been funding research for cleaner fuels, especially natural gas and electrical vehicles since the 1990's. During the last few years, however, research funding has been directed primarily to hydrogen research. The research and promotion of electrical cars have long been having numerous benefits in Norway. For electrical cars the benefits are that it can be bought without paying any VAT, it can park free on public parking spaces, it does not have to pay congestion fee, it has no annual registration fee or road tax, and with an electrical car one can use the public transportation lane on congested roads. (SD 2004) As Bellona (2007) points out, as long as car traffic is still growing we cannot only rely on the management of parking and road pricing and enhancement of public transportation, we also need to favor new technologies and especially hydrogen vehicles. But here also, there are set no clear measures in the transport plan on how to achieve this. (Bellona 2007)

6 Conclusion and recommendations

The Norwegian National Transport Plan is a lot longer and more detailed than the Hungarian Transport Policy. However, the Norwegian policy describes many background factors and explaining numerous possible measures, but it is similar to the Hungarian policy in not giving enough detailed plans on how exactly to improve the environment. This shows that the concept of sustainable transport is easier in overall theory than in practice, as pointed out by Dryzek (1997) and Feitelson *et al*. (2001) in their literature.

Feitelson *et al*. (2001) also point out that policy measures have a better effect when they are used in combination, as policy packages, to target a wider set of objectives and this is clearly understood by both the Hungarian and Norwegian government. The overall task for both their policies is to make a more sustainable transport sector for their countries, especially in the long term. Global warming is a rising concern for the transport sector and in both Hungary and Norway transport is contributing with almost one fourth of all the greenhouse gas emissions. The most polluting modes of traffic, road and air, are though still increasing in both countries and the policies show signs of retreat in really taking their part in reducing necessary greenhouse gas emissions, as stated in the various international agreements. The two transport policies are, however, focused on reducing the concerning trends at present and make more of a kind of damage control. This is too defensive and one would like to see the transport policies take a more offensive position towards their overall targets in the future.

The information provided to the public about the effects of the rising economy on the transport sector is not good enough and the transport policies are not considering this fact too much. The urban sprawl is continuing, especially in the big cities of Hungary, and this is creating more demand for transportation. The Hungarian policy focuses on increasing the public transportation and commuting capacity, but not much attention is given to cooperation with land use planning specialists to shorten the distances, so that people can easier choose alternative modes of transport. The Norwegian society is a bit more developed economically and the urban sprawl started earlier, so it is more under control, but there are still problems to overcome. In both countries the problem of making good integrated land use and transport planning is on the institutional level to make better cooperation between land use planners and transport authorities.

Economic incentives are the most effective measures to reduce private car use, but these are all very unpopular policy incentives among the public and, therefore, politicians are reluctant to implement fair pricing of the different modes of transportation. To make public transportation more attractive, it is needed in both countries to have higher taxes on fuel and annual registration and road taxes to make car use pay for its real costs.

Toll roads have long been an effective measure in the big cities in Norway and on road networks that have needed more than budget money to be constructed. In Hungary the motorways vignette system is helping to pay the construction costs, but the public's negativity towards toll roads is too high and toll roads do not seem to be a viable option, even though it is wanted by city planners and environmentalist. Toll roads can also help fund public transportation, as it does in Norway, even though Hungary uses a part of the parking fee to fund its public transportation. Parked cars are, however, flowing over the streets and sidewalks of Hungarian cities and more parking alternatives are needed. The construction of more underground parking facilities are opted for, but higher pricing should also be a measure. Most of the "park and ride" facilities in Budapest have disappeared and space is scarce, so the reduction of cars in the city center will be a difficult task.

Privatization is now a factor in all transport sectors in both Hungary and Norway. In Norway the parking sector too is dominated by private car parks and parking spaces and with increasing privatization there is a need for the governments to have strict regulations and better control to ensure fair competition. The same applied for the public transportation and both countries want to find better solutions for integrated tickets, which will make it easier for the public to use the service. It is recognized by both governments that the operating cost of the public transportation service can not be funded by the public spending alone. There have to be given subsidies from the government, but in order for privately owned companies to be able to increase the quality of their service, greater funding opportunities are needed. Budapest has one of the best public transport networks with a higher share of passengers than any other city in Europe, but there is an urgent need to increase its quality and more money should be earmarked for that than for developing new infrastructure. Fare prices are increasing fast and for Budapest to keep its good share, they should be maintained at a lower level. In Norway, the share of public transportation is lower and lower, the smaller the cities are. Therefore, a rewarding system for cities and regions that manage to enhance their performance is a very positive response.

Both Hungary and Norway developed national biking strategies in the late 1990's and still in force today. Biking policies are regarded as good measures and both countries are getting better networks, but more attention should be focused on biking networks in the city. This is where we find the biggest potential to shift car use on shorter travels to biking and walking. Safety of bikers and pedestrians are linked to the amount of cars in the city and the speed limits and reductions here will also create a cleaner air and thus make more people want to bike and walk, so more emphasis should be placed on that in the future.

The modal split is regarded as the most important aspect in reducing greenhouse gas emissions and reducing transports' share in global warming. Both Hungary and Norway have their abnormalities in the share of the modal split. While Hungary has a higher share of passenger and freight transport on rail than the European average, Norway has a remarkable share in freight transport on sea. But the trend in both countries is that these modes of transport are losing ground to road transport. Economic development has given preference to road infrastructure spending and now roads are being congested and call for even more road infrastructure development. The building of bypass roads can work to relieve traffic from the central parts of the cities, but it is then also needed to use toll roads to make sure that people use the whole bypass and not just parts. The European Union applies pressure, on Hungary especially, in terms of constructing the European TEN-T network, but Hungary should coordinate these plans better with the country's already existing infrastructure. The focus should also be to do more research in advance to make sure that all the necessary environmental considerations are well responded to.

Both governments, however, see a greater potential in the railway sector, but they are not doing enough in practice. Preference is somewhat still given to new road building, even though this is reducing the railway traffic on the same networks. The money should rather be spend on increasing the quality and safety of current roads, which costs only percentages as much as new roads and on spending much more money on creating a better quality railway infrastructure. Many fees and regulations have adverse effects on the development of railways and these barriers should be removed in both countries. Also, Hungary should learn as soon as possible from the Norwegian and other countries' experience and develop a high speed railway connection to the airport with its growing number of passengers.

Bus traffic has a fair share of the Hungarian intercity travels and it is growing steadily in Norway. Even though it is regarded as road transportation, buses are public transportation and are a good alternative to private car use. Bus companies manage to often keep lower prices than railways on the same route, which gives them a competitive advantage. The pricing should be harmonized from the state level and there should be better cooperation instead of competitiveness between buses and trains on the same networks.

Waterway transportation needs to work together with other modes of transport to be fully operative. Especially good railway access is important for the modal shift. The structure of ports and logistic terminals is very important for the share of both inland waterways and short sea shipping to increase. Boats can carry a bigger volume of goods than trucks and are, therefore, vitally important to utilize on the most important transport routes.

The logistics of transportation is getting increasing attention in the Norwegian transport policy, but logistic terminals have got more attention in the Hungarian transport policy and the development of these and increasing railways access are very good steps forward. Some of these terminals also have access to ports and can then hopefully increase the modal shift better. Better harmonization and structure of the terminals is the most important future aspect for the Norwegian government. Sea access and connection with railways are the aspects that need improvements.

The reduction of greenhouse gases becomes ever increasingly more difficult with the development of air transportation traffic. This means that more taxes should be imposed on the air transport sector to be used for environmental purposes. For Hungary, a tax on domestic flights might not be very effective due to the small amount of travels, but with the increasing international traffic in Ferihegy airport, Hungary should also participate with Norway, amongst others, in getting a standardized CO_2 tax for international flights. This will also have positive effects of airline companies using better and cleaner technology in the long run.

Road transport contributes the most to accidents and fatal deaths from the transport sector. In Hungary the rate of deaths per inhabitant is three times as much as in Norway. The problems are that even though cars on the Hungarian roads are getting better and safer, the traffic has increased and the speed limits have been raised and this has caused Hungary to again experience

more deaths on the roads than have been seen in a long time. The increased in traffic volume has also happened in Norway, but traffic accidents and death tolls have gone down. The car standard is also improving constantly in Norway, but there has not been any rise in speed limits overall. In the process of achieving a target of zero deaths, the Norwegian government wants instead to reduce speed limits in cities. This will also increase the safety for bikers and pedestrians.

Both in Hungary and Norway, the most frequent accidents happen to young people, so better education of young drivers is vitally important. And better monitoring and law enforcement are always necessary. The use of automatic traffic control could also be used in Hungary. This has helped reduce accident rates on networks with heavy traffic in Norway.

Local pollution and noise are problems that affect a lot of people, especially in urban areas in both countries. An overall reduction in car traffic and speed limits would, of course, help on these issues as well. But more measures are needed. Especially for noise reduction, the technological improvements of infrastructure material and road, railway and air vehicles are among the most promising factors. No target has been set by the Hungarian government, but the Norwegian government has already found out that even to achieve small improvements in reducing noise is difficult. Noise is also a very subjective matter, but a decrease in noise pollution and also local air pollution is something that will improve the quality of life for the whole society and should be focused on with maximum attention.

Regarding technological improvements both countries follow the European market and favor the most environmentally friendly cars with economic incentives, but still more should be done to inform the users and to make the layman prefer the best environmental alternatives. For alternative fuels also, the European market is a leading force. However, there is need for policies to make the companies have the necessary fuel and the car importers to sell cars with alternative technology. Norway attempts to be a leading force in this area, while this is where Hungary has most of improvements to make and should at least follow the EU guidance.

Overall the Hungarian and the Norwegian transport policies have a sustainable approach to the transportation future in both countries. However, for future policies there is an overall need for more concrete environmentally friendly measures and they should include well described practical objectives and targets that are easy and understandable for the common public.

References

Aas, H. 2002. Flytting av transporttilsynene blokkerer for sammenslåing. [Moving of the transport authorities are blocking the cooperation] *Samferdsel* (10) URL: http://samferdsel.toi.no/article11746-326.html

_____ 2003. Mange kryssende interesser i NTP-arbeidet. [Lots of crossing interests in the NTP-work] *Samferdsel* (2) URL: http://samferdsel.toi.no/article11749-328.html

Air Transport Action Group (ATAG) 2000. *Aviation and The Environment.* Report prepared for ATAG by the International Air Transport Association.

Association of the Hungarian Logistic Service Centers (MLSZKSZ) 2007. Homepage. URL: http://www.mlszksz.hu [consulted July 29th 2007]

Avinor [Norwegian Aviation Authority] 2007. Annual Report: 2006. Oslo: Avinor

BirdLife, CEE Bankwatch network, Friends of the Earth Europe, Transport& Environment. 2003. *Conflict Areas between the TEN-T and Nature Conservation: Case Study: TINA Road Development, Hungary*. Hungary

Budapest Airport (BAA) 2007. Budapest Airport Zrt: About Us: Environment. URL: http://www.bud.hu/english/about_us/environment_policy/?article_hid=1241 [consulted August 3rd 2007]

Button, K. J. 2001. *Are Current Air Transport Policies Consistent With a Sustainable Environment?* In Feitelson, E. and Verhoef, E.T. 2001. Transport and Environment. Celtenham: Edward Elgar Publishing Limited

Carlier, K. 2005. Developments in Urban Transport since the 2001 White Paper, Annex XVI of ASSESS Final Report, DG TREN, European Commission.

Commission of the European Communities (COM) 2001.*The European White Paper: Time to Decide 2001-2010.* Brussels. Commission of the European Communities

Department of the Environment, Transport and the Regions (DETR) 2000. *Encourage Walking, Advice to Local Authorities*. London: Crown

Dryzek, J.S. 1997. *The Politics of the Earth: Environmental Discourses*. Oxford: Oxford University Press.

European Cycling Federation (ECF) 2007. URL: http://www.ecf.com/1765_1 [accessed July 1. 2007]

European Conference of Ministers of Transport (ECMT) 1991. *Freight Transport and the Environment*. Paris: OECD Publications Service

_____ 1999. *What Markets Are There for Transport by Inland Waterways?* Report of the 108th Round Table on Transport Economics, Paris, November 13-14, 1997. Paris and Washington, D.C.: Organization for Economic Cooperation and Development.

European Federation for Transport and Environment (T&E) 2004. *Reconciling. Environmental and Social Transport policies.* Brussels. European Federation for Transport and Environment

_____ 2006. *T&E Statement on Publication of EU Common Transport Policy*. URL: http://www.transportenvironment.org/Article199.html [consulted July 21st 2007]

European Network for Cycling Expertise (ENCE) 2003a. Cycling and the Environment.

_____ 2003b. Cycling and Transport.

_____ 2003c. Cycling and Safety.

Feitelson, E., Salomon, I. and Cohen, G. 2001. *From policy measures to policy packages: a spatially, temporally and institutionally differentiated approach*. In Feitelson, E. and Verhoef, E.T. 2001. Transport and Environment. Celtenham: Edward Elgar Publishing Limited

Feitelson, E. and Verhoef, E.T. 2001. *Transport and Environment*. Celtenham: Edward Elgar Publishing Limited.

Fleicher, T. 1998. *Hungarian National Environmental Protection Program; Transport Sector Study*. A paper prepared for the COWI coordinated contract: Development of the Environmental Action Programme, Transport Sector Issue Paper. Budapest.

Green10. 2006. *Letter to European Commission President Barosso*. By T&E, CEE Bankwatch Network, International Friends of Nature, Climate Action Network Europe, Friends of the Earth Europe, European Environmental Bureau, European Public Health Alliance – Environment Network, WWF European Policy Office, BirdLife International and Greenpeace European Unit. Letter dated May 23, 2006. Brussels

Gwilliam, K., Kojima, M. and Johnson T. 2004. *Reducing Air Pollution from Urban Transport*. Washington. The World Bank

Hungarian Ministry of Economic Affairs and Transport (GKM) 2004. *Hungarian Transport Policy 2003-2015*. Budapest: GKM

Hungarian Ministry of Economy and Transport (GKM) 2006. *Transport Infrastructure Development in Hungary*. Budapest: GKM

_____ 2007. *Strategy 2007-2010*. Budapest: GKM

International Association of Public Transportation (UITP) 2000a. *Best Practices*. Brochure prepared by UITP General Commission for Urban Life.

_____ 2000b. *Solutions*. Brochure prepared by UITP General Commission for Urban Life.

International Energy Agency (IEA) 2001. *Saving Oil and Reducing CO2 Emissions in Transport*. Paris: OECD/IEA

Joó, F. 2004. *Country Fact Sheet March 2004: Hungary*. Prepared for the Transport and Environment (T&E) information series. Brussels: European Federation for Transport and Environment.

Kazatsay, Z. 2003. *The Hungarian Transport Policy – Accession to the European Union*. Ministry of Economy and Transport.

Krzywkowska, G. 2004. *Next Stop: Sustainable Transport, A Survey of Public Transportation in Six Cities of Central and Eastern Europe*. Szentendre: Regional Environmental Center for Central and Eastern Europe

Lukacs, A. 2004. *Transport: Public vs. Private*. Speech at the Stationed for Sustainable Transport workshop, Szentendre 21-22 June 2004. Regional Environmental Center for Central and Eastern Europe. URL: www.ngo.ro/site_item_full.shtml?x=9262

Maat, K. 2001. *Effects of the Dutch compact city policy on travel behaviour*. In Feitelson, E. and Verhoef, E.T. 2001. Transport and Environment. Celtenham: Edward Elgar Publishing Limited.

Majchrzak, A. 1984. *Methods for Policy Research*. Newbury Park, California: Sage Publications.

Marshall, S. 2001. *Public transport-orientated urban design:plans and possibilities*. In Feitelson, E. and Verhoef, E.T. 2001. Transport and Environment. Celtenham: Edward Elgar Publishing Limited.

Masser, I., Sviden, O. and Wegener M. 1992. From growth to equity and sustainability: paradigm shift in transport planning? *Futures* (24) 539-58.

McEldowney, M., Ryley, T., Scott, M. and Smyth, A. 2005. Integrating Land-use Planning and Transportation in Belfast: A New Policy Agenda for Sustainable Development? *Journal of Environmental Planning and Management*. (48) 507-526.

Nielsen, G. and Lange, T. 2007. *Bedre kollektivtransport i distriktene*. [Better public transportation in the districts] Transportøkonomisk institutt. [Institute for Transport Sciences]. Oslo.

Paper and Fibre Research Institute (PFI) 2007. From Biomass to Biofuels – A Roadmap for Future Solutions in Norway. URL: http://www.pfi.no/Biodrivstoff/From%20biomass%20to%20biodfuels%20-%20summary.pdf

Punch, K. 1998. Introduction *to Social Research – Quantitative and Qualitative Approaches*. London: Sage.

Ragin, C. 1989. *The Comparative Method. Moving beyond qualitative and quantitative strategies*. Berkley: University of California Press.

Stake, R. 2000. *Case Studies*. In Denzin, N and Lincoln, Y. 2000. Handbook of Qualitative Research. Thousand Oaks: Sage Publications.

Regjeringen [The Government] 2007. The Prime Ministers Office. URL: http://www.government.no [consulted 28.July 2007]

Rezessy, S., Antypas, A. and Szeker, K. 2004. *Environmental Policy Integration: Lessons from the Energy and Transport Sectors*. Berlin Conference on the Human Dimensions of Global Environmental Change. 3-4 December 2004.

Samferdselsdepartementet (SD) [Ministry of Transportation] 2004. Stortingsmelding nr. 24. 2003-2004. Nasjonal Transport Plan 2006 – 2015.

Statens Havarikommisjon for Transport (SHT) [Accident Investigation Board Norway (AIBN)] 2006. Annual Report: 2006. SHT.

_____ 2007. Accident Investigation Board Norway – Homepage URL: http://www.havarikommisjonen.no [consulted 10.August 2007]

Statens Kartverk (Statkart) [The National Map Service] 2006. *Arealstatistikk for 2006.* [Area statistics for 2006] URL: www.statkart.no/filestore/Profil/Areal_milj_og_plan/Arealstatistikk-2006-01-092.xls

_____ 2007. URL: http://www.statkart.no/?module=Articles;action=Article.publicShow;ID=4334 [consulted 12.July 2007]

Statens Vegvesen (Vegvesen) [The Norwegian Public Roads Administration] 2005. *Annual Report: 2005*. Oslo: Statens Vegvesen

State of Environment Norway (SOE) 2007. State of Environment Norway: Noise. URL: http://www.environment.no/templates/themepage____3032.aspx [consulted August 10th 2007]

Statistisk SentralByrå (SSB) [Central Bureau of Statistics] 2006. *Population: An ageing society.* URL: http://www.ssb.no/norge_en/bef_en.pdf

Statistisk SentralByrå (SSB) [Central Bureau of Statistics] 2007a. Domestic Transport Performance. URL: http://www.ssb.no/english/subjects/10/12/transpinn_en

_____ 2007b. *Veitrafikkulykker med personskader* [Road accidents with injuries]. URL: http://www.ssb.no/vtu [consulted August 10th 2007]

Stortinget. 2007. Stortingsdebatt [Parliamentary debate] February 2nd 2007. URL: http://www.stortinget.no/stid/2006/s070202-02.html [consulted June 9th 2007]

Teune, H. 1990. *Comparing Countries: Lessons Learned*. In Øyen, E. 1990. Comparative Methodology: Theory and Practice in International Social Research. London: Sage Publications.

Twaalfhoven, G.J. and van Ham, H.C. 2001. *Sustainable Freight Transport for the Netherlands: an Evaluation of a Policy Analysis Study*. In Feitelson, E. and Verhoef, E.T. 2001. Transport and Environment. Celtenham: Edward Elgar Publishing Limited.

United Nations Environmental Program (UNEP). 2007. Earthwatch: Emerging Environmental Issues: Noise. URL: http://earthwatch.unep.net/emergingissues/health/noisepollution.php [consulted June 9th 2007]

Veen Groot, B. and Nijkamp, P. 2001. *International transport and the environment: an assessment of trends and driving forces.* In Feitelson, E. and Verhoef, E.T. 2001. Transport and Environment. Celtenham: Edward Elgar Publishing Limited.

World Health Organisation (WHO) 1999. *Guidelines for Community Noise.* Geneva: WHO.

Zecca E., Bak M., Gerçek H., Van Zeebroeck B., De Ceuster G. and Gühnemann A. 2005. Member States policy review, Annex II of ASSESS Final Report, DG TREN, European Commission.

Personal Communications with Organizations

Bellona. Formal Interview. Oslo, 8 June 2007. URL: www.bellona.no

Friends of the Earth Norway (FEN) Formal interview. Oslo, 7 June 2007. URL: www.naturvern.no
Unpublished materials about their inputs to the national transport plan: http://www.naturvern.no/cgi-bin/naturvern/imaker?id=328&visdybde=3&aktiv=152

Hungarian Institute for Transport Sciences (KTI) Formal interview. Budapest, 18 July 2007. URL: www.kti.hu
Graphs, statistics and maps can be found at the following link: www.kti.hu/kti.php?event=100201&order=2&folder=630

Jernbaneverket [The Norwegian Railways Administration] Formal interview. Oslo 11 July 2007. URL: www.jbv.no

Levegó. Formal interview. Budapest, 15 July 2007. URL: www.levego.hu
Some information gathered can also be found in the following articles: www.levego.hu/kiadvany/ifejla-a.htm, www.levego.hu/english/eukozl_angol.pdf and www.levego.hu/kiadvany/ifejla-a.htm

Statens Vegvesen (Vegvesen) [The Norwegian Public Roads Administration] Formal interview. Oslo, 11 July 2007. URL: www.vegvesen.no

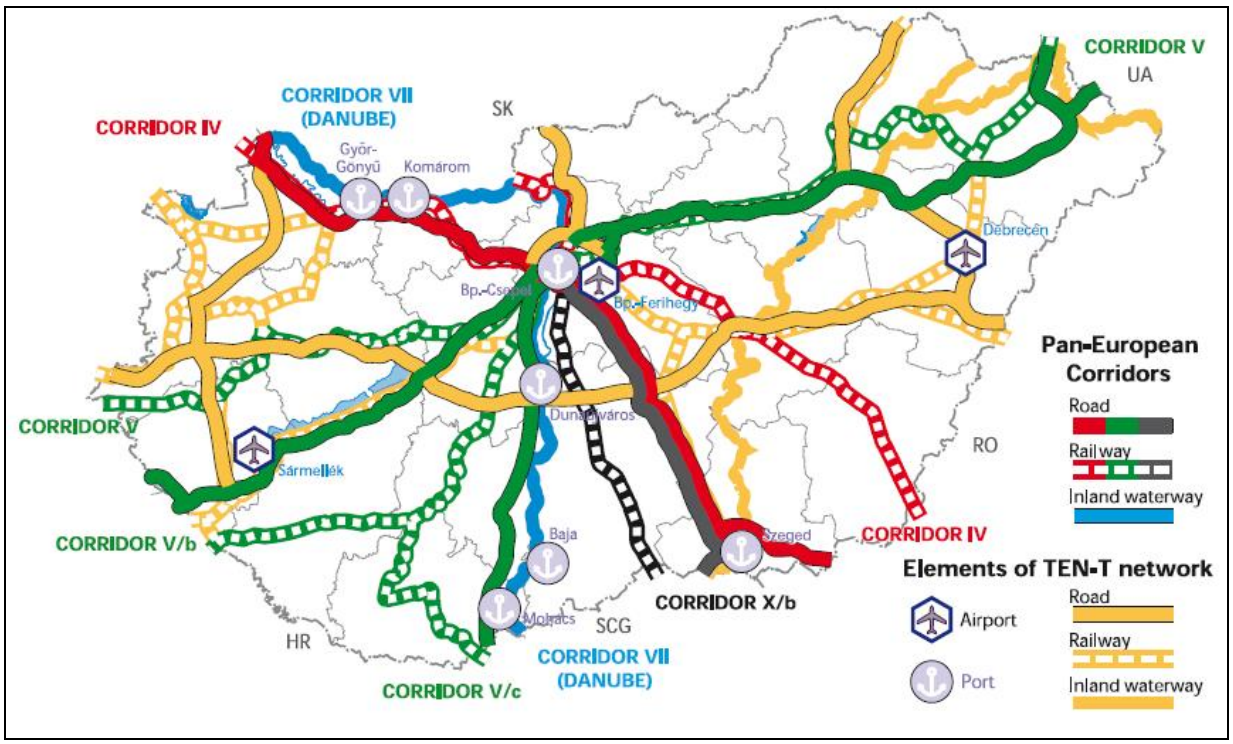
Annex I

Europe

Source: www.travelswise.com

Hungary

Source: www.mapquest.com



Source: GKM 2006

Norway

Source: Statkart 2007