Baltic 21 Series No 8/98:

Baltic 21 Transport Sector Report

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*While national yearbooks of each country are an obvious prime source to turn to for data compilation, most of the statistics in the tables are culled from international statistics because international compilations provide comparative data. Some member countries indicated in reaction to the first draft of this paper that the national sources show somewhat different figures. These were not used in order to maintain the same source in each table.

List of Abbreviations Used

BA21	Baltic 21
BAT	Best Available Technology
BSR	Baltic Sea Region
CAFE	Corporate Average Fuel Economy
cap.	capita
CBA	Cost Benefit Analysis
CBSS	Council of Baltic Sea States
CEI	Central European Initiative
CNG	Compressed Natural Gas
CPE	Centrally Planned Economies
EBRD	European Bank of Reconstruction and Development
EC	European Commission
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EU	European Union
GDP	Gross Domestic Product
GVW	Gross Vehicle Weight
HDV	Heavy Duty Vehicles
HELCOM	Helsinki Commission
I&M (programme)	Inspection and Maintenance (Programme)
IFIs	International Financial Institutions
IMO	International Maritime Organisation
inh.	inhabitants
ISO	International Organisation for Standardisation
km	kilometres
km2	square kilometres
kph	kilometres per hour
LCA	Least Cost Access
LCP	Least Cost Planning
LCTM	Least Cost Transportation Management
LDV	Light Duty Vehicles
LPG	Liquefied Petrol Gas
MARPOL	International Convention for the Prevention of Pollution by Ships
mio.	million

N-W	(countries) North-West (countries) (= Denmark, Finland, Germany, Sweden)
NGO	Non-governmental organisation
OECD	Organisation for Economic Co-operation and Development
p-km	Passenger-kilometres
PHARE	A programme of assistance for the restructuring of the economies of Poland, Hungary, initially, and now extended to other central and Eastern European Countries
PITF	Programme Implementation Task Force
PM	Particulate Matter
PPP	Purchase Power Parities
RO/RO	Roll-on/Roll off
RVP	Reid Vapour Pressure
S-E	(countries) South-East (countries) (= Estonia, Latvia, Lithuania, Poland, Russia)
SEA	Strategic Environmental Assessment
ST	Sustainable Transportation
t-km	tonne-kilometre
TACIS	A programme of assistance for the restructuring of the economies of non-EU applicant states
TCM	Transportation Control Measures
TDM	Transport Demand Management
TEN	Trans European Networks
TWC	Three Way Catalyst
UBA	Umweltbundesamt (Federal Environmental Agency)
UBC	Union of the Baltic Cities
UN-ECE	United Nations Economic Commission for Europe
UNCED	United Nations Conference on Environment and Development (Rio de Janeiro 1992)
USD	United States Dollar
V.A.T	Value Added Tax
VASAB	Vision and Strategies around the Baltic Sea 2010
WB	World Bank
WHO	World Health Organisation

Chemical Formulae

CO	Carbon Monoxide
CO_2	Carbon Dioxide
HC	Hydrocarbon
NO_2	Nitrogen Dioxide
NO_X	Nitrogen Oxides
SO_2	Sulphur Dioxide
VOC	Volatile Organic Compound

Foreword

The mandate to develop an Agenda 21 for the Baltic Sea Region, with the objective Sustainable Development, stems from the Heads of Government of the region and the meeting of Ministers for Foreign Affairs of the Baltic Sea Region, within the framework of the Council of the Baltic Sea States, including the European Union. Because of this, Baltic 21 comprises all Nordic countries and all other countries around the Baltic Sea. For the Russian Federation only the north-western part is included. The European Union is also a participant in the elaboration of Baltic 21.

Baltic 21 was officially launched by the Ministers of Environment in October 1996 in Saltsjöbaden and the Saltsjöbaden Declaration provides the terms of reference for the Baltic 21 set-up and process. In their back-to back meeting, the Ministers responsible for spatial planning in the BSR also decided to concentrate work on sustainable development, and in particular to integrate relevant activities with the Baltic 21 process.

Baltic 21 is a democratic, open and transparent process. It is steered by the Senior Officials Group (SOG), with members from the Governments of CBSS and the European Commission, NGOs, intergovernmental organisations like HELCOM, VASAB, International Baltic Sea Fisheries Commission (IBSFC), Nordic Council of Ministers and the international development banks (World Bank, EBRD, EIB, NIB, Nefco). All Baltic 21 documentation; back ground documents, SOG meeting reports, workshop reports, draft texts, are published on the Baltic 21 website (http://www.ee/baltic21).

The emphasis of Baltic 21 is on regional co-operation and on the environment and its bearing on economic and social aspects of sustainable development. The work focuses on seven sectors of crucial economic and environmental importance in the region. For each sector, goals and scenarios for sustainable development have been elaborated, as well as a sector action programmes including time frames, actors and financing. The responsibility for the sector work is distributed among the SOG members. The seven sectors and their lead parties are: Agriculture (HELCOM and Sweden), Energy (Denmark and Estonia), Fisheries (IBSFC), Forestry (Finland and Lithuania), Industry (Russia and Sweden), Tourism (Estonia, Finland Baltic Sea Tourism Commission) and Transports (Germany and Latvia). Work on the Baltic 21 initiative has involved some 300 persons in the region.

All sectors have presented their work in a sector report. This report is a result of the work carried out in the transport sector. All Baltic 21 countries and the following organisations; Swedish NGO Secretariat on Acid Rain, Lithuanian Green Movement, Baltic Environmental Forum and Friends of the Earth Estonia have participated in this work. The work was organised by the lead countries Latvia and Germany, represented by the Ministry of Environment and the Federal Environmental Agency of Germany and the Ministry of Environmental Protection and Regional Development and the Ministry of Transport of Latvia. The work was supported by the consultants Ökopol and the Wuppertal Institute for Climate, Environment and Energy GmbH.

The sector reports, and other working papers produced by i.a. VASAB, IFIs, the European Commission and Baltic Local Agenda 21 Forum constitute the background for the integrated and comprehensive Agenda 21 for the Baltic Sea Region. These reports are however not an integral part of the Agenda 21 for the Baltic Sea Region. The Agenda has been adopted by the Council of the Baltic Sea States and will be reported to the Prime Ministers of the region at their next summit.

1. Goals and Objectives

1.1 Sustainable Transportation (ST): The Idea and the Principles

Mobility of people and of goods is an essential part of all social and economic activities. In modern societies, which are characterised by high-rated division of labour in industrialised production chains, by open markets and by - compared to most countries of the world - high incomes of the private households, passenger cars and trucks have become the most important transport modes. Non-motorised transport, which in early societies has been the common way to link together the places of activities, and rail transport, which has been the basis of industrial development since the second half of the 19th century, has to a large extent been substituted by the car in daily mobility, and by trucks, respectively. The result of this process was also a significant change in land use patterns.[1]

This process has begun during the 20s and 30s in the United States and spread in the wealthier countries all over the world. The trend is still going on in Europe although here modern public transportation systems and high-speed railways have been established in transport market. On the other side the shift towards road transport - both in the passenger and the freight market - reduced the share of other modes and led in some areas to a reduction of services offered by public transport concerning coverage, frequency and quality.

As the transport mode with the highest annual rate of increase, air transport has gained importance in the last decades, both for tourist and business purposes. The developments in the transport sector also include sea transport changing its structure in terms of the kind of goods, use of containers, high travel speeds and short harbour times.

The common problems of the transport sector in all industrialised and wealthy countries are a threat to and partly a destruction of nature and an increasing demand for mineral oil fuels, severe air pollution and an increasing noise level due to transport activities. Furthermore, congestion especially in large cities and conurbation, fatalities and injuries due to traffic accident are adverse effects of this development. From the social point of view the trend towards individual motorisation causes unequal mobility chances and disparities in burdens and advantages, e.g. burdens for those who cannot drive or cannot afford ownership of a private car.

The transport system demands large investments and, thus, imposes economic burdens to the public budgets. This leads to the conclusion: High per-capita transport activities in terms of passenger kilometres and ton kilometres, done mainly by passenger cars and trucks, not only indicate economic progress and welfare but also cause severe problems which dominate the agenda in transport and environmental policy of most states since decades.

In order to ensure mobility with less negative impact to nature and to the societies, most countries promote transport modes with less specific fuel consumption and emissions, especially use of public transportation in urban transport, as well as

[1] Land use planning consolidated the increasing role of road transport and in many cases even facilitated it. In particularly, the decline of city centres and industrial locations to places with easy access to motorways has not only fuelled further the demand for road transport, but also compromised the competitive position of other modes.

more walking and cycling, and the transport of goods via rail and inland navigation respectively coastal shipping. Nevertheless, market conditions as well as individual preferences currently do not support the use of the modes with less specific negative impact.

The threats and damages to human health and to the natural environment make the current transport structures unacceptable in the light of the ideas of sustainability. Applying the sustainability criteria to the transport sector, leads to a number of definitions and principles, part of which are laid down in Annex 1. In a very simplified approach, we can differentiate between the environmental, social and economic goals that have to be satisfied in sustainable transport:

- environmental: the rate of use of non-renewable resources should not exceed the rate at which renewable substitutes are developed, the rate of pollution emission should not exceed the assimilative capacity of the environment (see Daly 1990 and Kageson 1994), biodiversity should be protected,

- social: access to all activities necessary to participate in social life has to be guaranteed as far as possible, air quality and noise should not exceed the health standards suggested by the WHO (World Health Organisation), accident risks should be minimised,

- economic: mobility of persons and of goods necessary to achieve a prosperous economic development has to be provided, without overdrawing the financial possibilities of the public and private budgets.

As a practical consequence of these (and similar other) criteria for sustainable transportation, the transport sector needs structural changes that can be described as follows:

- decrease the demand or at least mitigate the increase of demand for motorised transport of people and goods, e.g. by establishing transport avoiding spatial structures, by applying fiscal incentives and other policy instruments to promote regional access rather than long distances,

- shift transport demand from unfavourable transport modes (in terms of environmental, social and economic impact) to those with less negative impact on man and nature,

- ensure the use of best available technology (BAT) both for the transport vehicles and for the management and communication tools in transport,

- promote responsible behaviour of individuals and responsible decisions by enterprises.

1.2 ST in the Baltic Sea Region (BSR) Countries: Chances and Challenges

The countries of the Baltic Sea Region[2] have very different political, social and economic conditions. Common element of the countries belonging to the Baltic Sea Region is the share of one geographic space; the Baltic Sea itself. The Baltic Sea offers favourable conditions for slow moving goods transport by ships and at the same time is a barrier to any form of high-speed ground transportation. Due to the geographic conditions, ground transport forms something like a ring of transport corridors around the Baltic Sea rather than a network. Therefore, a high share of ground transport will be concentrated on these corridors. Integration of transport planning and spatial development planning will be particular important in the areas along these corridors. Because of low density of population in large parts of the Baltic Sea area, air transport will continue to play an important part in connecting the metropolitan centres of the region.[3]

With the Baltic Sea being the common element characterising the region, shipping has a special importance and chances. In the times of the Hanse (12-16c), Baltic Sea shipping was the basis of trade and wealth of a number of major cities at the coasts, which are still of importance today. Although shipping and harbours are of high importance for import and export of goods today, as well as for travelling via passenger ferries, the technical and economic development in the transport sector made road transport play the most important role also in the Baltic Sea countries since about half a century. Today maritime transport, in particular RO/RO and ferry transport (especially the trend towards high-speed ferries, called feeder-ships), requires specific attention with regard to energy consumption and environmental impact.

Although the common element is the Baltic Sea itself, and the natural and cultural aspects linked to this, the geographical situation within the various countries differ with respect to the coastal structure, soil, vegetation, shipable rivers etc. The most obvious political and economic differences are based in the fact, that Estonia, Latvia, Lithuania, Poland and Russia until the end of the 80$^{Th.}$ have applied centrally-planned economic policies without free markets, while Denmark, Germany, Finland and Sweden have been living under the conditions of widely open markets and free economic activities of individuals and enterprises over long periods. With respect to the transport sector, the different policies had consequences for a.o. the transport infrastructure, especially the road network, the vehicle fleets, the passenger car ownership rate. Also, the technical parameters of the vehicles differ. These and other parameters, and especially the consequences, are discussed in Chapter 2.

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[2] Within the framework of the Agenda 21 for the Baltic Sea Region the Baltic Sea Region is defined as the Nations wholly or partly bordering the Baltic Sea watershed. In this text Finland, Sweden, Denmark and Germany are indicated as the West Baltic Sea Region (we use accordingly the category for differentiation North-West (Baltic) Countries) and Estonia, Latvia, Lithuania, Poland and Russia as East Baltic Sea Region (we use accordingly South-East (Baltic) Countries). The Council of Baltic Sea States (CBSS) membership also includes Norway and Iceland. Island and also Belarus are not taken into consideration of this report.

[3] Although air transport is an important issue of ST aspects this report could not evaluate the subject in depth. This report will only give some general remarks about the development of air transport without addressing to the situation in the Baltic Sea Region in particular. Because of the available data basis (which was rather incomplete towards air transport) and concerning further activities respectively actions, focus of this report including also the action programme is ground respectively road transport.

With respect to the transport sector and its problems, it could be useful to differentiate between the international, long distance transport over the harbours and the transit to the hinterlands on the one side, and on the other side the local urban as well as rural transport issues dominated by commuting, shopping and leisure activities of the people, as well as the goods transport associated with the local production of goods and the distribution of consumer ware. While the international transport is an issue to be dealt with under the perspective of international competitiveness and relations to foreign countries, with all decisions being of importance for the external matters, most of the local transport activity and decisions have no direct relation to the Baltic Sea, its shipping and to international matters.

For the actual environmental and social impact, the latter part of the transport sector may be even more important than the international aspects. In respect to this assumption especially regional and local co-operation could challenge long-distance transport. This is also a question of the size of the countries and of the provinces included in this study, respectively. For the three relatively small Baltic States, the economic importance of the harbours, of Baltic Sea shipping an of the transit of goods via rail and road through its territory has a higher relative importance than for e.g. for Germany with is larger share of economic activities being independent from Baltic shipping.

The chance given by the fact that Baltic Sea shipping in principal could provide both environmentally favourable and cost-efficient access to people and goods, has to be looked at together with the risks. The Baltic Sea is a highly vulnerable ecosystem which is threatened and damaged also by shipping.

Compared to land transport via rail and roads, shipping is a rather slow but relatively sustainable transport mode[4]. But at high speeds of fast modern ships, energy consumption and exhaust emission[5] are increasing rapidly, leading eventually to levels higher than land transport. The specific emission of fast ferries and of fast container ships have to be discussed, as well as its other negative impact like noise etc.

A more balanced distribution of transport between the different modes is a necessary condition for long term sustainability. Intermodality is an essential component for improving sustainable mobility as it promotes the use and development of more environmentally friendly transport modes. Improvements in intermodal transport chains are urgent steps to a more sustainable transport development.

1.3 Goals and Objectives of the Baltic 21 Process

The Baltic 21 activities must be seen in the context of very lively discussions about the future of the European transport. The range of Baltic institutions (e.g. Helsinki Commission (HELCOM), Vision & Strategies around the Baltic Sea (VASAB)) is the expression of the co-operation between the nations of the Baltic Sea Region.

Baltic 21 is organised in seven sectors one of which is transport. For each sector goals and scenarios for sustainable development should be elaborated, as well as an action programme, including time frames, actors and financing.

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[4] The infrastructure requirements are small and large volumes of goods can be transported at low energy cost.

[5] Especially high emission of sulphur dioxide and nitrogen oxides.

Parallel to the other sectoral activities, the transport working group, headed by the two lead countries Germany and Latvia, decided to concentrate on the process of initiating discussions between the member states about sustainability aspects of transport in the region, about useful definitions for sustainable transport, about the main issues that should be tackled in the countries of the region, and about indicators to be used to monitor the Agenda 21 process in the transport sector. An Action Plan is going to be developed that contains practical steps towards a sustainable transport future for the region.

The European Commission is increasing its engagement in the infrastructure sector, see Trans European Networks (TEN), even if most of the financing is left to the national governments. In the Baltic region, in the N-W countries as well as in the S-E countries, major infrastructure projects are under construction or under discussion. In the N-W there are a. o. the Swedish-Danish Oeresund bridge (planned to be completed in 2000), the Great Belt bridge connecting the Danish islands of Fuenen and Sealand (for rail in operation since June 1997, for road vehicles expected to be operational in mid-1998), the highway A 20 in the German State of Mecklenburg-Vorpommern, leading West - East not far south of the Baltic coast. In the S-E countries, major plans are prepared, oriented on the so-called "Crete corridors" defined by the EC Transport Ministers in their 1994 meeting in Greece.

In this phase of heavy infrastructure investments, there is also an increasing criticism against it. At the 3rd Pan European Transport Conference in Helsinki in June 1997 EC Transport Commissioner Neil Kinnock said: "Building infrastructure is not the only answer. In many cases indeed, it has become an increasingly unrealistic option because of its cost, both financial and environmental." This was agreed upon by many financial as well as environmental experts. The question has to be discussed how much infrastructure is necessary to support economic and social progress, and what strategies would be suitable reach this without unacceptable risks and burdens for man and nature. The Baltic 21 process contributes to this discussion and to the search for sustainable solutions; where a broad understanding of "sustainable" includes the economic, environmental and social aspects.

In the working group it was decided to identify concrete steps that can be taken to foster the exchange of views and to start solving actual problems by multilateral and bilateral actions but not to aim at the establishment of own institutional structures for the future collaboration. The steps are described in Chapter 4. The working group proposes to make use of already existing bodies in the framework of regional co-operation structures, in particular HELCOM, VASAB and the UBC (Union of the Baltic Cities). The Baltic 21 process with regard to transportation should also be understood as a supplement to the UN-ECE (Regional Conference on Transport and the Environment held in Vienna, November 1997) working process and the EU approximation process, focusing on matters related to regional co-operation on sustainable transportation.

Under these conditions, and under given time constraints for the preparation of the transport sector report, the analysis and the recommendations only can be of tentative nature, demanding further refinement on the basis of a broader negotiation process and information gathering.

As a necessary requirement for all future steps, broad information about the situation of the transport and of the environmental issues in the member countries have to be collected systematically, and distributed. This includes, inter alia, data about infrastructures, transport activities, planned investments, assumptions for

prognoses and scenarios, policy principles and institutional arrangements. To support spread of information, a questionnaire had been distributed in mid-1997 by the two lead countries to all members of the Baltic 21 process. It asks for data in its Part I. Almost all of the addressed countries have answered, this is a useful first step to look at the own shortcomings in data collection, and it could be a starting point to create a joint information basis. Although due to lack of statistical resources only from a few countries all data could be provided, this survey allows the participants to start the discussion about sustainability issues in transport.

In order to gather information about the national policies in the field of transport and the environment, Part II of the questionnaire asked for policies and institutional arrangements. Although these questions were not answered by all member states, with additional material and verbal information received on the workshops certain aspects can be discussed, as well as recommendations given.

Transport is closely linked to other sectors of human activities which, like agriculture, industrial production and tourism, cause the demand for transport. In the Baltic 21 process special emphasis is laid upon such cross-sectoral issues. With the other sectors dealing with fishery, agriculture, forestry, industry, energy, and tourism, issues of joint interest are to be defined which have to be tackled together with the transport perspective. With respect to the other sectors mentioned, some short remarks can be made about links with transport:

- fishery: demand for transport services for products, energy consumption, water pollution;
- agriculture: demand for transport services for products, conflicts because of fertile land used for transport infrastructure;
- forestry: demand for transport services for products, conflicts with land demand for transport infrastructure;
- industry: demand for transport services for products, logistic chains in the production and distribution networks, location of production facilities to support use of environmentally sustainable transport modes, transport of dangerous goods;
- energy: common data basis for mineral oil products and electric energy used in the transport sector, pipeline transport is dealt with in the industry sector
- tourism: close connection with transport infrastructure, vehicles and fuel use, travel to places of interest demand transport services, long-distance travels within the region by air and ferries, short and medium distances also by passenger cars, buses and rail.

A broader debate about future joint activities is expected to start after finalising the sectoral reports.

2. Current Situation in the Transport Sector of BSR

Looking at Russia, Germany and Poland especially, the question arises how much of its territory should be included in the discussion of Baltic Sea issues. The importance of the Baltic Sea and its transport declines with increasing distances from the harbours but in principal reaches far beyond hundreds of kilometres from

the Baltic coast. Vice versa, the impact of transport activity on the Baltic Sea environment increases the more those transport activities take place near the coast - in a very rough estimate.

For practical reasons, and because the statistical information delivered by the member states of the Baltic 21[6] process refer to the complete countries areas, their whole territories and populations are included here. Especially for the case of the Russian Federation and for Germany and Poland - in declining order - areas are included which hardly can be named being Baltic Sea regions.

Therefore, the problems discussed and the recommendations developed under the region Baltic Sea aspects may not be applicable to all territories of the Baltic 21 member countries.

2.1 Different Starting Points of Baltic 21 Member Countries[7]

There is a large range of different situations, options and problems existing in the member countries of the Baltic 21 process. In a very simplified approach we can differentiate between the north-western Scandinavian states of Sweden, Norway, Denmark and Finland and additionally Germany in one group, characterised by its high average income (see Annex 2: page 2; per-capita GDP between USD 22,000 and 28,000 (in purchase power parities: between USD 17,000 and 23,000), large motor vehicle fleets (see Annex 3: page 11; car densities between 320 and 500 per 1,000 inhabitants), and also high per-capita fuel consumption in transport (between 600 and 900 kilograms per year). These countries have a high share of road freight in goods transport and intensive economic ties to the EC and other traditional free market countries. The countries are marked N-W countries in this paper.

In another group there are the former state economy countries Estonia, Latvia and Lithuania, Poland and Russia (resp. the Russian regions in the Baltic Sea area). Although the countries of the second group - named hereafter S-E countries - are rather different in their transport structures, motor vehicle ownership and economic activities, some common parameters can be described to be different to the first group. These are a. o. a lower per-capita GDP (see Annex 2: page 2; about USD 1,000 to 2,000, in purchase power parities USD 3,000 to 5,000), lower rates in passenger car ownership (see Annex 3: page 11; between 100 and 250 per 1,000 inhabitants). Fuel consumption in transport is relatively low (between 150 and 450 kilograms per capita and year), due to a high share of public transportation in passenger mobility, and high shares in goods transport by rail rather than by long distance trucks.

The differences also include various levels of vehicle emission standards and of technical condition of the vehicle fleets in general. Due to the tightened emission standards in the Scandinavian countries and in Germany since the mid 80's, most passenger cars in these countries are equipped with 3-way catalysts which use unleaded gasoline, and also the truck fleets show relatively low specific emissions. The functioning inspection and maintenance (I&M) programmes contribute to

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[6] The Agenda 21 for the Baltic Sea Region is termed the Baltic 21.

[7] It should be repeated that these assessments must be looked at as a very rough guess. The comparability of monitoring data in general is very questionable, the problem needs further evaluation. Certain heaths aspects can only been mentioned here: lead in gasoline has been phased out completely or nearly completely in a number of states, others still have not yet banned leaded gasoline. In Chapter 4.3 and in Annex 4, some information is given on actual policy decisions concerning emission aspects.

specific emissions per vehicle km below that level of the former state economy countries.

On the basis of the information received, it is hard to guess if the higher specific emissions in the S-E countries are compensated by the - from the sustainability point of view - more favourable transport structure with its lower per-capita passenger car use and lower per capita truck-km. This differs with respect to the constituent, the total and the specific values are given in the Annexes 2 and 3. Some aspects are discussed in this chapter further below.

With the economic changes in the S-E countries now going on, not only the private households and enterprises restructure their transport activities, but also the governments and municipalities face decisions about the future role and the legal as well as financial frame for public transportation respectively rail services. In the N-W countries, EU regulations, aiming at an opening of the transport markets also in public transportation and rail transport, have changed the financial conditions as well as the legal status of some public companies. Public subsidies will to a certain extent be cut down, and private enterprises will compete with traditional public transportation companies. In general, we experience an increased financial pressure in the public transportation sector. E. g., local and regional rail services are more and more questioned due to efficiency considerations while high-speed services are extended. In the S-E countries, the institutional and financial rearrangements also bring problems to this tranport sector: The subsidies from the national level to local public transport may be shortened as well, and the national budgets may not be able to cover expenses for the necessary modernisation of the rail systems.

The air pollution situation in the Baltic Sea region has not been covered by the questionnaire to the member states because this very complex problem would by far exceed the working capacity available in the Baltic 21 process. Based on international published data[8], it can be assessed roughly that the background concentrations of particulate matter (dust) and SO_2 in general are higher in the S-E countries. The traffic related sites in those countries also show high values of these substances, also of NO_2 and of CO (for example: St. Petersburg, Warsaw, Gdansk). In the large cities and conurbations in the N-W countries, especially CO is very low as a consequence of the introduction of tightened emission standards especially for passenger cars, forcing manufacturers to equip the engine with three-way catalysts. NO_2 levels are still in critical magnitude but below WHO standards; here the diesel trucks, where no such high emission reduction rates as for gasoline cars could be achieved, contribute a lot. Diesel vehicles are also the sources of Particulate Matter (TSP or PM 10) where the ambient air standards partly are exceeded in traffic related sites (for example: Stockholm, Hamburg, Copenhagen).

The N-W and S-E countries face a different situation concerning technology availability and application in the transport system. Apart from the modernised vehicle technology in the N-W countries one focus of innovation of the transport sector is the development of transport telematics aiming at improved organisation and operation of traffic.

In order to increase the efficiency and reliability of transport operations, different technology systems are already in use and still under preparation in the N-W countries. Basic technology is the telecommunication, which allows to monitor,

[8] Zantvoort, Sluyter, Larssen: Air Quality in Major European Cities, National Institute of Public health and the Environment, Bilthoven/Netherlands and Norwegian Institute for Air Research, Kjeller/Norway, 1995

correct and control e. g. the traffic flow. The telematic equipment (e. g. route guidance, variable message signs or radio data information) of streets/roads and vehicles should influence the vehicle itself resp. behaviour of its driver, but is hoped to serve also the customers of public transportation. Information technology in the freight transport sector is dealing with a wide range of freight management functions or systems. Main objective is the effective planning (of the logistic chain) and monitoring of the vehicle fleet and the freight. Information technology can support a shift from long-distance road to intermodal transport by making rail and shipping more competetive, e.g. by reducing time losses.

The development of goods transport and trade in S-E countries is characterised all in all by a lack of those systems, of expertise, modern equipment and strategies paying heed to the requirements and wishes of the international enterprises, to economic efficiency and especially to the environment. The way in which the systems work today in the transport field cause both great delays of the transport and delays in connection with documentation, customs clearance and other procedures.

This causes very poor utilisation of the existing transport equipment while at the same time not enough money is earned to replace what is often obsolete and highly polluting equipment. For lorry transport, the system delays have meant that the transport capacity has had to be increased by approximately 30 per cent compared to 1996 merely to be able to supply the same volume of transport service.

The development is illustrated quite well by the fact that many companies have been forced to increase the transport distance, and thereby increase the environmental impact of the transport, due to the very poor facilitation of border crossing. At the same time there is a tendency to use ports where the succeed surface transport is much longer than needed. The need for more equipment, as well as restrictions, also mean that obsolete equipment is used to a higher extent for transport to Russia. This development takes place at the same time as lack of efficiency and competitiveness on the part of the railways "force" more and more cargoes to be switched to lorries, because the railways are unable, as the situation is, to provide the flexible customer service required in today's competitive environment.

Also in respect to urban development the N-W and S-E countries are facing different situations respectively starting points. Especially in the N-W, the development of housing, industrial location and retail business was not applied to the transport planning process, which lets to urban sprawl increase within the last decades. People became more captive to the use of the private car, where locations were not concentrated along public transit lines. Advanced spatial planning regulation try to force the urban and regional settlement structure and the transport system development in a co-ordinated way, in order to prevent further urban sprawl and to protect landscape from infrastructure investment. But planning regulations have not turned out to be efficient enough to avoid continued growth of vehicle kilometers because the economic incentives formed a. o. by externalisation of social cost of transport.

The S-E countries did not yet undergo this extent of sprawl development. But like in the N-W, the transport system in the S-E countries after the political and economic changes also is becoming an organising element that establishes unfavourable forms of settlement. The automobile presents the possibility of abandoning the compactness and efficiency in the current S-E countries´ land-use patterns. The economic restructuring process, which is connected with an increasing motorisation plus a lack of spatial planning regulation the S-E countries might face

a similar process of suburbanisation like the N-W countries in the past.

2.2 Role of Indicators: State, Pressure, Response[9]

Within the complex structural situation of the various Baltic Sea countries sketched above, all decisions made by public and private parties influence the chances for future transport development. In order to support a sustainable transport future, the question arises how sustainability can be measures, and what kind of indicators could be applied to guide the decisions. Indicators are to be used both to help guessing the current situation and to assess the consequences of the various options.

In this Agenda 21 activity, the information asked for in the questionnaire, and information from other sources, are used to characterise the situation of the transport sector of the member countries with respect to sustainability. Also, the questions are meant to form an information basis for future decisions.

Although it is not possible to define sustainable transportation in simple terms for all Baltic Sea countries - see Chapter 1 -, it is possible to give some general assessments:

- The environmental, social and economic figures describing the quality of the environment, the health burdens, debts and investment needs, inter alia, are named status indicators; these mark the current position of the countries;

- The underlying forces of the current and the future development in the field of transport and the environment, which influence the increase of transport demand and indicate future chances and conflicts, are named pressure indicators;

- Both the current situation and the driving forces of the development urge the responsible institutions to take actions to handle and to improve the situation, respectively, and to influence the course of development. This is characterised by so-called response indicators; these could include a. o. legal provisions on pollution standards and impact assessment, funds allocated to be invested in the future, qualified staff, drafts of appropriate regulations.

As has been explained above, environmantal indicators like e. g. air pollution have not been a main focus of the questionnaire. But it should be kept in mind that the Baltic Sea region has a special regional vulnerability, because of the specific Nordic ecosystem consisting of Nordic woods and lakes. Lake acidification caused by SO_2 and NO_X has been observed already for a long time; also soil acidification is an issue because of the for the region typical poorly buffered soil. Especially transport activities contributes to NO_X -emission and NO_X deposition of the aquatic and terrestrial ecosystem. Critical load maps have been prepared for lake and soil acidification, which indicate that actual deposition of sulphur in most areas are far above the critical loads[10]. The deposition of nitrogen varies considerably over the Baltic Sea Area. The concentration of ozone and other photochemical oxidants, which cause damages to human health and to vegetation (e.g. decreased forest production) is considered to be serious and not very different from the level in

[9] see also Annex 5

[10] The critical load concept based on the assumption that there exists a pollution load below which no harmful ecosystem effects occur (Transport and the Environment in the Baltic Sea, 1994).

central Europe episodically.

Following issues have to be addressed:

- The marine and aquatic ecosystems are sensible to eutrofication, acidification and accumulation of hazardous substances.
- Certain coastal and other areas are important wildlife habitats, sensible a. o. to disturbances by transport activity.
- Forest ecosystems are sensible to acid deposits.
- Baltic Sea shipping in principle is a favourable transport mode; it has economic chances as well as ecological risks.

When the status of the transport sector and of the environment in the countries of the region can be described by statistical data like transport activity in the various modes, infrastructure network length and vehicle fleets, other important aspects cannot be covered by that kind of information. The quality of access to places of social and economic activities is not been described by simple data but needs more complex information, A suitable parameter could be the information, how many people could be reached within a certain time and cost budget. This was not possible to figure out within the Agenda 21 process.

Indicators for the description of the underlying forces of the ongoing and future development also are hard to find. The main assumption is that the N-W countries will continue its development trends of the last decades (see also the scenario chapter), but other than population and GDP trend figures are not easily available. For the S-E countries we assume an accelerated development in the direction of the N-W countries´ examples but also for this not stable indicators can be given rather than a prolongation of the GDP increases over the past few years.

For the response indicators, the situation is even more complicated. The - partly - very different political, economic and social conditions of the countries of that region, and its consequences for the future development, need complex characterisation. Indicators for policy responses cannot be given in simple figures alone. What may be appropriate for one country, can be unsatisfactorily for others. It should be kept in mind, therefor, that the answers to the policy part of the questionnaire only can give a very first guess.

2.3 Data Overview: Main Results of Questionnaire and of Other Sources

Some of the results already have been mentioned above, like car density and average per-capita fuel consumption in transport. In Annex 3: page 1, the original data provided by the Baltic 21 member countries are put together. Nearly all member countries have delivered information on road, rail, sea and air transport, as had been asked for. Besides the information gap with respect to a singular country, other country data show gaps in certain areas, too.[11] The data on road and rail

[11] The evaluation of the received statistical data by Estonia, Latvia and Lithuania must be very careful because of some general and specific problems of data collection in this countries (e. g. there is a considerably high amount of black imported gasoline on the market; the results is a calculation of energy consumption and related emission, which is too low; because of a dimly differentiation between the different road categories the road length of the three countries seems to be too long especially in comparison with other

infrastructure, on vehicle fleets, transport activity and energy consumption are more or less complete and can be easily interpreted. More difficult is the air transport and shipping sector, because the national statistics differ with respect to transport activity over international territory, also the fuel consumption and emissions are difficult to interprete. This is a well-known fact also for other international statistical activities. In the context of this study, we do not discuss the air and sea transport figures but mention some aspects in a qualitative manner.

One of the objectives of the questionnaire was to receive information about the future transport development expected by the responsible national authorities. We have asked for estimated data for the years 2010 and 2020. Finland, Germany, Latvia, Poland and Sweden have provided estimates for these years while Denmark gave data for 2005 and 2030. These estimates give important inputs for the trend scenarios developed for the Baltic Sea region (see Chapter 3 and Annex 3: page 20-22).

Additionally to the direct answers to the questionnaire, some states offered papers with further information. In certain cases information could be derived from those papers that had not been delivered directly (e.g. Denmark on road length, but not broken down according to the questions). For the sake of this study, international sources have also been evaluated to broaden the data basis.

In order to interpret the data and to make them comparable to each other it is useful to relate them to the population of the respective country and - for infrastructure and emissions as well - to the area. In this report only a few aspects can be elaborated on:

international data; in the early 90s in Latvia was no working regulation of cars in use, motorisation in 1991-94 looks definitely to high; also transport performance is very rough estimated because data collection started only few years ago) Because the international statistic often based on national statistic these should also be questioned. (Concerning this situation see Chapter 5, 5.2 No.1.)

- **Road and rail infrastructure**[12]

highway-length per capita	
Germany	133 km per 1 million inhabitants
Sweden	128 km per 1 million inhabitants
Lithuania	108 km per 1 million inhabitants
Poland	52 km per 1 million inhabitants
main double rail lines per capita	
Poland	205 km per 1 million inhabitants
Germany	210 km per 1 million inhabitants
Sweden and Lithuania	152 km per 1 million inhabitants
Latvia	121 km per 1 million inhabitants
Norway	26 km per 1 million inhabitants

Source: Questionnaire, 1995

- **Passenger car ownership and use**[13]

Car density per 1,000 inhabitants	
Germany	500
Norway	384
Latvia	134
Russian Federation	91
Passenger Car use in vehicle-km per capita and year N-W countries	
Norway	9,663 km
Sweden	6,640 km
Germany	6,427 km
Denmark	6,211 km
Passenger Car use in vehicle-km per capita and year S-E countries	
Latvia	2,015 km
Poland	1,734 km

Source: Questionnaire, 1995

In the other S-E countries we assume lower average kilometres.

- **Passenger transport activity - Road**[14]

[12] Total road and rail length as well as rail and road m per km^2, as given from other sources, are given in Annex 2: page 12 and 13.
[13] See also Annex 3: tables on page 2-10 and figure on page 11
[14] See also Annex 3: page 1

N-W countries 10,000 passenger-km travelled by car per year	
S-E countries	
Latvia and Poland (1)	about 2,500 to 3,000 km per capita and year
Estonia (2)	1,396 passenger-km per capita and year
S-E average	2,500 km passenger-km per capita and year

Source: Questionnaire, 1995
(1) only vehicle-km have been given, with an average occupancy rate of 1,5
(2) mentioned a total of 2,179 million passenger-km

- **Passenger transport activity - Public Transport / Rail**[15]

Denmark	average of 3,012 passenger-km per capita and year 10,600 million km by bus and 5,000 million by rail
Sweden	1,766 km
Germany	1,688 km
Poland	1,570 km
Latvia	1,298 km
Lithuania	1,223 km
Norway	612 km

Source: Questionnaire, 1995

This shows clearly that the differences in passenger-km per capita and year travelled by public transportation and by rail are smaller between the N-W and the S-E countries than the average use of passenger cars. On the other side, it can be guessed that there are structural differences with respect to the average distance of rail trips but further analysis would go beyond the working capacity of the group.

[15] See also Annex 3: page 1

- **Annual Goods transport activity per capita**[16]

Road transport in t-km per capita in the N-W countries	
Finland	5,180 t-km
Germany	4,267 t-km
Sweden	3,285 t-km
Norway	2,202 t-km
Denmark	2,104 t-km
Road transport in t-km per capita in the S-E countries	
Lithuania	1,419 t-km
Poland	1,325 t-km
Latvia	743 t-km
Rail transport in t-km per capita in the N-W countries	
Sweden	2,132 t-km
Finland	1,820 t-km
Germany	849 t-km
Norway	376 t-km
Denmark	251 t-km
Rail transport in t-km per capita in the S-E countries	
Latvia	3,950 t-km,
Estonia	2,500 t-km
Lithuania	2,105 t-km
Poland	1,789 t-km

Source: Questionnaire, 1995

It can be seen that the three states of Estonia, Latvia and Lithuania depend on rail transport in its important transit functions from the Baltic harbours to the Russian Federation and to other countries in Eastern Europe. Latvia, Lithuania and Poland transport more goods on rail than on roads (data for truck transport of Estonia were not available), whereas in all N-W countries the truck is the most commonly used goods transport mode, with Sweden showing the highest rail share in land transport of about 40 percent.

[16] See also Annex 3: page 1

- **Energy consumption / CO_2 and NO_x emissions:**

Because the data provided by the participating countries on energy consumption and emissions are not complete we took other sources for the analysis.[17])

Again calculated as emissions of the total transport sector per capita, we see for CO_2 - which for fossil fuel indicates the energy consumption, neglecting for this case the minor mistakes deriving from the use of non-fossil fuel for part of the railway operations - the following figures:

- **Annual per-capita CO_2 transport emissions**

N-W countries	
Norway	2.82 tonnes
Finland	2.7 tonnes
Denmark	2.56 tonnes
Sweden	2.46 tonnes
Germany	2.23 tonnes
S-E countries	
Latvia	0.9 tonnes
Estonia and Poland	about 0.7 tonnes
Lithuania	about 0.65 tonnes
Russian Federation	0.43 tonnes

Source: SEI-Boston Center (1997) (datas are taken from International Energy Agency (IAE) (1996): Energy Statistics of OECD Countries 1993-1994; Energy Balance of OECD Countries, 1993-1994); Norway: national source

For NO_X, the data do not seem to be very reliable, there are major differences between the international source and the figures given by the member countries. The data should be carefully evaluated by the country experts.

[17] See also Annex 2: page 4

3. Scenarios of the Future Transport Development

The chapter starts with basic assumptions from outside of the transport sector, concerning the population and the economies of the countries of the region. Equal demographic and economic development trends are assumed each for the N-W countries and for the S-E countries in both scenarios, see 3.1. This allows us to concentrate on the transport issues as parameters of interest. In the transport development we shape two future developments: a trend scenario which contains a prolongation of current developments and which includes those policy decisions that are already implemented or are the most likely ones of the future, and a sustainable transportation (ST) scenario according to the ideas of sustainable transportation introduced above in Chapter 1.

The trend scenario is detailed in 3.2, the ST scenario in 3.3. The consequences of the scenarios are discussed in 3.4. Both scenarios have to be developed differently for the traditional market economy countries of the N-W and for the former state economy countries of the S-E. We were not able to differentiate further between the countries of both groups due to working capacity restrictions although it is very obvious that this is a rough simplification. Also within both country groups there are major differences. But for the sake of this Agenda 21 activity, serving as a starting point for further discussions and future cooperative efforts, this simplification may be tolerated.

3.1 Basic Assumptions about Population and Economic Trends

Driving forces of transport development are sociodemographic and economic parameters. In Annex 2: page 1 and 2, the current population figures, change rates and the economic parameters are listed, drawn from available international statistics. In general, there is rather a decline in the population than an increase; for the actual study we assume the population in all member countries remaining constant.

The age structure of the population decides about the share of people allowed to drive; in Germany these are the persons of age 18 years and more. In 1995, they account for 80,6 percent of the population. According to the latest data, this figure will increase to 84 percent in 2010 and to 85 percent in 2020. This leads to the conclusion, that there is a potential increase in passenger car use even when the total population is not expected to grow.

According to the available data from international sources (see Annex 2) the other N-W countries show very small growth rates and similar structural development with respect to an increasing share of elder people, too, but with slightly more people of young age. The population development in the S-E countries shows a decrease in the total number which may be stabilised in the next time, and a higher share of young people under 18. In spite of the current declining trend in the overall population figure - and the expectation of improving economic situation, which will stop migration -, we expect a more or less stable population for the years to come.

The actual economic figures in the N-W countries show low GDP increase rates which are not expected to change dramatically. For the sake of this study we assume that the moderate development will continue, with average per-capita increases of about 3 percent p. a. In the S-E countries, the shift towards a free market economy is expected to gain higher growth rates over the next decades, although the restructuring process within the national economies contains many

risks. We assume that the deep decline of the economic activities in about 1989/1990 has been overcome, and national per-capita income will increase by at least 5 percent per anno. Thus, the basic development shows a decreasing gap in economic figures between both country groups.

3.2 Trend Development Scenario

As general assumption for all countries of the Baltic Sea area we foresee a stable economic development, as mentioned above, and also a stable global mineral oil market. Both factors lead to an increase in motor vehicle ownership as well as in vehicle mileage. It also supports disperse settlement structures that increase transport demand, and supports also a shift in goods transport from rail to road haulage.

These transport trends[18] again must be seen differentiated between the country groups:

- **In the N-W** countries (Scandinavian states and in Germany) passenger car ownership and passenger car mileage is expected to increase only around 3 percent per year for the next years. Following the experiences of the United States as an early example of broad motorisation, it can be expected that ownership rates even increase beyond 700 cars per 1,000, with a lot of household owning two or three cars each, and differentiation of car types like vans, 4-wheelers, sports cars etc. Eventually, small city cars like "Smart" of Micro Compact Car will reach a breakthrough as a new segment of the market. Their impact on total fuel consumption (see below) would but be small because city cars are expected not to substitute other cars in extra-urban traffic. In the goods transport sector, the already existing congestion problems may on the one hand gain renewed interest in rail and shipping instead of truck haulage, on the other hand the shifting potentials are not that large under current and trend transport cost conditions. It is expected that trucks will carry most of the transport demand increase, and that there will be enough flexibility either by use of telematics or by using night times for transport to avoid stand-still on the roads. Additional construction of road may contribute to improvements in some bottlenecks although it cannot be expected that large network extensions can be realised in the N-W countries, due to financial constraints of public budgets and conflicts with nature protection. Goods transport on roads is expected to grow by about 5 percent per year to 2010 over long distances while short distance goods movement may show a slower increase or even a stabilisation.

  Use of transport information technology will reduce transportation cost for private users and fleet operators, also this technology to a certain extent will contribute to higher infrastructure efficiency. All in all, development and adoption of telematic technologies mainly in the private transport sector is expected to increase the attractiveness of road transport.

  The transport sector with highest demand increase will be air travel, prolonging a trend that has taken place during the last decades. The OECD project on

[18] Because of the received incomplete data basis especially for the subject air and sea transport chapter 3.2 and 3.3 will concentrate on the evaluation of road and rail transport development in the BSR.

environmentally sustainable transport assumes for air travel in its business as usual scenario an increase of p-km by more than 500 percent.[19]

Competition between road and sea transport could effect a technical change towards high-speed ships especially for short sea shipping. Because of the use of residual fuel containing up to 5 percent sulphur without any emission regulation up to now and the trend towards fast feeder ships (Isensee: 1997) it must be questioned that a shift from road transport to sea transport would bring that advantages in emissions and fuel consumption.[20] (From the technical point of view it would be possible to reduce the specific emission of SO_2 and NO_X by 80-90 percent, according to the OECD study, but this is not expected in the trend.)

- **The S-E** countries (former state economy countries) will experience more changes and larger increases especially in private mobility. In the following considerations we concentrate on land transport, for international air and sea transport the developments might be similar to the N-W countries. Motor vehicle ownership and use is expected to grow in a range of up to 10 percent in the next years or even more. Although only a few estimates from the member countries have been given in the answers to the questionnaire, assessments on the workshops and from published sources agree that these countries follow the previous experiences of the N-W countries in private motorisation rapidly. More and more, the fleets will be modernised and become very similar to that of the N-W countries but this takes at least one or two decades. The S-E countries´ goods transport sector also will undergo a rapid change towards road haulage because the economy demands flexible transport services which private truck operators are able to offer rather than state-run railway companies. This already can be observed in this part of the region. Spatial changes in the locations of production and logistic centres support the demand trend towards the truck.

  The logistical development with increased focus on just-in-time delivery (to reduce stocks and inventories) means that the size of goods units will decrease (to avoid stocks at both supplier and recipient), and that the frequency of transports will therefore increase.

[19] Regarding the trend case for total air transport energy demand (mill. t fuel) there will be a doubling from 1995-2010 and a triple until 2030 (Source: Wuppertal Institute (1996): The Case of Transport)

[20] „However (...) ships only reduce environmental impact if they sail slowly and burn diesel oil instead of residual fuel". (Isensee; F., (1997): Energy Efficiency and Air Pollution - A Comparison of Ships and other Vehicles, Institut für Schiffbau, Hamburg)

This development will, if the emphasis is laid in the policies on improving trade facilitation and combined mode transport, mean that there will be

- more vehicles on the roads;
- less use of rail transport;
- lower utilisation of existing transport equipment;
- less money for new transport equipment;
- longer delays at border points and harbours, and thereby a need for more transport units to handle the same amount of cargo;
- increased need for capital investment;
- more empty transports (empty legs) than today, etc.

These factors will cause significant increases of environmental impact.

Comparing the expected development 2010 and 2030 with the reference year, the following development in passenger and freight transport may happen in the S-E countries:

Passenger Traffic (p-km)	**1995**	**2010**	**2030**
Passenger Cars	100 %	200 %	400 %
Public Transport	100 %	100 %	75 %
Rail	100 %	100 %	75 %

Freight Transport (t-km)	**1995**	**2010**	**2030**
Road	100 %	250 %	400 %
Rail	100 %	100 %	100 %

The differences in transport levels between the N-W and the S-E countries in the most polluting modes - passenger car traffic and truck traffic- can be assessed by the following table showing very rough average figures. It should be kept in mind, that the data basis is not complete resp. reliable, and that there also are major differences within the N-W and the S-E group.

Transport Activity p-km, t-km per capita	**1995**	**2010**	**2030**
Passenger Cars (p-km) N-W, S-E	10,000 2,500	13,0005 ,000	15,000 10,000
Road freight (t-km)N-W, S-E	3,000 1,300	5,000 3,000	7,000 5,000

- In the long run, both the spatial orientation on the local level, which is characterised by suburbanisation of housing, working and shopping, as well

as economic orientation on the international level, with consumer-goods being distributed over long distances, complex production networks between production facilities in different parts of the world, international tourism and removed custom barriers, will cause increases in passenger and goods transport activities. This development must be expected to bring more environmental and social burdens, while in the same time increasing individual - but not necessarily, see situation in the N-W countries with the financial burdens and the high transport externalities - public economic wealth.

With respect to energy consumption and environmental aspects, the N-W and the S-E countries also experience different developments in transport activities and resulting fuel consumption:

- **In the N-W** countries, total road transport fuel consumption will more or less be stable during the next years because the increases in vehicle mileage can be balanced by technical improvements of the vehicle engines. Progress in motor vehicle efficiency is estimated to be around 1,5 percent per year for new cars on the current fuel price level. For passenger cars, fleet increase is expected to concentrate on the second and third cars per household, which have less average mileage per year. The total increase in mileage therefore is lower than the fleet increase, also the increase in fuel consumption is lower.

  Toxic emissions are expected to decrease further, due to the vehicle standards implement since the 80's. Still severe problems will remain with particulates, because an expected higher passenger car share of diesels and the continued truck kilometres will most likely not been compensated by specific improvements. NO_X can be seen as the most crucial emission component in terms of environmental effects and emission level, because it had not been tackled seriously by technical measures before the mid-eighties, and because the increase in traffic speeds and the growth in heavy-duty trucking especially increases these toxins. Also, air traffic and sea shipment contribute to NO_X emissions because of the lack of strict emission regulations. Opposite to road traffic, these sources have not been administered by effective environmental legislation; air planes have some regulations but only in landing and take-off cycles which do not cover the main emission conditions.

  Due to the traffic growth, exhaust emissions from mobile sources will remain a serious problem within the NW countries where the per-capita level already is relatively high. Although technical progress in vehicle technology has brought improvements in emissions per kilometre during the last years, especially in passenger car traffic, the overall load is still critical. Under trend conditions of further increasing traffic demand, the future development will see a moderate decrease from the absolute emission maximum which has been monitored a few years ago (see Figure 3 for NOx). Although this seems to show a good path to follow, it will take some decades of renewal of the fleets and further tightened emission standards until the total emissions will reach low levels of the 50s or early 60s. To ensure compliance of ambient ozone concentrations with no-effect levels, the UBA estimates a necessary total NO_X and HC emission decrease of at least 80 to 90 percent, compared to today status (see also OECD Study cited above).

With respect to noise, no significant improvements will be realised; the effects of slightly less noisier cars being brought to nothing by the traffic increase - at best.

- **In the S-E** countries the increase in motor vehicle motor use also will lead to a significant increase in fuel consumption. The exhaust emission also will increase over the next years because fleet growth will come too rapidly compared to the decrease in specific terms.

  Emission control technology of the vehicle fleet is less advanced than in the N-W countries. Rapidly growing traffic and poor technical as well as maintenance levels both fuel the emission increase. Although today´s absolute emissions as well as per-capita emissions in traffic are well below those of the N-W countries, a worsening emission situation is expected to sharpen the environmental and health problems. Most S-E countries are currently implementing emission and fuel quality regulations that in the long run, following fleet renewal, will lead to similar vehicle fleets as in the N-W countries; but this is likely to take a long time. Current fleet and kilometre increases as well as the expected figures will lead to increasing total traffic emissions, especially of NO_X at least over the coming decade.

  Although implementation and enforcement of I&M procedures as well as tightened emission standards for new vehicles can be expected to be introduced by all national governments of that group of countries, this will most probably be not enough or come too late to compensate traffic growth. It will depend on the measures to be taken now and within the near future if a decrease can be reached around 2010.

The social aspects of future transport development under trend conditions also are expected to vary between the N-W and the S-E countries:

- **Traffic accidents**: Traditionally, Swedish, Norwegian and Finish people face a lower risk to get killed in a traffic accident (6.5, 6,9 respectively 8.6 per 100,000, data are for 1995) than e.g. Germans (11.6 fatalities per 100,000), Poland (17,5 fatalities per 100,000, data for 1994) or Latvia (24 per 100,000) examples for the situation in the E-S countries. The differences in the number of accidents with injuries of people are far higher, here the figures for Sweden and Finland are 177 and 153 per 100,000, for Germany 475 per 100,000, Poland 168 per 100,000 and Latvia 195 per 100,000. The international comparability of the injuries figures is weaker than of the fatalities. The future development in N-W countries is expected to follow the trend of the previous years: A further decrease of fatalities is expected due to improved safety measures and medical treatment, with the number of accidents with injuries remaining more or less constant. Following earlier experiences in the West, in the S-E countries the rapid increase in motorisation is expected to cause more fatal accidents in total but, as also experienced in the phase of rapid motorisation in N-W countries, this most probably will lead to preventive measures and to improvements over a longer time period.

- **Air pollution / health**: The general emission expectations are valid with respect to health: Decreasing air pollution values in the N-W countries, with some constituents (especially particulate) showing relatively high values in

traffic sites of large cities, and expected increases of emissions and worsening air pollution at least for the next years in critical traffic situations in the S-E countries.

- **Access to places of activities**: Increasing transport activity in terms of passenger and ton kilometres does not automatically mean better access. When due to wider distances to working places, shopping etc. the time and the cost for reaching these places increase, then access may even become worse. Currently, there is no easy indicator for access. It may theoretically be defined as the number of people each individual can reach within a certain time and cost budget. In dense urban structures that kind of figure would be higher, when mixed-use development allows people to reach a lot of destinations by non-motorised modes and by public transportation. For a rural population, passenger car ownership will improve access for those who have cars available, but in denser areas an increasing car fleet will have adverse effects when congestion increases. With respect to cost of the individual households, access may become more expensive. Access could worsen for citizens without a car when the quality of public transportation decreases.

- **Non-motorised access**: Motorised transport always worsens access for the non-motorised people. This is a result of changes in land use patterns respectively the process of suburbanisation. Urban sprawl increases the car dependency, which reveals further disadvantages for the non-motorised people. But also direct adverse effects of motorised transport towards the non-motorised modes are obvious: It takes more time and becomes more complicated for pedestrians to cross busy roads, and cycling often becomes more dangerous. With a lot more cars entering the roads in the S-W countries, non-motorised modes most probably will be less attractive in future and public transport service will decrease. Following the development in the N-W countries, car-free areas in cities will be established, and cycle lanes will be built along urban roads which may compensate some of the adverse effects of motorisation for the non-motorised. Nevertheless, this will not compensate all the disadvantages generated in the trend.

- **Gender issues**: In all countries, the passenger car is used more by men than by women, following both societal and economic conditions. In countries with high car rates, nowadays passenger car use of women has become more common but the differences in car use are still significant. It is assumed that in S-E countries there are far less female drivers than men, and that the gender differences are larger than the general ownership. Although official ownership is not identical with major use, the figures in the N-W indicate that car use of men remains more or less constant on a high level while car use of women will equalise in the long run. The social trend towards single households, later marriages, less children and higher rate of employment support increase of car fleets and car use. Increased car use of women is expected to happen in the S-E countries, too, but with a significant time lag.

- **Elderly people**: The case is similar to the gender aspect: Car ownership rates and car use of elderly citizens is expected to increase, both in N-W countries and S-E countries but with significant different levels. Mobility conditions for citizens without cars probably will worsen.

- **Mobility of handicapped**: Access to cars generally improves the mobility chances for handicapped but denser traffic also can bring barriers. In the future, the situation in general may improve for non-motorised handicapped; board walks more and more will be designed for rolling chairs, and public transportation vehicles as well as facilities are equipped with lifts. Modern low-floor buses enable handicapped to move around without assistance. It is expected that planning practice in the S-W countries will lead to general improvements.

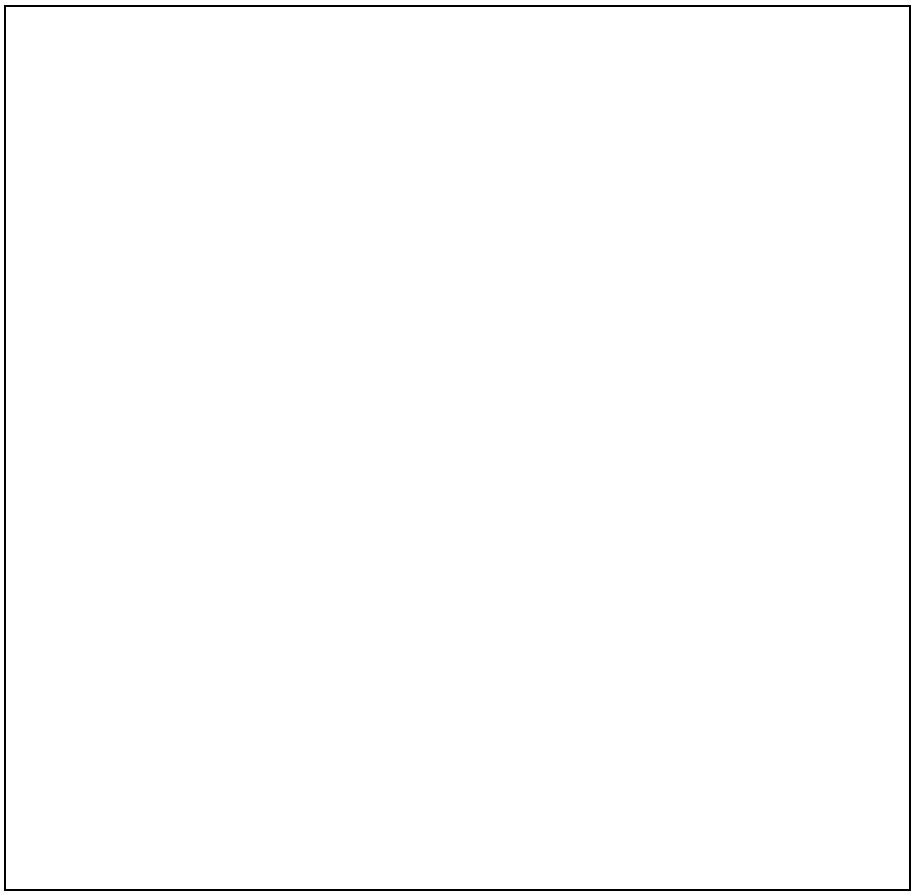
With respect to the **economic aspects** of the trend development we have to differentiate between the advantages provided by increased transport activities, and the disadvantages caused by increasing external cost. Basically, there is no doubt that the economic activities of a society will flourish with better mobility of persons and goods.

On the other side several studies have shown, that the cost of transport in the highly motorised countries is too low to cover the social and environmental cost. This leads to false allocation, overdrawing the use of common goods. If these were priced according the real cost the societies and the national economies will come to more effective transport systems.

Under trend conditions both in the N-W and in the S-W countries we assume that higher transport activities also lead to higher external cost[21]. The rate of increase a. o. depends on the modal share and on the technical condition of the vehicles, as well as on the vehicle speeds, safety regulations, road conditions etc. The following graph (Figure 1) shows the basic problem of increasing external cost following the increased transport activity (here given in ton-kilometres, the graph basically is also valid for passenger-kilometres).

[21] The term external cost is defined as the economic and social cost due to transport, which are not sufficiently covered by the user of the transport system.

Figure 1: Cost and Benefits of Transport



Source: Pastowski, A. (1997)

We assume that for the highly motorised N-W countries the per-capita transport activity already has reached a point where more transport leads to less net benefit. Under trend conditions, i.e. without modal shifts and without further breakthroughs in vehicle technology - which will mitigate the gradient of the full-cost curve -, the overall net economic benefit will decrease. It seems obvious that improvements transport infrastructure enabling enterprises to transport more goods for lower cost, cause higher overall improvements for a national economy in situations where there is a severe lack of infrastructure. In the course of increasing supply and increasing demand, additional investments and additional transport only brings marginal improvements but the adverse effects increase at a faster rate, following scarce resources, competing land-uses, environmental and social cost. This currently is not reflected by the officially applied cost-benefit analysis (CBA) procedures where time savings and environmental impacts are monetarised linearly, and only few of the external cost are counted at all. Additional weak points of the current CBA are a. o. that the shortage cost of mineral oil are neglected. Summing up it must be said that current CBA is not suitable it terms of sustainability considerations.

For the S-W countries we assume that the net benefit will still increase with higher transport activity but this demands specific improvements in the transport sector to mitigate increase of the external cost.

It should be kept in mind that these scenario assumptions are only qualitative and are not based on quantitative analysis.

Some other **economic aspects** may be highlighted:

- **Effect of transport cost on production structures**: Investments in transport infrastructure often are argued by the economic advantages of decreasing transport cost. Cheap transport of goods over long-distances is a desired effect with respect to the competitiveness of national products on foreign markets. On the other side, it also makes products from distant places cheaper which puts pressure on local and regional goods. In the N-W countries not only high-price products but also food and low-cost consumer goods are produced and distributed in long-distance networks, dominated by international companies. This development will take place also in the S-E countries. It makes these economies more dependent from the international markets and increases transport activity.

- **Spatial development**: After the German re-unification the East German production facilities were closed down within a short time, and the market was served by goods produced in West Germany and other Western countries; the goods mostly are transported by trucks because of its low price (due to externalisation of social cost), and because railway service was not flexible enough. Sites for new production and trade facilities are preferably in new development areas outside of the cities near highways, i.e. in places which cannot efficiently be served by rail and public transportation. Here, planning regulations were not implemented in time.

- **Changes in urban development**: Also following the experiences of the German reunification it must be expected that the private car and the free real estate markets will fuel suburbanisation in the S-E countries as a new development. Families with high income will leave the cities and move to quieter and cleaner housing areas. Inevitably, this creates an increasing demand in passenger car traffic because these areas cannot be served by public transportation efficiently. The growing car traffic leads to congestion, putting pressure on additional road investments. This and the motor traffic decreases the quality of life in urban areas further which again urges people to move to the suburban zones. Experiences in the N-W countries show that the traffic problems cannot be solved by additional roads. Although land-use planning schemes aim at a mitigation of settlement sprawl this trend is still going on. It is assumed that under trend conditions both in the N-W and in the S-E countries this development will take place and continue, respectively, leading to increasing traffic problems which - due to time losses and construction activities - also cause economic losses. Indirect consequences of the suburbanisation process are higher cost for all kinds of public services (a. o. post, social and medical care, schools, communication).

3.3 Sustainable Transportation (ST) Scenario[22]

Prolonging the current trend as has been done in the previous chapter, is only one possible future development. Following the idea of sustainable development also in the transport sector (sustainable transportation) demands certain policy changes, a. o. pricing policies, a stronger support for environmentally more favourable transport modes, to stricter technical standards, and other measures.

Some of the critical remarks made in the description of the trend development already keep hints for a more sustainable development. We will elaborate on possible measures to take later on, and concentrate first on targets and instruments for a different development. What could be realistic targets for sustainable transport policies in the countries of the Baltic Sea area? And what are the strategies to follow, and the instruments to use?

For the environment, focusing at the moment on the two indicators energy consumption and toxic exhaust emissions, the trends and measures could be as follows (see Figures 2 and 3):

N-W countries - ST

In the N-W countries, the very high per-capita transport activity should be mitigated both for greenhouse gas emission reduction and because of a broad range of social and economic reasons connected with a continued auto-oriented policy. Measures to reach this are a. o. higher prices for transport via fuel taxes and road pricing[23], enforced support for the more environmentally favourable transport modes and - in the long run - a shift in spatial development from the ongoing suburbanisation process towards denser and mixed-use development. Ecological tax reforms would shift taxes from labour to energy and other resources, avoiding an increase of the total tax burdens for individuals and enterprises.

The scenario for ST development assumes also enforced technical measures and traffic demand management (TDM) strategies.

In the N-W group, energy consumption of the transport sector could be reduced by about 15 to 20 percent until 2010 by introducing passenger car fuel standard of e.g. 4 litre per 100 km for middle class cars from the year 2000 on (which means equivalent to CO_2-emission: Gasoline: 9,3 kg CO_2; Diesel: 10,5 kilograms CO_2), by introducing an annual vehicle tax regime that would support the buyer's decision for very efficient cars.

For exhaust emission reduction, transport mode shift, spatial structures, which reduce transport demand and an optimised organisation of traffic will support the positive effect of the use of BAT. For the sustainability scenario, we assume accelerated phasing-out of vehicles without latest emission control technology, i. e. passenger cars without Three-Way Catalysts (TWC), and older trucks. Public transportation buses and delivery trucks should switch to Compressed Natural Gas (CNG) with TWC. Because NOx emissions increase with engine loads and vehicle speeds, lower driving speeds will help to reduce these emissions.

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[22] Other scenarios for instant for the OECD countries give some information but can not applied directly on the situation of the BSR countries.

[23] These cost increases would roughly cover the external cost as they have been calculated in several studies (e.g. without climate and biodiversity damages). But the theoretical aspect of covering "true cost" is seen less important than the incentive to let modern technologies and modern organisational structures come to the markets.

With respect to transport alternatives, investments in the public transportation sector and in rail networks will make these modes viable alternatives both for passengers and for goods transport. While it is quite clear that in low-populated areas the individual car and the truck will be more efficient than trains and buses, there are major potential savings in better and more attractive public transportation in cities and conurbation. Swiss cities and regions have developed very efficient TDM strategies within the frame of the national NOx reduction activities. As an example we can take the public transportation share in Swiss cities of about 300.000 inhabitants, ranging about 35 or more percent of all trips (total modal split including non-motorised trips), while e. g. in German cities the levels about half this value. As a rough orientation of sustainable transport, passenger cars should not exceed 25 to 30 percent of all trips in large cities and metropolitan areas.

But the shift towards these modes also needs restrictive measures towards automobile use and truck use, respectively, especial full cost pricing via high mineral oil taxes and road pricing.

Modern information technology can help to satisfy the customers of public transportation and of rail, and at the same time cut operating costs. Road pricing will be realised by satellite communication, it will be differentiated according to urban and rural region and helps to avoid congestion, too. Parking in cities is restricted and priced by a higher rate than today. Land use planning and property tax regulation reverse the suburbanisation process and make people settle in urban structures again. Because of the reduction in motor vehicle use and the continuously high technological level the toxic emissions are reduced in an even higher rate than under trend conditions.

Better access to places of activities, which is important for a sustainable social and economic development, could be reached in the ST scenario for the mobility of persons because the spatial structures would be influences to improve the conditions the non-motorised and for public transportation. Access of goods would be change in a differentiated manner: Higher transport cost will make long-distance products, especially those carried by trucks, more expensive but local products will become more competitive. It is expected that the industry will adjust their production and distribution networks to the new conditions, this could in total lead to similar access of goods as today.

Air transport kerosene would be taxed in a level similar to land transport fuel. Ship fuels also should be taxed internationally, and should be subject to strict quality regulations and control.

No large road infrastructure projects will be started in this scenario but investments taken in better rail links and in transport telematics, especially in those projects that make the more sustainable modes (these are most often rail and ships) more competitive in intermodal transport chains.

S-E countries - ST

In the S-E countries we basically assume a broad mix of measures to reduce large future transport demand increases, support for rail and public transportation, sustainable tax and pricing schemes, and technical improvements. Urgent seems an enforcement in the renewal of the fleet which helps to reduce specific toxic exhaust emissions rapidly.

The actual most critical issue is the market penetration of modern technology together with enforced inspection and maintenance. Unleaded gasoline should be available in all states and should be cheaper on the market; this is to be reached by

tax incentives and disincentives for leaded gas, respectively. By 2000 the latest, leaded gasoline should be phased out from the markets. Vehicle tax regulations should be changed to give incentives for TWC models and disincentives for no-control vehicles in the fleets. The ST-scenario assumes with these measures that NOx increase can be avoided in the S-W countries, stabilising the emissions at the current level despite the demand increases (see Figure 3).

The mineral oil taxes would have to be raised in steps in order to internalise external effects, this in turn will shift the customer's demand to vehicles with good fuel economy. Import tariffs and annual vehicle taxes for old and polluting vehicles are rather high compared to modern types. Unleaded gasoline will be phased out of the market.

The revenues from higher fuel taxes and import tariffs as well as annual vehicle taxes enable the governments to modernise the urban and regional bus fleets, invest in rail infrastructure and new rail engines and wagons. Private operators manage to offer good service for the travellers under strict supervision by state agencies (a shift to private operators is not in any case the right option, bus and rail services e.g. in Switzerland are excellent.).

Urban transport demand will be served mainly by public transport. A new vehicle fleet operates with BAT both with respect to the vehicles and to public transport system management. This ensures an efficient operation, harmonises the link to regional transit and supplies the customer with travel and traffic information. Basis for operation is a solid legal and financial framework and the responsibility of the management of the system on the local level. Regional public transport should be under national supervision.

In order to keep the transport demand at low levels, urban development and regional land-use planning influences the location of private settlements and of production facilities. Road pricing for heavy trucks makes the production and trade companies look for locations with good rail connection. Decentralised facilities for combined rail/road transport enable companies to take advantage of rail transport to a rather high extent. For international telematic innovation, see above for N-W.

The result of this example in sustainable transportation policy is with respect to overall energy consumption a stabilisation in 2010 compared to the current situation. Exhaust emission can be reduced at the range of about 25 percent (NO_X).

The social aspect will be characterised on the one side by a reduced number of traffic accidents, by less fatalities and by better conditions for the non-motorised. Access will be more socially adjusted than under trend conditions. This also is important for economic reasons: Cheap mobility of persons due to dense and mixed-use spatial structures enables people to participate in economic activities (i.e. reach more working places and shop very cost effective) without forcing them to spend lots of money for car and car use. This money could be spent more productive. For the national balance of payment, less import of mineral oil also has advantages, leaving more potential for productive investments.

For transport of goods, the ST scenario sees advantages in the longer run in a well-kept rail system and a short sea shipping system which especially makes the goods transit from Baltic Sea harbour more profitable. The use of fiscal and economic instruments will decrease the amount of high speed ferries in the region and support the adoption of BAT due to reduce the emission of NO_X and SO_2 of existing and new ships. Fuel quality has to be strictly regulated and controlled.

The strategy of transport shift to rail and short sea shipping as the more eco-

efficient[24] transportation mode should be supported by taxation on kerosene in order to mitigate the demand for air transport. Further economic instruments should initiate the renewal process of the existing aircraft fleet.

For goods transport the focus on development of trade facilitation and multimodal transport which will systematise and rationalise procedures, information flows and documentation relating to trade and transport will reduce lead times - besides making transport systems more efficient. It will develop and support efficient operation of combined mode transport and reduce the physical barriers, while at the same time an upgrading of the customs systems will reduce lead time, detours, the use of obsolete equipment and highly polluting equipment in the total transport process.

Higher cost for truck transport of course would increase cost of long-distance products but local manufacturers will become more competitive which in turns stabilises the local labour market. The idea of ST would be to adjust the transport cost in a way that the conditions for local and regional production and distribution networks are improved while the non-sustainable structures face disincentives. The S-E countries basically have advantages compared to the N-W countries because the spatial structures are not that disperse. The ST scenario assumes that these advantages are preserved.

[24] eco-efficient means: efficient in terms of economy and ecology

Figure 2: Overview about Trend Development and ST Development

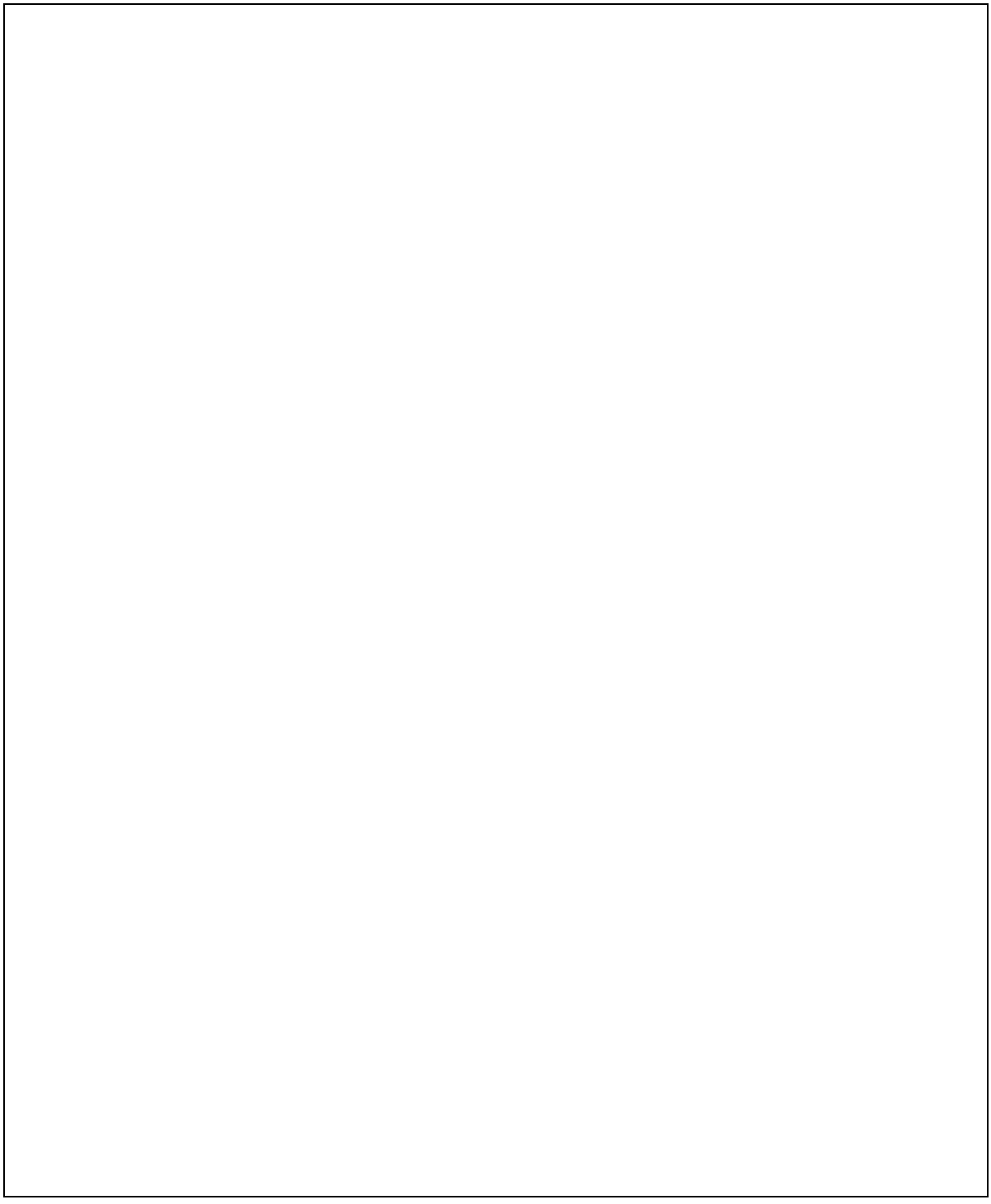
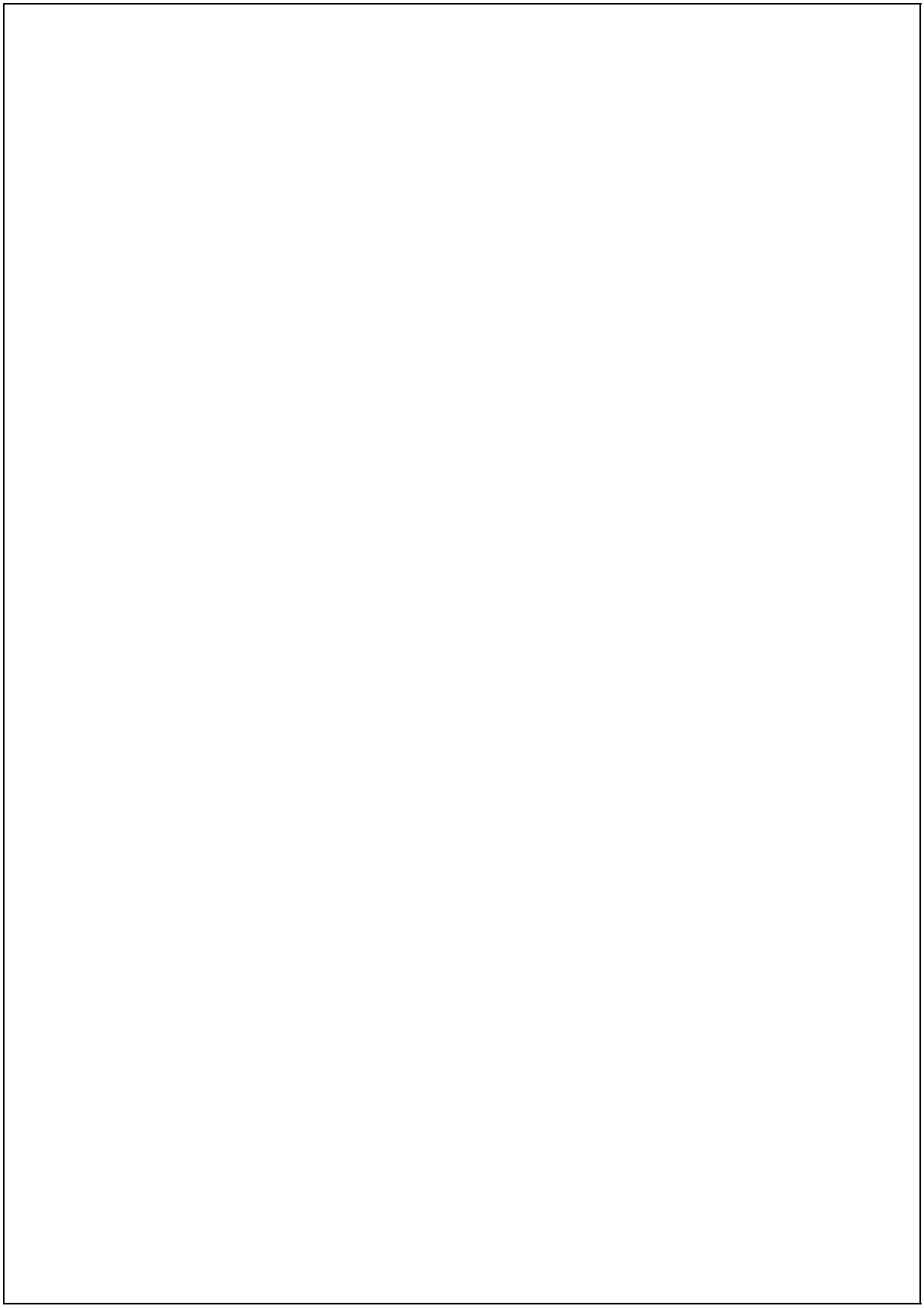


Figure 3: Development of NOx-emission



3.4 Environmental Consequences of Both Scenarios

Some basic results already have been discussed in the previous chapter. It must be kept in mind that due to lacking information concerning the expected trend development, our trend scenario may not reflect the position of the respective member countries of Baltic 21. Especially, the expected emission increases in S-E countries has already gained criticism on our workshops. Nevertheless, we have tried to explain the reasons for the trend assumptions; the results have to be discussed by the national experts. The ST scenario only has been described very roughly, too, it cannot discuss differences between the countries of each group with respect to measures already been taken in one or another country, and special conditions, respectively.

Consequences for N-W Countries

Without additional policy measures to be taken in the direction of less transport demand, transport mode shift and enforced technical process, energy consumption and CO_2 emission in the transport sector in the Scandinavian states and in Germany, which are already on a rather high level, cannot be expected to decrease significantly, although some countries might face a slight decrease. Exhaust emissions will decrease but not as much as wanted. There are a lot of other social and environmental indicators as well as economic parameters that could be discussed which show that the trend development in the states of this first group brings higher stress to the society and to the environment, and at the same time demands high investment to keep mobility on the current level.

Consequences for S-E Countries

In the countries in transition, the high increase in transport energy consumption, noise level due to transport, destruction of nature and landscape, and the increase in exhaust emission under trend conditions can only be avoided if sustainable transportation measures would be implemented. Under trend conditions, local air quality in cities and conurbation is expected to suffer significantly due to traffic increases. Also some other social and environmental indicators will worsen. Accident fatalities and injuries will probably rise. Although costly road network extensions will be constructed congestion is increasing, and the noise burden to the people living near roads is going to be higher as well.

On the other side, there is a significant technical and organisational potential both in the N-W and in the S-E countries to improve environmental conditions of the future transport development. It can be expected that the measures assumed in the ST scenario would gain environmental as well as economic and social advantages.

4. Policy Implications

4.1 Will ST Be Realised? Comparing Scenario Results with Goals and Objectives

The trend scenario does not sketch the desired ST development. It can be expected that strict additional measures will be necessary to reach those improvement that are necessary from the environmental point of view but also for social aspects. The current situation and the trend development in the S-E countries can be described as insufficient towards the following subjects:

- • road and highway infrastructure projects with heavy investments are under construction or already planned;
- deterioration of the rail network at the same time;
- lack of financial support for the public transport system;
- the shift from rail to trucks for freight transport;
- high specific emissions because of an out of date vehicle fleet;
- assuming an at least similar development in air transport for passengers and freight like in the N-W countries an annual growth of 6 percent to 7 percent until 2030 could be expected. This growth will compensate the technical improvement, which means an increase of CO_2 emissions;
- the EU assumes for Estonia, Latvia and Lithuania a growth of 75 percent for sea transport. Regarding the sulphur content in marine fuels and the trend towards high-speed ships an increasing contribution of sea transport to environmental and health damages could become severe.

The sustainability scenario can be expected to reach advanced environmental and social targets. Energy consumption, emissions and other adverse effects to man and nature will be reduced to a degree that seems to be acceptable. Also, social aspects will be improved: Better mobility for those without a car, less dangerous traffic and less fatalities.

The open question is how the strict measures of the ST scenario would affect the economic development. The other question how such a policy could be implemented, and if such a policy could attract the majority of the voters, must be left open here.

One important aspect of economic feasibility is the question if the production companies in the N-W countries would loose world market competitiveness if transport cost would be increased, in order to let the enterprises use more sustainable transport modes and to let them look for non-transport alternatives (e.g. less transport intensive logistics. Command-and-control policies as they have been applied by the centrally planned economies in the past are not the right way to influence modal split and spatial decisions[25]. Also in the ST scenario, planning decisions would have to be made by the enterprises under strict economic optimisation criteria. The same is true for the private households: Sustainable decisions cannot be commanded, they have to be made by individuals as result of individual decision processes.

[25] It is well accepted that a disastrous economic development is not sustainable.

This leads to the consequence that pricing tools have to play a major role to influence decisions, supported by appropriate planning guidelines, traffic regulations and investments of enterprises, households and also of the private budgets. High investments in the road network currently made or planned to improve traffic flows and to avoid congestion are very unlikely to be cost-effective ways to solve problems. According to the Western experiences additional roads in turn will fuel the process of transport demand increased via the establishment of dispersed spatial structures. After all, the financial basis for the planned construction activities is rather weak in most countries.

When the overall cost burdens for the enterprises and for the households, consisting a. o. of taxes on labour and on profits, do not increase when environmental taxes are introduced, there is no real reason why the competitiveness of enterprises and of national economies as a whole should be weaker than under current conditions. Shifting the burdens to the use of natural resources and to non-sustainable behaviour offers decision alternatives for the enterprises and for the individuals without increasing the total cost. Incentives for a more sustainable transport future, given in the way of an ecological tax reform, could offer win-win solutions for all involved parties.

There is not so much conflict between the economy on the one side and the environment on the other side as it seems from the public discussion. Decisions are ahead to be taken either for one development path with higher environmental burdens and high road investments or, on the other side, for a development path with an improving environment, with high investments in rail and public transportation and additionally strict legal guidelines for technical and for the spatial development.

4.2 Policy Instruments to Reach for ST

The general objective of the activities discussed in this report is to take advantage of the positive social and economic effects of mobility of persons and goods and minimise the adverse environmental and social impact of transport. While the environmental effects of all human activities basically must be guessed to affect the environment adversely, social and economic aspects are ambiguous: Mobility in general is a necessary basis for useful social and economic activities but in the same time often imposes threats and burdens. Policies should support the activities but aim at a reduction of the negative side effects.

In the past the fact and conditions concerning data collecting for the transport sector has been very different in the S-W and N-W countries, so deficiencies characterise both the quality and comparability of data. In order to forecast the development of transportation and the total yearly emissions and to set goals and measures a set of transport and environmental related data / statistics are needed. Data collection and the exchange of experiences (e.g. towards methodology) between the BSR countries is one of the basic need and task of the co-operation (see also chapter 5.).

The following table structures the overall objective, the strategic approaches, the areas where actions can be taken, and the policy instruments that can be used.

•	Objective Level:	Sustainable Mobility;
•	Strategic Approach:	Transport Demand Reduction[26] Transport Mode Shift Organisational Improvements in Transport
•	Areas of Actions:	Cost of Transport Transport Quality Parameters Vehicle technology, Transport Telematics Infrastructures Attitude and Behaviour of Transport Users
•	Policy Instruments:	Fiscal Instruments: Taxes and Fees Transport / Traffic Regulations Land-Use Planning Regulations Public Investments Public Awareness Programmes

In general terms, the actions should focus at

- land-use planning to minimise transport demand and infrastructure;
- increasing the cost of the less sustainable transport modes;
- improving the qualities of supply and utilisation of the more sustainable transport modes;
- improving vehicle technology, taking advantage of information technology in organising efficient transport;
- addressing the traffic participants to support responsible behaviour;
- public transport funding as long as the private car does not pay the full price.

It is very obvious that in a free market economy transport users, both individual persons and enterprises, are free to choose the destinations and the transport modes they want to use. In order to influence the demand for certain transport services and the kind of vehicle used, policies only can indirectly aim at changes in behaviour and decision making.

Policy instruments generally have a magnitude of main effects and also of undesired side effects that cannot be discussed here in total. In this study it only is possible to focus on major aspects.

Taxes and Fees

Taxes and fees influence the fixed and the variable cost of transport. They can be implemented on national, provincial and community level. These can be directed towards the purchase price of vehicles for individual households and for enterprises (e.g. via V.A.T (Value Added Tax) or import tariffs), towards ownership (e.g. via annual vehicle taxes), towards the use of vehicles (e.g. via mineral oil taxes, road user fees and parking fees). All of these measures need different implementation strategies and aim at different reactions of the users. As a basic principle, it is recommended to make transport cover all direct and indirect cost that are caused

[26] EU-reservation

by the respective transport activity (true cost pricing).

The European Commission's Green Paper "Towards Fair and Efficient Pricing in Transport" of 1995 and numerous other studies conclude that motorised transport, especially road transport, often does not cover the external cost today. This leads to false allocation of resources, and in the end subsidises a not sustainable transport development. Although this fact is generally agreed by all political sides, the level of fair taxation is still open. While the cost of infrastructure construction, operation and maintenance can be calculated quite easily, figures about the damage cost to the natural environment vary broadly. Also, the cost imposed to society by traffic accidents, air pollution and noise health effects, as well as by indirect effects like the consequences of settlement sprawl are discussed controversially.

If designed accordingly, taxes and fees on passenger car use as well as on truck and air transport will help to reach various desired effects; inter alia: mitigation of demand for motorised transport in general, support for public transportation and rail, modernisation of vehicle fleets, dense and mixed-use settlement development, support for local and regional production and distribution chains.

Transport / Traffic Regulations

Between fiscal strategies and traditional regulative measures there is no "either ... or", both strategies have to be used, and they have to support each other.

The legal provisions on transport decide a. o. about the technical specifications and about the speed of vehicles. For passenger cars, the technical development has resulted in vehicles that weight one ton or more in the average to transport one or two persons in daily traffic. These cars are designed to go for 150 kph or more, which only under very rare circumstances can be driven. Except of two-third of German motorways, the maximum allowed speeds are generally about 100 to 120 kph If both the technical regulations and the traffic regulations would be changed to optimise the passenger cars for the commonly used speeds, i.e. those up to about 100 kph, this could lead to significant improvements in fuel consumption.

ST development would demand fuel economy standards that could either be implemented similar to the exhaust emission standards - which means that all cars have to meet e.g. a standard of 4 or less litres per 100 km in the EU driving Cycle - or as fleet average standards comparable to the so-called CAFE regulations in the United States. (CAFE: Corporate Average Fuel Economy. The effect of these regulations has been very strong in the 70s but fuel economy stopped to improve afterwards because the standards were not strict further more.)

A speed limit could support the shift of fuel efficiency development towards slower cars. Car engines with smaller displacement optimised for low speeds can reduce fuel consumption in most driving conditions immediately by about one third without any other changes of the car bodies. With body weight reductions possible for low-speed designs the average 5 passenger car could reach a reduction in fuel consumption of 50 percent or more without any utopia new technologies.

Vehicle specifications for the protection of pedestrians and cyclists (so-called "weak" traffic partners) should be enforced. For safety and noise reasons, the driving speeds in urban traffic, especially in housing areas, could generally be reduced to about 30 kph, with exception of 50 kph on wide main roads.

Access for vehicles which do not meet advanced emission and noise regulations to housing areas could be restricted. This would on the one side gain direct environmental and social improvements and on the other side accelerate the fleet

shift towards modern vehicles.

Land-Use Planning Regulations

Land-use planning aiming at reduced transport demand is a necessary condition for a long-term sustainable development. It does not necessarily reduce car use and car kilometres directly when the price of car use is low (compared to income) and when no shortage in road or parking space is existing. Anyhow, this complimentary strategy is very important to mitigate transport and emission on the long term.

A comprehensive planning system would start with principles of land-use development to be laid down by the national and by the provincial levels, which give the frame to local detailed planning on the community level. These principles could include minimum settlement densities for different areas and purposes, demand rail-oriented development for land-uses with high transport activities, give design guidelines to support efficient service of public transportation, and demand compliance with sustainability objectives like e.g. maximum vehicle kilometres per capita or per planning area.

The principle of subsidiary which is an important policy principle in the EU, too, demands that the decisions have to be made at the lowest appropriate level. On the other side, this should not allow the communities to develop a not sustainable transport structure.

Planning regulations should demand the assessment of consequences, not only the direct environmental impact as it is demanded in Environmental Impact Assessment (EIA) but also of the long-term impact on spatial development, transport demand and energy consumption. Shortcomings of the usually used instrument of Cost-Benefit Analysis (CBA) to exist with respect to the long-term consequences. Especially the SEA should be seen as a starting point which should be concentrated on further on.

Public Investments

Investments in transport infrastructure are traditional policy instruments of governments. In previous years there has been an automatism in this field: Growing traffic has proven a growing demand, and the duty of the transport authorities was to provide additional infrastructure to satisfy the demand and to do away with congestion. This has changed in recent years for two main reasons: The first is the shortage in the public budgets, and the second is the experience that especially road investments induce additional traffic demand and have proven to be not successful against congestion.

New Instruments: Least-Cost Access/Least-Cost Transportation Management

Although most states, also the Baltic 21 members, have recognised the importance of environmental aspects in transport and have implemented measures for environmental protection in their national policies, they at the same time make investments in large infrastructure projects which support the increase of motorised transport. This must be guessed as not sustainable in a lot of cases.

In general, infrastructure investments are made for economic reasons. According to cost-benefit analysis which normally have been prepared before such decisions, these investments are expected to bring economic benefits to a region. In most cases, also the environmental and social consequences have been evaluated. In this study we will not generally deal question with these results - although we especially

think that mostly environmental and social cost are not properly taken into account - but ask if other investments could bring more benefits.

This is the principle of Least Cost Planning (LCP) as it has been developed in the energy sector. LCP aims at reaching maximum benefits at lowest cost. It does not follow the traditional rule of the business but concentrates on the services the customer asks for.[27] In energy economics, this principle led to demand-side measures, i.e. investments in the reduction of energy consumption instead of increasing the amount of energy delivered. At the current insulation standards, in most cases a lot of improvements are more cost-effective for the customer than paying a high energy bill. The customers as well as the power company can take advantage of measures for rational use of energy, as far as these demand less cost than they save. When the power company is going to finance the measures for rational energy use, it can make a higher profit out of these services than it would loose by selling less oil or gas.

The idea of LCP can be transferred to the various levels of transport decisions under the name of Least Cost Access (LCA) or Least Cost Transportation Management (LCTM). For private house holds and for enterprises, it is quite obvious that a decision for a location near a rail or a public transportation line allows to save money which otherwise would have to be spent for operating an additional car or additional truck transport. When these savings are higher than the eventually higher cost for real estate or other possible cost, then the demand-side management would pay. This kind of decision is made often without naming it „least cost transportation management“: Choosing a house near shopping areas and schools or not far away from a working place.

For the public budgets, the idea of demand-side management in transport is not common. Normally, the demand for transport, the increase of motor vehicle traffic, is seen as an inevitable development which can not be influenced. Often, it is seen as the duty of transport policy to build the roads and other transport facilities to serve the current and expected demand. No one really asks if the welfare of a society could be served better by non-transport measures. This would demand trans-sectoral cost benefit analysis which - to our knowledge - is not implemented in the decision making process. Even worse, real inter- and trans-modal planning, including mobility shifts between modes, is not common neither on national nor EC level, also no integrated planning including the non-transport options.

During the last decades, an increasing criticism against transport infrastructure construction, especially road construction, can be observed. While over long periods road and rail lines have been synonyms for economic progress of a region, this has changed the more roads and denser infrastructures been realised. The additional surplus of additional roads becomes smaller and smaller, while both the cost of construction and the social cost increase rapidly. Now the public is very critical about the cost effectiveness of that kind of supply-side policy.

In this situation, the question has to be studied what kind of measures could be more cost effective than e.g. new highways. Traditional CBA can give only a few

[27] To give an example: The purpose of a customer buying oil or gas for heating purposes is to have warm rooms in a building. A traditional energy company would try to sell as much oil or gas as possible, which means that the company is interested in a low insulation standard. A modern service company would offer the service of warm rooms to the customer, and would look at the most cost-effective way to provide this service: Either by good insulation and a low the amount of oil or gas to be used, or by poor insulation and a high amount of oil and gas.

hints for this decision because it does not include alternative strategies, especially not those non-transport alternatives. In an increasing order of innovation there are three basic alternatives to evaluate:

- organisational and other measures within the transport mode to solve a problem, instead of constructing new lines or adding lanes. These measures can be e.g. a traffic management scheme to avoid congestion, speed limits to reduce the number of accidents, police enforcement to improve the drivers behaviour,
- transport mode shift, e.g. induced via the modernisation of a public transport system, instead of a new highway for commuters; other measures to be evaluated are special rail transport services for large companies of the region, modernisation and better equipment for rail instead of highways to be mainly used by trucks; this alternative especially is of interest for transit of goods,
- reducing transport demand; here the question is to be raised: Could it be more cost-effective to locate enterprises to another place than to build expensive transport infrastructure? This alternative may not be suitable for existing structures but is of highest importance for future development. Low density sprawl development of housing will create traffic increases, policy decisions towards mixed use, higher settlement density and rail orientation can be accompanied by incentives for the households and companies, to be financed from the transport budget. To increase competitiveness of a large employer of a region it could be more cost-effective to finance e.g. modern communication infrastructure, reduce the company taxes or improve the qualification of the staff, rather than improve access for company trucks by some minutes.

In the context of this study, the principle of least cost management in transport only can be described in general. For the idea of sustainable transportation, this principle especially is attractive because it combines economic savings and protection of the environment. For the private households, less passenger car demand, either reducing the demand for an additional car in a household or for a first car, can enable people to spend the money for own property or for retirement savings. This increases the social stability. A company could reduce transport cost and spend the money for improvement of products.

The higher the cost of transport are, the more attractive it becomes to reduce the demand. And when the alternatives become cheaper, for instance due to reduced taxes on labour or on other non-transport expenses, the more attractive is the balance for transport demand reduction.

For the implementation of Least Cost Management schemes, two basic steps are necessary to make. First, for all transport infrastructure plans, really comprehensive trans-sectoral cost-benefit analyses should be demanded, part of which would be a strategic environmental impact assessment[28]. This especially is of importance for North-West countries where the density of the transport networks is on a very high level which leads to the expectation that the advantage of additional infrastructure would not be that high than in countries with a less developed transport network. Second, transport cost - especially of those modes which impose high burdens to the environment - ought to be increased step by step over the coming decades. This would make non-transport alternatives economically viable, and gives a reliable planning perspective for the economic actors.

[28] The Strategic Environmental Impact Assessment (SEA) is an instrument, which should be focused at in future by the BSR countries.

Public Awareness Programmes

Decentralised decision making and participation of the public is a key approach to use local and regional knowledge for better solutions and to gain acceptance. Local initiatives dealing with environmental and transport issues should be asked by the responsible authorities to participate in the process of planning and decision making. Environmentalist groups should form round tables and become approved partners of the administration. Intensive contact should be held and discussion should be organised by municipal environment bureau's. The public should be asked before launching important projects like city motorways, underground lines, and large private facilities. Behaviour of local politicians, choosing public transport, walking, and cycling instead of using official cars can serve as a model. The cities councils should implement and publish appropriate guidelines for the administration and for public authorities. Politicians should try to persuade large local employers to follow.

Creating a feeling of local responsibility for the community and its environment is a long term goal demanding step-by-step activities by the governments and administrations together with local initiatives. Formation of *round tables* on community level seems to be an appropriate starting point. Non-governmental organisations (NGOs) have played an important role in the follow-up of the UNCED (United Nations Conference on Environment and Development) world summit in Rio in 1992; not only in the N-W countries but also in the former Centrally planned economies (CPE) countries there are a lot of groups engaged in environmental politics which may be partners to official activities. This contributes to a favourable climate for the development of policies for sustainable development.

Government decisions taken towards sustainable transport should be accompanied by press campaigns based on successful examples in other countries (cities). E.g., or the public transportation sector Swiss cities as well as the Swiss railroad company show how to design excellent solutions and reach broad public support. Governmental public relation strategy to raise public interest in ecological themes can only be successful if it is backed by a credible policy. Also on the national policy level, positive examples of politicians behaviour can play a major role for public acceptance of measures.

4.3 Policies already Implemented in the BSR Countries[29]

Initial Remarks

In its Part II, the questionnaire sent to the member countries asked for legal provisions in the area of transport with special emphasis on environmental aspects, for policy principles and for financing schemes. The objective was twofold: An overview should be reached for the sake of this report, and in the same time a discussion between the participants should be initiated about the issues.

It is quite clear that on the basis of short written information no comprehensive assessment of the national policies can be made. But the answers and, even more, additional comments from the member countries show if the responsible persons have a clear picture of the challenges and of the necessary strategies, and of the shortcomings. Unfortunately, not all member countries have undertaken the efforts to prepare answers. From some countries the time schedule was exceeded by far, so it was not possible to distribute the results to gain discussion on the workshops, as initially had been planned.

Annex 4 contains the revised material sent by the member countries, structured according to the original scheme of the questions. The following remarks, also structured according to the scheme of the Questionnaire Part II are based on the answers provided which may be incomplete[30].

Legal Frame

Sustainable transportation development demands an integration of transport, environmental, spatial and urban planning. The first three questions aim at the legal provisions regulating these issues, and their interaction.

- Transport: It remains unclear if and how environmental and sustainability aspects - which would influence all transport related decisions - are integrated in basic transport laws. Within the MATS-project suggestions to Swedish law-makers are given how to prepare a bill establishing targets for the transport sector and aiming at an economically, socially, culturally and ecologically sustainable transport system. Currently, there are no other examples at hand where this is defined in national laws. Indeed, for road and other infrastructure construction, environmental concerns have to be respected, via Environmental Impact Assessment (EIA). But this is to be applied only to new major infrastructure projects to measure the direct impacts on the environment[31]. For the N-W countries the EU Directive on EIA is mandatory. The regulations of some S-E countries are in the phase of harmonising with EU regulations (Lithuania mentioned this) Lithuania also mentioned that the law on EIA demands to consider environmental issues in national transport policy and planning; this would go far beyond the EU EIA Directive and would touch the issue of Strategic EIA which up to now is not operational. The current standard both in N-W and S-E countries seems to demand EIA for major construction activities in the transport sector. For

[29] From national answers to Questionnaire.

[30] In the frame of this study is was not possible to make an in-depth evaluation of additional information to related subjects.

[31] The general problem of the traditional EIA is the lack of methods to address strategic alternatives during the assessment process.

these, numerous environmental regulations have to be respected (e.g. as mentioned by Poland).

The technical standards for new vehicles also are part of transport law systems, they are either in accordance with EU (N-W countries) or in the phase of harmonisation, the time frame is not mentioned (S-E countries). EU-harmonised or EU-comparable regulations for testing of in-use vehicles are valid in the N-W countries; in the S-E countries either EU directives are already applied or will be applied in the future (Lithuania, Latvia). Poland did not specify the status of its regulation on this subject. Results on the effect of in-use testing in terms of pass/failure rates were given (e.g. Germany, Latvia) but in terms of reduced emissions are not available.

- Environment: In general, environmental regulations concerning the quality of the environment media air, water, soil etc. also are mandatory for the transport sector. But there is a major difference between e.g. stationary sources (production facilities, power plants) and transport: While stationary sources affect the environment as they are licensed, the transport emissions are only restricted for single cars, and the impact from road on the environment is only looked at in the phase of planning; the real impact of continuously increased transport onto the environment is no subject to legal regulations, and there are no instruments to deal with the problems caused by the sheer traffic volumes. Although there are ambient air pollution and noise standards, either as guidelines or as limit values (Finland mentioned a recent revision and introduction of limit values instead of guidelines), the consequences of exceedances are not clear. No legal mechanism is in place to guarantee compliance.
- Spatial and urban planning: Both countries from the N-W (e.g. Germany) and from the S-E countries (Poland, and others) mentioned comprehensive land-use regulations to influence the spatial development. Lithuania mentioned that the Law on Environmental Protection demands transport avoiding structures in regional/spatial and urban planning. Local, regional and national spatial planning regulations are mentioned (Germany, Poland) aiming at land-use planning at the respective administrative levels.

Transport Policies and Programmes

Some countries were mentioning transport masterplans and development programmes, respectively, to be the basis for the national policies (Germany, Latvia). Lithuania indicates its actual governmental programme to define the priorities. Like others, Poland describes the investment priorities in road, rail, water and air transport but does not describe its political position to this or that transport mode (as had been asked for in Question 4 a). It can be guessed that rail and multimodal transport have priority over road freight transport but this is not explicitly expressed.

Questions 4 b, c and d) asking for investments in road and rail infrastructure and in harbours aimed at the policy priorities to be expressed in the funds allocated. To illustrate this point: A few years ago, Germany had decided to give priority in land transport to rail, and had announced that in its recent Federal Transport Infrastructure Masterplan the investments for rail would be higher than for roads. Unfortunately, only a few countries now gave answers. Lithuania gave a very informative breakdown on the investments for the various modes. All investments have been increased during the previous years and are planned to increase further (see also Lithuanian answer in Annex 3). From 1993 to 2000, in Lithuania about 56

percent of the total investments of 1,365.5 million Lt are dedicated to roads, 27 percent to rail, and about 17 percent to airports, air traffic services and ports. For the years 2001 to 2005, a total 2,586.5 million Lt is planned to be invested with rail increasing its financing share to about 52 percent.

Latvia and Finland also gave detailed information about investments in roads but not rail, so it is not possible to show the priorities.

Several of the S-E countries have provided information about international loans and grants in the transport sector, as asked for in Question 7a. Major financing comes from World Bank (WB), European Investment Bank (EIB), European Bank of Reconstruction and Development (EBRD), and from the PHARE Fund, as has been listed up e.g. by Poland. Loans and - in the case of PHARE - funds are dedicated to highway construction and road renewal programmes in Poland. These are the issues also in Latvia, where additionally the East West Railway Rehabilitation Project is under discussion, a 100 mio. USD (United States Dollar) project with 70 mio. loans, 50 percent each by EIB and EBRD. Other projects include port reconstruction (Ventspils 49 mio. USD, Liepaja 3,2 mio. USD). The project financing for Latvia listed above are those with state guarantee; additionally there are significant loan without state guarantee, e.g. for air traffic control, for rail communication systems, etc. Latvia also receives PHARE Fund help for infrastructure of 3.2 mio. ECU, in 1996 a. o. for works associated with the Via Baltica project. Lithuania´s main projects with international support are for road reconstruction (69 mio. ECU), railway reconstruction (62 mio. ECU), Klaipeda sea port reconstruction (24 mio. ECU) and for air transport development (12 mio. USD). This shows that also in Lithuania modernisation of the rail system is of high priority.

As far as the national answers contain information at all about EIA for transport infrastructures, this is generally applied for major new projects, which as well means that the assessment is also made for those projects supported by international loans and funds in the S-E countries in transition. Because of as lack of according information it cannot be discussed here if the EIA requirements are satisfactorily with respect to sustainability issues. It can be guessed that, similar to N-W countries procedures, no strategic and "true-cost" analysis (including all external cost, land-use consequences and additionally generated traffic) are made.

In the area of road traffic rules and truck vehicle size regulations, S-E countries aim at harmonisation with EU. Latvia may be taken as an example, providing information about compliance with EU Directive 96/53/EC from 1996 (regulation about the width of trucks) on. In urban areas, maximum permitted speed was reduced from 60 to 50 kph.

Urban Transport Policy

The answers received to Question 5 a concerning the financing structure of public transportation point out that the passenger fares only cover part of the cost (typically about 50 percent, see e.g. Finland, Germany) and that public subsidies are paid. The responsibility for urban public transport is with the municipalities (see e.g. Finland, Lithuania) which have to cover the deficits, with the national budgets providing support (see e.g. Poland), either in general (see Lithuania) or especially for investments (see e.g. Germany, Sweden).

The modal-split data in cities of more than 100,000 (answers to Question 5 b) in Finland and Germany indicate that under N-W countries conditions passenger cars reach about 40 to 50 percent of all trips (complete modal split, i.e. including the

non-motorised modes of walking and cycling). Public transportation may differ between 16 to 24 percent (some German cities) and 28 percent (the example from Finland). Non-motorised transport accounts for 25 percent in the Finish case and between 30 and 40 percent according to the German figures. Denmark and Sweden did not provide data. None of the S-E countries has delivered data on the urban modal split. Poland mentioned that the market share of public transportation has decreased about 34 percent between 1986 and 1993, and that this trend must be expected to continue.

In the workshop discussions in Riga and Berlin some other aspects of public transportation were discussed. It was generally agreed that a well functioning and attractive public transportation would be of high importance for a sustainable transport development in all countries, and that the current trends endanger the future of the public modes. Both urban transportation and the rail services suffer from the continuing trend towards the private automobile and the truck, respectively, which impose heavy burdens to the public and to nature. A reliable financial and regulative framework which would guarantee fair conditions for the future of these - in general very sustainable modes - is seen necessary. The participants agreed that an exchange of experiences about these issues between the countries, and especially the municipalities, would be very useful. This should include technical co-operation as well.

Environmental Policy

Comprehensive information has been delivered by some of the participating countries; others have concentrated on some aspects. The complete answers are also documented in Annex 3. Because of the volume and the variety of information, here only a few aspects can be highlighted respectively discussed.

For all N-W countries the policy of the EU defines a minimum standard of quality of the environment to care for. In practice, hardly any country will actively reach for stricter ambient standards because it fears additional cost for the national industries. On the other hand, the product specifications, especially exhaust emission and noise standards of vehicles, cannot be tightened by national measures. Only some indirect measures to promote cleaner and more sustainable vehicles, e.g. non-discriminatory tax schemes, can be applied in national responsibility after notification.

For the S-E countries that had answered the questionnaire, the harmonisation process with the EU is an actual topic in environmental policy. Latvia describes details about in-use vehicle testing, aiming at compliance with the EU (see also Chapter 4.3.2 above). The taxes on gasoline still are differentiated between leaded and unleaded, giving a market incentive to by unleaded. (The tax difference is 0,02 LVL per litre, about 0,03 ECU, from 1. 1. 1998 on.) In a few years fuel taxes in general are expected to be harmonised with the EU. The same can be said for Lithuania where already now it is reported that no leaded fuel is on the market at all. Lithuania has mentioned a Law on Pollution Tax to reduce pollution but there is no additional information about the consequences for the transport sector.

Within the EU, mineral oil taxes can only be changed within certain limits by national activities. Gasoline taxes are far higher than those for diesel fuel, supporting a trend in passenger cars towards the diesel car and acting as subsidy for trucks. Typical average values are reported by Germany: Mineral oil tax for leaded gasoline is DM 1.08, for unleaded gasoline DM 0.98, for diesel fuel DM 0.62; the market prices are DM 1.78 (leaded gasoline), DM 1.65 (unleaded) and DM 1.25 (diesel), respectively (data from 9/1997). It can be seen that the market price

difference between unleaded and leaded is higher than the tax difference, indicating that the oil companies can produce and distribute unleaded gas cheaper.

Other market based instruments are the annual vehicle tax, purchase tax or differentiated V.A.T, and other environmental taxes, e.g. differentiated according to fuel consumption or exhaust emissions. Traditionally, Denmark has high purchase taxes on cars which led to a significantly lower passenger car fleet than in countries with comparable high GDP. Germany just has introduced a new vehicle taxation scheme which provides incentives for low-emission vehicles; also, the time-based highway user fee includes incentives for low-emission heavy duty vehicles.

Although the given answers to the questionnaire showed that all countries undertake efforts and strategies to challenge ST, additional steps must be done to overcome the existing deficits. One example is the necessary harmonisation and integration of environmental and tax policy.

4.4 Additional Steps to Take: Short Term and Long Term Perspectives[32]

N-W-Countries
Basic Long-Term Decisions in Transport and in Environmental Policy

The basic concept of future transport policy should be a limitation of road traffic. Limitations and long term decrease targets in transport activities should be stated to reduce CO_2-emission and the noise level, to protect habitats, nature and landscape and to improve urban liveability. On state, district, and local level according targets should be fixed.

Some proposed figures that partly reach beyond the ST scenario considerations are:

Parameters	Criterion		Specification
CO_2	– 80 %	emission reduction of the	
NOx	– 90 %	transport sector in 2030	all areas
VOC	– 90 %	compared to 1990	
PM	– 99 %		urban areas
Noise	<= 65 dB(A)		all areas
	<= 55 dB(A) daytime		residential
	<= 45 dB(A) night		areas
Land Use	criterion has to be developed		urban areas
	no extension of transport infrastructure		rural areas

Source: Umweltbundesamt (UBA), (1997)

These figures are planning goals to be taken into consideration for spatial planning, urban planning, infrastructure investment and decisions about taxes.

Besides more stringent regulations for new vehicles such a far-reaching goal demands Transportation Control Measures (TCM) on local and regional levels. It is proposed that N-W countries decide to reach further progress in traffic emission mass beyond the possibilities of the S-E countries.

[32] The recommendations given hereafter have to be read keeping in mind that only limited information was available. The recommendations need further considerations.

This means no further increase in passenger car and goods transport activities above levels of 1990 during the 90s, for 2010: decrease by some 25 to 30 percent; for 2020: some 50 percent compared with 1990.

S-E-Countries
Basic Long-Term Decisions in Transport and in Environmental Policy

The former CPE countries developments will more or less follow that of the Western countries. It is important to use early experiences to avoid similar increases in traffic related environmental damages. The future increase in road traffic is the key factor. In order to serve as orientation values for decision making on state, district, and local level, quantitative tasks should be fixed. Proposed basic decision: No worsening of the transport related environmental situation in 2000 to 2005 compared to 1990, therefore, increases in passenger car and goods transport activity should take place only according to the average decrease in emissions and fuel consumption. If technical progress was enforced by according regulations (see below) this would allow a 25 percent increase in vehicle-km during the next decade.

These goals ought to be taken into consideration for spatial planning, urban planning, infrastructure investment and decisions on taxes.

National, regional, and local emission reduction plans ought to be implemented with similar goals as recommended for the N-W countries. Compliance with air pollution standards with respect to WHO respectively EC should be reached during the 90s. This aims especially at NO_2, SO_2, Lead, Ozone, and Particle Matter, but should also be applied e.g. to Benzene. National reduction targets for acid emissions (NO_X and SO_2) should be set extending the figures of the Sofia declaration. Per capita fuel consumption and emissions of Sulphur and Nitrogen Oxide from the traffic sector should not exceed the 1990 values.

Taxes and Fees

Because scientific evidence about the true price of certain public goods will probably never by reached, a pragmatic approach should be followed. Transport and fees should be implemented in the Baltic 21 member countries in order to promote better land use, traffic behaviour and mitigate further increase in passenger car and truck use especially in the highly motorised N-W countries. In the S-E countries, gasoline and diesel fuel taxes should be in accordance with the current average EU level within the next years, while in the N-W countries further increases should be scheduled in order to support the market introduction of more fuel efficient cars.[33]

It is recommended to introduce road user fees (road pricing) for long-distance truck haulage based on the size of the trucks (gross vehicle weight, GWV) and on the kilometres driven. Such a scheme should cover both transport on highways and on other roads. Information technology is at hand that allows easy identification and collection of payments. The level of taxation should differentiate between the countries, reflecting also the availability of transport alternatives and regional situations.[34]

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[33] In some countries higher excise duties (V.A.T.) should possibly imposed on passenger cars than on daily consumer goods; and the annual vehicle tax should be varied according to exhaust emission and fuel consumption. To gain support for raising taxes it maybe necessary to communicate the true social cost of driving towards the public.

[34] In some cases it could be possible to adjust the taxation also to local conditions.

Traffic Regulations

The speed of motor vehicles is of major importance for the energy consumption, exhaust emissions, accident risk and noise. Additionally, transport speed often is the decisive factor to choose a certain mode. Finally, the desired speed influence the buyers decision what kind of car is purchased; with faster and larger cars generally having a higher fuel consumption per kilometre than those designed for slower speeds. With respect to the future technological development, the maximum speed cars have to designed for will be very important.

For passenger cars maximum speeds of 100 and 120 kph on motorways, 80 to 90 kph on other roads outside municipalities, 50 kph on main roads within municipalities, 30 kph in living areas are recommended. For vehicles with more than 2.8 t GVW (Gross Vehicle Weight): 80 kph on motorways and all other 4 lane roads, for vehicles > 7.5 t GVW: 60 kph on two lane roads.

Enforcement of speed regulation should be fostered by technical measures (see below; EU already demands speed limit systems for vehicles of more than 12 t GVW) and higher fines respectively withdrawal of drivers licenses. In order to reduce the number of accidents and fatalities, zero limits for alcohol should be introduced and controlled.

Within municipalities, restricted and priced parking are very effective to reduce traffic demand. Access to urban areas may be restricted for certain vehicles and during the nights. Inner-city parking regimes should be developed aiming at a reduction of the number of parking lots and development of alternative access by park-and-ride.

Vehicle and Fuel Regulations

Exhaust emission standards of the EU already are decided to be tightened during the upcoming years. The S-W countries should aim at a harmonisation with those standards from 2000 on latest (where not already implemented); only used vehicles not older than model year 1990 should be allowed to be imported. Cars that do not meet the current EU standards should be subject to higher import tariffs. For HDVs serving urban areas (e.g. buses, delivery lorries), low NO_X and particulate standards should be introduced earlier.

Responsibility of the manufacturer respectively importer for 100000-km-compliance with emission standards should be mandatory. In-field-surveillance programmes ought to be carried out. In the case of non-compliance, the responsible enterprises should be obliged to recall the respective vehicles. To ensure appropriate maintenance of emission related vehicle parts, cost-effective inspection and maintenance programmes should be implemented and enforced.

Effectiveness ought to be proven by scientific surveys. I&M programmes lacking effectiveness should be redesigned using international experience. It is recommended to announce I&M programmes every 3 to 5 years a new to contractors in order to ensure full effectiveness.

Leaded gasoline should be phased out until 2000 at last, where not already decided; for engines needing lead for valve seat lubrication other additives are available. Oxygenated fuels should be introduced during the winter months in order to reduce CO and HC emissions. RVP (Reid Vapour Pressure) could be reduced to decrease HC emissions of elder gasoline vehicles without evaporative emission control devices. Sulphur content of Diesel fuel should be limited to 0.005 percent.

Alternative fuels are not recommended to be introduced within the next decade.

Instead of those costly solutions, cleaner traditional fuels (gasoline and diesel) should be demanded. Of the non-traditional fuels, Compressed Natural Gas (CNG) and Liquefied Petrol Gas (LPG) proposes most benefits especially for application in urban buses and delivery trucks. Retrofitting modern Diesel engines for urban buses may be a cost-effective way to reduce emissions. Currently, it is not recommend to equip existing buses with particle traps due to their limited durability. Retrofitting catalysts for private passenger cars has not been very successful in various countries; before choosing this strategy careful evaluation should be done on the cost-effectiveness.

In respect to reduction of the sulphur contents in marine fuels the Working Group on Transport and the Environment in the Baltic Sea Area (1994) proposed to achieve reduction by the means of the new Annex to MARPOL (International Convention for the Prevention of Pollution by Ships) 73/78, which is developed by IMO (International Maritime Organisation); also the HELCOM Recommendation 13/15, the IMO Assembly Resolution A.719(17) on prevention of air pollution from ships and HELCOM Recommendation 11/12 on reducing of air pollution from ships should be taken into account[35].

[35] Taken from the recommendation list of the Final Report of the Working Group on Transport and Environment in the Baltic Sea Area, 1994

Land-Use Planning Regulations

Spatial Planning N-W countries

Regularly most of the N-W countries are equipped with an advanced spatial planning regulation, where sustainability aspects are embodied in. The legal framework for spatial development has mostly been revised with respect to the weight of environmental matters related to other goals.

Organisation of spatial planning should reflect the principle of counter current: Top - down planning schemes designed by the national levels ought to be precised and corrected by bottom-up planning on local and district level. Co-operation between local communities and the comprehensive communication towards the public and extended participation in decision making is essential to gain acceptance being a major prerequisite of cost effectiveness in the long term.

Urban Development N-W countries

Major targets of urban development policy ought to be the avoidance of further settlement sprawl and achievement of municipality structures that enable citizens to organise their every-day life without extended use of passenger cars.

National planning authorities should set minimum figures for density and size of settlements as well as for public transport quality (e.g. the Dutch ABC-planning system). In order to reduce transport demand, municipalities should enforce mixed land use for housing, work, shopping, leisure, and recreation both for new and for existing city quarters. New construction of office buildings should only be allowed in quarters with or near housing areas, and vice versa.

Spatial Planning S-E countries

A comprehensive legal framework for spatial planning should be implemented on state/county/municipality levels that concedes environmental matters appropriate importance. The sustainability approach ought to be introduced as the major task. Organisation of spatial planning should reflect the principle of counter current, as has been mentioned above for the N-W countries: Top - down planning schemes designed by the national levels ought to be precised and corrected by bottom - up planning on local and district level. Co-operation between local communities and the comprehensive communication towards the public and extended participation in decision making is essential to gain acceptance of policy.

Urban Development S-E countries

It seems appropriate to introduce planning regulations for minimum population density (according to local situation), mixed land use, and good access to public transport.

Neighbour municipalities should form planning corporations to avoid competition for investors by decreasing the planning standards. The principle of subsidiary demands own tax revenues for municipalities; additional funding may be appropriate to cover expenses in special local situations.

No shopping facilities (supermarkets) without public transport access should be allowed outside municipal borders. Other new facilities outside the cities that cause special transport demand (large number of employees or visitors) must present

transport plans with minimum share of public transport (e.g. 50 percent, 75 percent or according to local conditions)

Inner city parking regimes should be developed. Traffic planning should reduce number of parking lots within municipalities and develop alternative access by park-and-ride.

Public Investments

In all N-W countries of the Baltic Sea region, extended road infrastructure construction has taken place. A *general* capacity increase in the road networks is not sustainable; although local extensions could be necessary to reduce environmental burdens and accident risks of the citizens. Special SEA studies ought to be implemented to ensure compatibility of the questioned project with the basic task of limiting respectively decreasing road transport activity and other environmental tasks.

When cost and benefits of infrastructure investment are evaluated, generating of additional traffic must be taken into account. For passenger car transport it seems appropriate to be based on the assumption of average constant trip duration. Time savings result in additional trip distances, with time response varying for leisure purposes (nearly immediate response), shopping (due to changes in spatial orientation), and commuting (medium and long term movements due to development of settlement). Calculation of consumers surplus due to time savings should be restricted to commercial traffic and business trips.

Generally, the least-cost approach should be applied to the transport sector. If increasing transport demand is observed raising the call for road or rail network extensions alternative measures outside the transport sector should be reviewed that might serve the basic purposes more efficiently.

In the S-W countries, the legal framework for road/rail planning & construction should be completed according to the related EC directive on EIA. Cost-benefit analysis should include cost of external effects on the environment and on society. Least-cost planning principles in certain cases may lead to the decision not to extend road infrastructure but serve the demand by non-transport activities or by demand-side management. For example, support to local industry may be given more cost-effectively by strengthening the communication network or raising the qualification of local human resources. More traffic safety may be reached by financing better enforcement of traffic regulations or support of transport mode shift. Today‘s public budgets in most countries urge for the most cost-effective solution.

With respect to necessary expenditures on the road sector, priority should be given to proper maintenance of the existing road network and upgrading of roads where necessary. Construction of new motorways should be evaluated carefully with respect to cost as well as environmental aspects. For high shares of lorry traffic three-lane, four-lane and two-plus-two-lane roads designed for lower speeds save land area and serve local conditions better. Public investment should concentrate on modernisation of railways[36], goods shipping incl. related facilities, and - for large cities - on underground and light railways. Public participation in decision

[36] It is possible to use existing rail infrastructure more efficiently and simplify existing operational procedures between countries. Freeways can significantly increase the operational capacity of the railway system and open possibilities for a model shift from road transport to other modes.

making should be a basic part of administrative efforts. The principle of subsidiary should be strictly applied.

5. Action Programme

5.1 Scope of the Programme and Working Process

Practical application of strategies for securing Sustainable Transport is a new challenge for **all** countries in the region. Finding a common language and identification of common interests are essential for any co-operation in the Baltic Sea region. The following actions are proposed as the first steps towards development of structures, processes, and tools for co-operation concerning attainment of sustainable transport in the region. They supplement the action programmes developed in other fora, including the UN ECE (Vienna Declaration, 1997), HELCOM (17/1), and the Declaration of the CEI Environment Ministers (New York, 1997).

The draft action programme has been written based on the lists of proposed actions, compiled in Riga/Berlin on August 29/30 and October 12/13. The actions have been partly discussed in Riga on December 4/5 and in Copenhagen on January 30 in particular those, that occur in the BA21 draft final document for the transport sector. The complete initial list of actions is documented in Annex 6.

The action programme aims at

- establishing a regular, long term co-operation process in the region with regard to sustainable transport, taking into consideration the region-specific conditions, e.g. low density of population and the specific types of transport links across and around the Baltic Sea (RoRo and ferry transport, air transport and a ring of ground transport corridors),
- avoiding duplication to the action programmes of other institutions and making use of existing co-operation bodies in the region like VASAB, Union of the Baltic Cities (UBC) and HELCOM,
- the implementation of instruments (assessment and auditing processes, public participation, indicator based trend observation, education, training) rather than technical or infrastructure ("hardware") projects.

The actions are characterised with regard to the basic idea, the expected outcome, goals, time frame and the target groups. The proposed lead parties and financing sources have not yet been approached, thus detailed action plans remain to be developed. The sector working group invites national governments, the transport ministers in particular, local governments, NGOs, trade, industry, services and IFIs (International Financial Institutions) to consider the proposed actions. They may wish to take leading role, to provide funding or to contribute in another way to the implementation process.

5.2 Proposed Actions

The following actions were selected from the initial lists of action. They aim to support the following strategies:

- Develop the necessary institutional and legal framework to integrate transport and land-use planning (spatial planning, physical planning) so as to reduce or mitigate transport demand in the medium and long term;
- Ensure that sustainable transport supports attainment of sustainable development in other sectors by being efficient and timely;
- Give priority to modes of transport that meet needs in the most eco-efficient manner in every specific case, which may include a general shift from road transport to sea and train transport if appropriate;
- Raise public awareness about the environmental, social, economic, and safety-related consequences of excessive motorised transport; provide information and promote public discussion of sustainable transport;
- Apply the polluter-pays principle by internalising external costs so that each transport mode bears its current and future social and environmental costs;
- Promote the use of cleaner and more fuel-efficient transportation technologies by use of fiscal instruments and legal standards;
- Improve the overall operational efficiency of transport systems;

The actions are listed in an order referring to the extent of elaboration. Actions at the end of the list are not less important than those at the top.

1. Carry out a project on developing guidelines, criteria and recommendations for infrastructure investments in a sustainable transport system
(see final SOG document sector actions: TR 1)

A study will be undertaken under the auspices of HELCOM PITF (Programme Implementation Task Force) to develop guidelines, criteria and recommendations for infrastructure investments supporting the development of sustainable transport systems in the Baltic Sea region.

The countries' present decision-making processes will be taken into account, especially as they concern the use of criteria for sustainable transport. Funding processes will also be considered, including funding from domestic and international sources. The guidelines, criteria and recommendations may be applied in the decision making processes of the national governments and international funding institutions.

A proposal for a concrete strategic environmental and regional impact assessment of transport policy and infrastructure networks for a major infrastructure project in the Baltic sea region will be made. The integration of transport and spatial planning, i.a. along the major transit corridors, shall be emphasised.

Goals	Target Group	Time frame
• Transport system planning and infrastructure investment take into account the needs of sustainable transport. • National governments and IFIs apply appropriate guidelines, criteria and recommendations for the sustainable development of transport systems. • Investment is allocated in such infrastructure projects that support sustainable transportation.	• HELCOM PITF • International funding institutions (IFIs) • National Governments • European PHARE and TACIS programme • NGOs • VASAB 2010 • UBC	1998 till 1999

Actors: Sector, HELCOM, VASAB

2. Establish and strengthen collaboration among the governments with regard to measures for more efficient goods transportation in particular by improving railway and ship connection
(see final SOG document sector actions: TR 2)

National governments will establish a regular collaboration towards sustainable transport in order to secure common goals, and to avoid unfair competition by subsidising non eco-efficient means of transport or unnecessary investment in infrastructure.

The current situation in the S - E countries is still characterised by large inefficiencies in freight transport. Therefore a trade facilitation and multimodal transport programme in the S - E countries which systematises and rationalises procedures, information flows and documentation will be started. There is a need to develop and support efficient operation of combined mode (multimodal) transport and reduce the physical barriers, while at the same time upgrading the customs systems will reduce lead time, detours, and the use of obsolete or highly polluting equipment in the total transport process. In this context pilot projects will be carried out to show the achievable improvements.

Goals	Target Group	Time frame
• Railways and ship connections are improved, as well as cost efficiency and utilisation of existing transport capacity, thus minimising new infrastructure investments. • Particular attention has been paid to the improvement of international transport co-operation.	Regional co-operation among • Ministries of transport • Ministries of planning • Ministries of finances, • Ministries of economics • Customs • Transport enterprises, • Banks • Insurance companies • NGOs.	Start in 1999 and focus on the decisive period till 2005.

Actors: Sector, VASAB

3. Develop a forum for the promotion of policy integration, target setting and trend observation with regard to sustainable transport in the region
(see also final SOG document joint actions: JO 6 and 2)

A group of transport and environment experts will be set up in order to monitor progress towards sustainable transportation in the Baltic Sea region. Urban and regional planners shall be involved as well. The task includes (i) to develop a common set of indicators[37] which is related to policy targets, and supports sector policy integration, including transport planning and spatial development planning; (ii) to exchange experiences concerning data collection and integration of transport end environment statistics; (iii) to calculate environmental burdens of transportation; and (iiii) to evaluate national reports on the implementation of measures set out in HELCOM 17/1. Every 3 to 5 years, an indicator-based regional report to the governments will be published. When setting up the expert group, the lead party may involve existing collaboration bodies like the appropriate HELCOM committees, the *Nordic Monitoring and Data Group* (established by the Nordic Council of Ministers) and the *Baltic Environmental Forum* (acting in co-operation with the Baltic Council of Ministers).

Goals	Target Group	Time frame
Regional **information** with regard to Sustainable Transportation is available, based on mutual understanding of terms, comprehensive indicators and comparable and reliable data.	• Experts from governmental and non-governmental institutions • National governments (ministries of transport, environment and regional development)	Start in 1998 and come up with a first report in 2000

Actors: Sectors, Governments, HELCOM

4. Strengthen co-operation among Baltic cities and public transport companies in order to promote environmentally sustainable urban traffic organisation, sound and efficient public transport systems, as well as appropriate spatial planning
(see also final SOG document joint actions: JO 4)

Co-operation among Baltic Cities will be strengthened with regard to public transport, traffic reduction and calming, and town planning. Partnerships among public transport companies will be promoted so as to help public transport providers in the south-east of the Baltic Sea region develop a proper technical and organisational basis for implementing state-of-the-art services[38]. The municipalities will exchange experience regarding the legal and fiscal instruments required to ensure sufficient, economically sustainable public transport.

[37] The set of indicators for sustainable transport discussed in the framework of the Baltic 21 Process (see the Sector Report) could be used as a starting point.
[38] Partnerships of this kind have been successfully established for other public services, for example, water supply. Sufficient financial resources are the prerequisite for such an approach.

Given the process is successful, public transportation in the south-east Baltic region will remain or become competitive in terms of service quality and prices. Pilot projects with regard to:

- technical modernisation of the public transport fleets in the S-E countries,
- training of municipal authorities, city planners, executives of public transport companies aiming at better management and state-of-art service in the S-E countries,
- training on financial management strategies on how to support public municipal transport,
- the use of alternative energy sources in city traffic (in particular CNG),
- the use of new communication technology in order to reduce the demand for business trips and goods transport,
- the improvement of non motorised transport e.g. by bicycle routes in cities,
- the development of sound infrastructure and spatial planning in cities in order to avoid structures, that demand excessive motorised transport

will have been successfully implemented.

Goals	**Target Group**	**Time frame**
• New spatial structures demanding excessive motorised transportation have been avoided. • Public transport enterprises have made their services attractive in order to mitigate the increase of private, motorised transport. • Light traffic facilities and less polluting vehicles and fuels have been substituted other, less eco-efficient means of transport in towns and cities.	Regional co-operation among • Municipalities • town planners • transport service enterprises • vehicle manufacturers • UBC	Start in 1998 and focus on the decisive period till 2005.

Actors: Sector, Union of Baltic Cities (UBC), IFIs, selfgovernments, vehicle manufacturers, public service enterprises

5. Exchange of experience among the governments regarding the legal and fiscal instruments required to ensure sufficient, economically sustainable public transport
(see also final SOG document joint actions: JO 4)

National governments will establish a regular collaboration in sustainable transport development around the Baltic sea to secure common goals. They will in particular exchange experiences regarding the legal and financial instruments required to ensure sufficient, economically sustainable, public transport on regional and local level.

Goals	Target Group	Time frame
• Application of the most efficient strategies to support public transport by the governments.	• Ministries of Environment, Finances and Transport • National Associations of Municipalities • UBC	Start in 1998 and focus on the decisive period till 2005.

Actors: Sector, Governments

6. Carry out pilot projects for the practical application of strategic environmental and regional impact assessment (SEA) concerning transport plans and transport system development
(see also final SOG document joint actions: JO 6; follow up of sector actions: TR 1)

The governments, taking into account the policy of the European Commission, will launch pilot projects on strategic environmental assessment (SEA) of both transport policy and infrastructure networks as they may support development of sustainable transport in the Baltic Sea region. Strategic spatial impact assessment on transport projects, particularly in the major corridors of the European Transport Network, is also a tool to integrate transport planning, spatial planning and environmental impacts assessment.

Strategic environmental assessment of the existing and planned oil transport infrastructure in the Baltic Sea Region may be addressed by a pilot projects as well.

The existing ECE recommendation and EU draft regulation will be taken into respect. The experience gained during the pilot projects may be the basis for establishing a mandatory assessment process before major investment decisions are made. The proposal for a feasible SEA project will be one result from action 1.

Goals	Target Group	Time frame
• The goals of sustainable development are considered in transport system planning. • Transport planning, spatial planning and environmental assessment have been integrated to a sufficient extent.	• HELCOM PITF • International funding institutions (IFIs) • National Governments • NGOs • VASAB	Start in 1999 and focus on the decisive period till 2005.

Actors: Sector, EU-Commission, VASAB

7. Seek to promote public involvement and the participation of industry, NGOs, communities, and citizens generally in decision-making processes concerning sustainable transport
(see also final SOG document joint actions: JO 2)

Within the framework of Baltic 21 the governments seek especially to promote public involvement and the participation of industry, NGOs, communities, and

citizens generally in decision-making processes. Success stories about action towards sustainable transportation shall be collected and discussed on a regional conference on "Action Towards Sustainable Transportation in the Baltic Sea Region" in the beginning on 1999, organised by ... . Based on the findings of the conference a regional programme for raising public awareness on transport and environment will be developed.

Goals	**Target Group**	**Time frame**
• Public has become aware of the need to develop a sustainable transportation system in the Baltic Sea region. • Public reporting on successful examples motivates further action. • A common understanding on what can be considered as "sustainable" has been achieved.	• national governments • industry • NGOs • citizens	start 1998 an ongoing process

Actors: Sectors, VASAB, Governments

8. Carry out pilot projects concerning eco-auditing with regard to logistics and transport management by trade, industry and service enterprises
(this action could be part of sector action IN 1)

Trade and industry will be invited to launch pilot projects to evaluate the environmental performance of their logistic systems and transport management using the process of **'eco-auditing'**. Full life-cycle analyses should be conducted so that such items as business trips and transportation of raw materials and products can be included. The results should be published in order to promote such action in other enterprises as well. The experience gained during these pilot projects may be used to develop auditing standards (perhaps as ISO standards).

This action has to be co-ordinated with the action plan of the industry sector of Baltic 21, in particular action III (see industrial sector report, chapter 7) and the actions proposed by the tourism sector group.

Goals	**Target Group**	**Time frame**
• Information regarding the environmental burdens caused by transportation are regularly included in the environmental performance reporting of trade, service, tourism and industry enterprises. • Transport technology and management have been improved in trade, service, industry and tourism sector towards more eco-efficient means of transport.	Enterprises based in the Baltic Sea region, preferably regional joint ventures.	1999 till 2003

Actors: Sector, industry ,trade and tourism organisations

9. Development of regional strategies to support sustainable sea transport
(see final SOG document sector actions: TR 3)

Shipping lines tend to direct their ships to the nearest port in the Baltic Sea region in order to accommodate most frequent point to point sailings. These are not necessarily the most suitable ports with regard to overall transport efficiency. Therefore the sailings to more remote ports and the development of small harbours shall be promoted aiming to minimise the overall burdens on the transport chain.

With view on the increasing role of high speed ferries, particular attention will be paid to their environmental impacts compared to other means of transport.

Data on traffic flows and emissions, including those of high speed ferries, will be collected and exchanged. Further ways of reducing emissions and use of hazardous substances, as well as introduction of alien species in ballast water, from existing and new ships, including exploring the use of fiscal and economic instruments and the development of emission standards for the BSR, will be identified, taking into account the recent adoption of MARPOL Annex VI. A regional strategy to support sustainable short sea shipping, taking into consideration:

- route permission requirements in order to protect sensitive ecosystems,
- the needs of (small and large) harbour development,
- to develop emission standards for the Baltic Sea Region , and
- to develop a harmonised fuel charges system for sea transport in the Baltic Sea Region.
- To analyse the number of high speed ferries and their environmental impact with regard to energy consumption, emissions, noise and other environmental burdens;
- to phase out the use of Tri-Buty-Tin based antifouling paints in the shipping industry
- to develop an action plan for reducing the use of hazardous substances in the shipping industry (possibly a cross sector issue)

will be developed.

Goals	Target Group	Time frame
• Transportation has shifted to short sea shipping in such cases that shipping is the more eco-efficient alternative. • The amount of hazardous substances released to the environment by ships and ship industry has been sufficiently reduced.	• Ministries of transport • Ministries of environment, • Ministries of finance, • Ministries of economy • Shipping industry. • IFIs	start in 1999, reporting at the latest in 2001.

Actors: Sector, HELCOM, VASAB, shipping industry

10. Promote the political process aiming at joint strategies concerning fuel taxes, road prices and emission standards in the region

In co-operation with each other, the governments will develop a regional strategy concerning the development and application of fuel taxes (referring to the EU minimum tax requirements) and road user charges. These systems must avoid unfair competition resulting from the subsidisation of transport that is not eco-efficient. Harmonised emission and fuel standards will be established for the whole region, possibly supported by import restrictions for cars and trucks exceeding a certain age. Development of fiscal strategies and harmonisation of technical

standards will be carried out within the context of the EU approximation process. A successful process will result in a politically agreed commitment on how to make use of financial instruments as a tool to support a regional development towards sustainable transportation. The strategy will be published and discussed in the public in order to involve private drivers and trading enterprises.

It is proposed that the European Commission takes the responsibility for speeding up this process, asking in particular for support by the car manufacturers.

Goals	Target Group	Time frame
• In all countries of the region, the polluter- pays-principle is applied in a way that the shift to more eco-efficient modes of transport is promoted and unfair competition is avoided. • The public intensively discusses the costs of transportation. • Leaded petrol is phased out in the whole Baltic Sea region latest by 2003	• The ministries of transport, health, environment and finances in the framework of the EU approximation process, • The parliamentarians con-concerned with fiscal policies • Car drivers association, trade and transport companies • Car manufacturers • Oil industry	Start 1999 and focus on the decisive phase until 2005

Actors: Sector, Governments, car manufacturers, oil industry, Nordic and/or Baltic Council of Ministers

6. CONCLUSIONS

The following text of 6.1 has been discussed intensively several times with the participating representatives of the transport sector.

6.1 Sustainable Transport—Goals and Strategies[39]

Access to people, places, goods and services is important for the social and economic well- being of communities. Transportation is a key means of ensuring access. It is particularly important for the development of a strong co-operation within the Baltic Sea region.

The goal with regard to sustainable transportation in the Baltic Sea region consists of two components:

[39]According to Canada's Centre for Sustainable Transportation, a sustainable transportation system may be defined as one that:

- allows the basic needs of individuals and societies to be met safely and in a manner consistent with human and ecosystem health, and with equity within and between generations;
- is affordable, operates efficiently, offers choice of transport mode, and supports a vibrant economy;
- limits emissions and waste within the planet's ability to absorb them, minimizes consumption of non-renewable resources, reuses and recycles components, and minimizes the use of land and the production of noise.

- To minimise the negative environmental effects, the consumption of non-renewable resources and the use of land for transportation purposes to protect human health and the environment, in particular the sensitive ecosystems of the region.

- To retain transport´s ability to serve the economic and social development of the Baltic Sea region.

The Baltic Sea is traditionally a shipping and trading route as well as an area for tourism. Shipping lines can link the densely populated areas in the region. However, at the same time the Baltic Sea poses specific challenges for transportation as well. This includes the naturally limited speed of waterborne transport and the fact that road transport tends to concentrate in a few corridors around the Baltic Sea. The development of efficient, safe and sustainable transportation is an objective for all countries bordering the Baltic Sea. The transportation systems must

- provide adequate mobility of people and goods; and
- stay within the carrying capacity of the ecosystems at local, regional, and global levels.

Attaining these will require significant changes in institutions, policies, and communication styles.

The increasing movement of both people and goods have the potential to improve the quality of life, but could - if no appropriate measures are taken - on the other hand increase the number of accidents; emissions of air pollutants and greenhouse gases, and the amount of noise; the pollution of the Baltic sea; the fragmentation of nature and urban or rural landscapes, loss in biodiversity; and consumption of fossil fuels without sufficient development of renewable substitutes.

As well as a growing overall demand for transport in the Baltic Sea region, there is a shift taking place towards private cars, road cargo transport, air traffic and high speed ferries, what may increase these effects. However, rail transport, conventional water transport, and even public transport can also be a threat to the environment if they are based on outdated technology, poorly utilised organisation or use dirty fuels.

The situations of the south-east and north-west Baltic Sea region are different. In the countries of the south east, economic development is associated with rapidly growing traffic volumes for which transport infrastructure must be developed. Progress towards sustainable transport must accommodate traffic growth and infrastructure development while mitigating their negative effects on the environment. The countries of the north west must focus on reducing the demand for motorised transport[40] in order to minimise its adverse effects, and on the shift to more eco-efficient transport systems.

The policies selected for implementation must be those that target the driving forces behind the current trends and take into account the lessons learned in north-west Europe during the recent decades. To these ends, the responsible institutions of the countries in the Baltic Sea region will develop joint policies within the framework of Baltic 21, making use of existing co-operation bodies like VASAB. Goals and principles decided on in other international fora - including OECD, UN-ECE, and HELCOM - will be taken into account.

[40] EU-reservation

The policies will be based on the following strategies:

- Develop the necessary institutional and legal framework to integrate transport and land-use planning (spatial planning, physical planning) so as to reduce or mitigate transport demand in the medium and long term.

- Ensure that sustainable transport supports attainment of sustainable development in other sectors by being efficient and timely.

- Give priority to modes of transport that meet needs in the most eco-efficient manner in every specific case, which may include a general shift from road transport to sea and train transport, if appropriate.

- Raise public awareness about the environmental, social, economic, and safety-related consequences of excessive motorised transport; provide information and promote public discussion of sustainable transport.

- Apply the polluter-pays principle by internalising external costs so that each transport mode bears its current and future social and environmental costs.

- Promote the use of cleaner and more fuel-efficient transportation technologies by use of fiscal instruments and legal standards.

Improve the overall operational efficiency of transport systems.

6.2 BSR Scenarios

In order to gain material for a discussion of policy options, scenarios were decided to develop in the frame of Baltic 21. With a stable population development as a background for all parts of the region and a prosperous economy with slowly increasing GDP in the N-W and a more rapidly growing economy in the S-E countries in transition, two different transport futures were designed:

- The Trend Scenario prolonged the current development trends into the future and assumed both for the N-W and for the S-W no deep changes of policies. A slow but continued growth of the passenger car fleets in the N-W, with further improvements in technology, is assumed in the N-W. The public transport modes will be under pressure also in the future, keeping road traffic for both passengers and goods the most attractive options for the users. In the S-E countries the car fleets and car use is still lower but tends to increase rapidly. Truck haulage will take over more and more of the market from rail. Within the whole region, air transport will grow further on, and fast ferries and ships will be used to a larger extent in the Baltic Sea.

  This trend means an unsustainable development with respect to the environmental criteria but also contains disadvantages for social issues. It also contains risks and burdens from the economic point of view, because it demands high investments in infrastructure (due to the market demands mostly roads) without convincing perspectives to improve the transport situation - the N-W example up to now show that congestion is still there, and that public budgets are not able to finance more and more roads.

- The ST Scenario started with some consideration what changes in transport and environmental development could be possible. The idea was to reach

improvements in the environmental criteria and in the same time take care of the social matters, discussing the potential impact to the economy. The general strategy for ST is to long for improvements in environmental, social and economic issues without compromising each of these goals.

For the N-W countries, a stabilisation of the level of transport activity was assessed to be possible, leading to less energy consumption and greenhouse gas emissions. In the trend, most of the technical improvements would be compensated by further traffic increases. Under ST conditions of transport demand management and modal shift as policy priorities, greenhouse gas emissions of transport could decrease and the level of toxic emissions could decrease faster than under trend conditions.

For the S-E countries, ST means enforced introduction of BAT and implementation of those regulations and incentives supporting market penetration of modern technology. Unleaded gasoline, cleaner fuels in general, and tightened emission standards according to the EC regulations are assumed to be implemented before the year 2000, as well as well-functioning i&m systems. Old vehicles with high specific emissions should be phased out within a few years. But there are also structural challenges: The high shares of public transport ridership and of goods transport by rail, which traditionally is supported by pt and rail-oriented spatial development, should be preserved as much as possible. Clearly, also under ST scenario assumptions car ownership and car use will increase. Also, the economies will need higher shares of truck transport as well. But the structural advantages of low road transport dependency should be seen as a chance to avoid some of the costly errors of the N-W countries which since some years urgently promote public transport and rail to the customers - now under unfavourable conditions, in an environment mainly shaped according to the car and the truck. With technical ST scenario assumptions alone, it should be possible to avoid an increase in toxic emissions in the S-E countries - here we focus especially on NOx - from passenger cars, and mitigate the increase of NOx from trucks. With structural differences to the trend development, even direct improvements in air pollution from traffic seem to be within reach.

Comparing the environmental, social and economic aspects of both scenarios there is no doubt that a prolongation of the current trend is not in line with the sustainability principle.

6.3 Policy Implications

While the theoretical consequences of the scenario exercise seem to be clear - a policy shift towards the ST scenario and its policy strategies - the practical problems of such a policy shift and the uncertainties are quite serious. Although especially in the N-W countries the long-lasting debate about the limits of growth, about development paradigms and - since about ten years - about sustainable development has led to a broad insight that indeed there is a need for fundamental changes, there also is a tendency to argue that there is no choice than to continue the current course.

Globalisation, international competition and a decreasing ability of policy to steer the development seem to make it impossible to follow the sustainability fundamentals. Just to take the principle of true cost pricing: It is argued, this would lead to higher transport cost for the regional enterprises and would weaken their competitiveness. Also with tax reductions assumed for labor - in fact there will be

some branches that would suffer. In times of high unemployment, no politician could stand the discussion that his policy would force enterprises to close down and look for cheaper places to produce.

Similar arguments always show up when modal shifts are demanded, investment priorities are changed from road to rail, when taxes on kerosene are discussed, tightened vehicle and fuel regulations are demanded, and even when a speed limit on Autobahnen is discussed.

The concerns of the local and national enterprises must be taken seriously; there really is a fierce international competition. But there is evidence that trend policy is not the way to improve the conditions within the region; this should be discussed carefully. Traditional policies and recipes should be evaluated in terms of economic efficiency - maybe there is not only a lack of social and environmental efficiency in current trend but also a need for changes for economic reasons. According to the available information, CBA of road infrastructure in the region currently does not include multimodality and also no non-transport options. Only those policies which help save public money can be named sustainable, and are in line with the needs of the businesses. For the N-W countries of the Baltic region, the competitiveness is based upon high technology level, qualified labor force, social peace, a well-functioning public administration, and a regulative framework that keep the products and the factories state-of-the-art also for the home market. The idea behind the latter is that tightened product standards, e. g. emission standards, on the home market provide the necessary basis for competitiveness all over the world. While it is clear that mineral oil is not endlessly available, and greenhouse gases have to be reduced in future, this leads to the conclusion that the enterprises of the Baltic Sea region would take advantage of future chances if they were able to provide products and services in line with these demands. This could be supported by regional policies going ahead in these demands - without compromising the competitiveness of the enterprises on traditional markets. The policies for this have to be formulated carefully but reliable.

The second topic to deal with is the speed of policy changes. Any harsh turnaround of policies creates losers and winners, with the losers representing the more energy-consuming, more transport-intensive branches, especially those who directly are engaged in producing and selling automobiles, trucks, airplanes and fuel. Normally, the losers representing the old industries are the better organised branches. It is absolutely necessary for any realistic policy strategy not to neglect their interest - for the sake of the national economy and to maintain the chances for policy reforms. It should be made clear that ST is not a challenge to be met within a few years; it is a challenge for at least 50 years. No invested capital should be endangered to get lost, but the conditions for future investments should be forced to be in line with sustainability considerations. This widens the perspective and may reduce the conflicts with interest groups. For the N-W countries, the automobile industry in Germany and Sweden, the mineral oil companies and the trucking companies may be those branches which need long-term perspectives not to have their investments hurt by sustainable transportation. In the S-E countries, the coalitions may be less traditional but surely similar interests have to be taken into considerations. Basically, the idea is to let enterprises earn good money with goods and services that are in line with ST.

Thirdly, the future discussion should deal with the advantages of international collaboration in terms of creating fair conditions for competition without eco-dumping, i.e. externalisation of social / environmental cost. Often, taxes and regulations for ST are not accepted because other countries who do not apply them keep the cost for their local enterprises low and give them better market chances.

Internationally accepted guidelines would help to avoid these fears and stop unfair competition. On the other side, for those countries with lower labour productivity it may necessary to provide favourable conditions to investors by lowering the environmental and social standards. Also, subsidies in terms of cheap land, highway access and other support may be given that is not in line with sustainability criteria. This can not be avoided, taking into account the very different wealth levels of the BS 21 member countries and the urgent need for investments. International agreements should regulate the frame for this, and it should be kept in mind that in the long run only the environmentally reasonable decisions also are economically sustainable.

With these considerations about ST, competitiveness and co-operation in mind, the following proposals for common actions can be seen as first steps towards sustainable transport development. It is of utmost importance to establish practical links between the partners, and to demonstrate that sustainability principles can be implemented while in the same time maintaining the economic viability. It is expected that joint activities and information fora will carry the ST idea in the future.

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This report provides the results of an Agenda 21 process in the Baltic Sea Region (BSR) as related to sustainable transportation. An overview of the current BSR transport situation is given, based on a comprehensive survey of the member states administrations and on published information, and scenarios for a sustainable transport development have been sketched.

The study was drafted by consulting experts (Wuppertal Institute and Ökopol) and has been reviewed by a Working Group of transport and environmental officials from the BSR member states.

Particular attention is given to the different developments in North-West and in the South-Eastern countries, including motorization, land-use planning, technological development and the situation of public transit. Relevant statistical data was collected whereby the environmental concequences of the scenarios could be estimated.

Various policy implications are also addressed. The existing legal and environmental framework was evaluated with respect to the goals and objectives for sustainable transport. Strategies and concrete actions were compiled through which the promoting cooperating countries can proceed in line with the demand for sustainable transport development.

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No 2/98 The Baltic Sea Agenda 21 Sector Report - Agriculture (1)
No 3/98 Sustainable Energy Development in the Baltic Sea Region (ISBN: 87-986969-0-4)
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No 5/98 Baltic 21 Action Programme for Sustainable Development of the Baltic Sea Region - Sector Report On Forests (3)
No 6/98 Sustainable Development of the Industrial Sector in the Baltic Sea Region
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No 9/98 Spatial Planning for Sustainable Development in the Baltic Sea Region
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No 12/98 Environmental Citizen Organisation's Vision of an Agenda 21 for the Baltic Sea Region
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No 14/98 Vision of Sustainability in the Baltic Sea Region: Beyond Conventional Development

The reports can be downloaded from the Baltic 21 website (http://www.ee/baltic21/).
At the website you can also find information on where you can order the reports.

(1) Also published in the HELCOM Baltic Sea Environmental Proceedings (BSEP).
(2) Also published in the IBSFC proceedings.
(3) Also included in the Publications of the Finnish Ministry of Agriculture and Forestry.
(4) Also published by the Finnish Ministry of Trade and Industry, Working Papers 6/1998.
(5) Also published by the German Federal Environmental Agency (Umweltbundesamt), UBA-Texte 38/98

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ANNEX 1: Sustainable Transportation - Definitions

I.

The World Commission on Environment and Development (Brundtland Commission) defined 1997 in its report "Our Common Future" sustainable development as

> " ... development that meets the needs of the present without compromising the ability of future generations to meet their needs."

(The World Commission on Environment and Development (1987): Our Common Future)

II.

The World Bank economist Herman Daly defined general operational principles for physically sustainable societies (not especially for the transport sector):

"- Their rates of use of renewable resources do not exceed their rates of regeneration.

- Their rates of use of non-renewable resources do not exceed the rate at which substitutes are developed.

- Their rates of pollution do not exceed the assimilative capacity of the environment."

(H. Daly (1990): Towards some Operational Principles of Sustainable Development, Ecological Economics 2:1-6)

III.

The Swedish scientist Per Kågeson discussed 1994 in a papaer called "The Concept of Sustainable Transport" the position of the EC Commission on sustainable transport and sustainable mobility (both expressions are used synonymously) and deals in detail with air pollution and climate change, noise, depletion of natural resources, accidents, cost effectiveness and with the concept of bsasic mobility. With respect to the EC position Kågeson states:

"- In 1992 the EC Commission published a green paper called "A Community Strategy for Sustainable Mobility (...), followed 10 months later by a white paper named "The Future Development of the Common Transport Policy. A global approach to the construction of a Community framework for sustainable mobility (...). Both papers, however, fail to offer any definition

for this new concept. Neither do they provide any long-term commitments or targets related to the impact of transport on the environment.

The EC white paper on growth, competetiveness and employment, presented in December 1993 (...), is another example of a document which discusses growth without providing an operational definition of sustainability."

(P. Kågeson (1994): The Concept of Sustainabkle Transport, European federation for Transport and Environment (T&E), T&E Paper 94/3)

IV.

The UK Round Table on Sustainable Development, established by the UK government, published in June 1996 a report entitled "Defining a Sustainable Transport Sector". Here, also no explicit definition is given but key principles that previously had been agreed upon with respect to sustainable development in general (The Precautionary Principle, The Integration Principle, The Polluter Pays Principle, The Preventive Principle, The Participation Principle) were used used to base upon were used to define transport policy objectives. The report says in its Chapter 27:

"- The following policy objectives are recommended in order to realise the broader sustainable development goals:

1. To provide access to goods, resources and services, while reducing the need to travel, so that economic, environmental and social needs can be met efficiently and in an integrated manner.

2. To ensure that transport infratsructure and travel use does not exceed the capacity of the environment to withstand their impact.

3. To ensure that users pay the full social and environmental cost of their transport decisions, without making industry uncompetetive or preventing those on low incomes from meeting their transport needs.

4. To reduce the growth in car and lorry traffic growth to sustainable levels.

5. To ensure that transport infratsructure investments are based on the Best Practical Environmental and Social Option.

6. To increase the choice, and encourage the use, of economically, environmentally and socially efficient transport modes for car users and freight operators.

7. To protect critical natural and physical capital.

8. To establish environmental quality standards based on critical ecological limits and precautionary public health requirements.

9. To ensure that renewable natural resources are managed and used in ways which do not diminish the capacity of ecological systems to continue providing those resources over time.

10. To ensure that non-renewable natural resources are managed and used in ways which account for future needs and the availability of alternative resources.

11. To enhance public health and safety and reduce accidents."

Furtheron, the paper says in Chapter 28: "(...) The Government must decide where, when and how to use the mechanisms at its disposal, which include: taxes, the planning system, public expenditure, creating opportunities for private investment, education and regulations. There is no single correct combination (...)"

(The UK Round Table on Sustainable Development (1996): Defining a Sustainable Transport Sector)

V.

The OECD Conference Towards Sustainable Transport recommended in March 1996 in Vancouver the following Principles for Sustainable Transport:

- Access: People are entitled to reasonable access to other people, places, goods and services.

- Equity: In meeting the basic transport-related needs of all people, including women, the poor, the rural, the disabled, and children, nation, states and the transport community must strive to ensure social, interregional and intergenerational equity. Developed economies must work in partnership with developing economies in fostering practices of sustainable transport.

- Individual and Community Responsibility: All individuals and communities have a responsibility to act as stewards of the natural environment, undertaking to make sustainable choice with regards to personal movement and consumption.

- Health and Safety: Transport systems should be designed and operated in a way that protects the health (physical, mental and social well-being) and safety of all people, and enhances the quality of life in communities.

- Education and Public Participation: People and communities need to be fully engaged in the decision-making process about sustainable transport, and empowered to participate.

- Integrated Planning: Transport decision makers have a responsibility to pursue more integrated approaches to planning. They must involve

partners from relevant sectors such as environmental, health, energy, financial, urban design, etc.

- Land and Resource Use: Transport systems must make efficient use of land and other natural resources while preserving vital habitats and maintaining biodiversity.

- Pollution Prevention: Transport needs must be met without generating emissions that threaten public health, global climate, biological diversity or the integrity of essential ecological processes.

- Economic well-being: Taxation and economic policies should work for, and not against sustainable transport. Market mechanisms must account for the full social, economic and environmental cost, both present and future, in order to ensure users pay equitable share of costs.

VI.

This definition of ¨Environmentally Sustainable Transport¨ was worked out within the OECD and accepted by the CEI sub Group for environment and transport at the 3rd meeting on 10th March 1997 in Vienna:

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

VII.

The Centre for Sustainable Transportation in Toronto, Canada, published in September 1997 its "Definitions and Visions of Sustainable Transportation". The definition reads as following:

"A sustainable transportation system is one that

- allows the basic access needs of individuals and societies to be met safely and in a manner consistent with human and ecosystem health, and with equity within and between generations,

- is affordable, operates efficiently, offers choice of transport mode, and supports a vibrant economy,

- limits emissions and waste within the planet´s ability to absorb them, minimizes consumption of non-renewable resources, reuses and recycles components, and minimzes the use of land and the production of noise."

A further chapter elaborates on the social, economic and environmental aspects of ST under the heading "What transportation should do to be sustainable":

"1) With respect to society, transportation systems should

a) Meet basic human needs for health, comfort and convenience in ways that do not stress the social fabric.
b) Allow and support development at a human scale, and provide for a reasonable choice of transport modes, types of housing and community, and living styles.
c) Produce no more noise than is acceptable by communities.
d) Be safe for people and their property.

2) With respect to the economy, transportation systems should

a) Provide cost-effective service and capacity.
b) Be financially Affordable in each generation.
c) Support vibrant, sustainable economic activity.

3) With respect to the environment, transportation systems should

a) Make use of land in a way that has little or no impact on the integrity of ecosystems.
b) Use energy sources that are essentially renewable or inexhaustible.
c) Use other resources that are renewable or inexhaustible, achieved in part through the reuse of items and the recycling of materials used in vehicles and infrastructure.
d) Produce no more emissions and waste than can be accommodated by the planet´s restorative ability."

(The Centre for Sustainable Transportation (1997): Definitions and Visions of Sustainable Transportation, Toronto, Canada

Annex 2

1: Datas on Population
2: Economic indicators
3: CO_2 and NOx- emission
4: CO_2 and NOx- emission per capita

Table 1: Data on Population

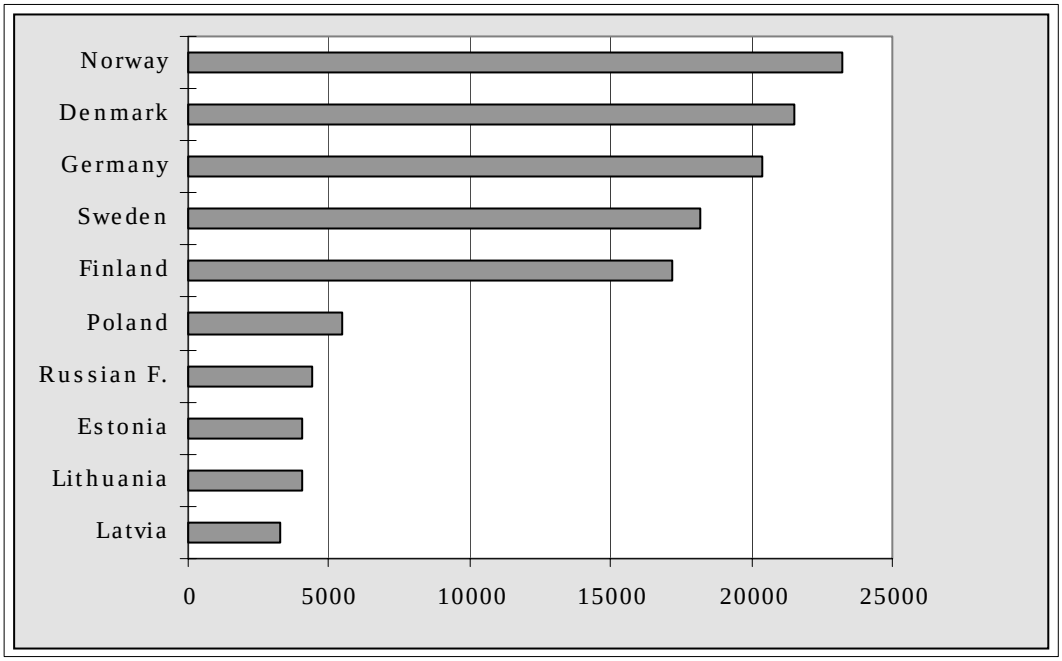
	Area (sq qm)	Population in M	Population growth rate (%)	Net migration rate (migrant(s) per 1000 inh.)	Density (inh. per sq qm)	Population distribution urban / rural (%)
Denmark	43070	5,18	0,38	2	120,26	85 / 15
Estonia	45100	1,56	-1,13	–7,96	34,58	73 / 27
Finland	337030	5,105	0,1	0,58	15,14	63 / 37
Germany	356910	83,536	0,67	8,25	234,05	87 / 13
Latvia	64100	2,47	–1,39	–9,69	38,53	73 / 27
Lithuania	65200	3,65	–0,35	–3,09	55,98	72 / 28
Poland	312683	38,64	0,14	–0,4	123,5	64 / 36
Norway	324220	4,383	0,48	3,57	0,00	73 / 27
Russian F.	17000000	148,18	–0,07	.	8,7	76 / 24
Sweden	449964	8,9	0,56	5,48	19,77	83 / 17

Source: CIA (1996): The World Fact Book, Washington (Datas are from 1995 and 1996); Population Division of the United Nations Secretariat, 1996

Table 2: Economic indicators

Country	Per capita GDP $US PPP
Latvia	3261
Lithuania	4014
Estonia	4035
Russian F.	4401
Poland	5478
Finland	17188
Sweden	18201
Germany	20370
Denmark	21502
Norway	23202

GDP per Capita in US Dollar based on purchasing power parities, 1995: Source: Statistical Yearbook of the Economic Commission for Europe (UNECE) (1997): Trends in Europe and North America, Genf



Country	Per capita GDP $US
Lithuania	1132
Latvia	1173
Estonia	1510
Russian F.	1951
Poland	2503
Sweden	22499
Finland	24608
Germany	25179
Norway	25378
Denmark	28245

GDP per Capita in US Dollar based on exchange rates from Statistic Division of the United Nations Secretariat, 1994

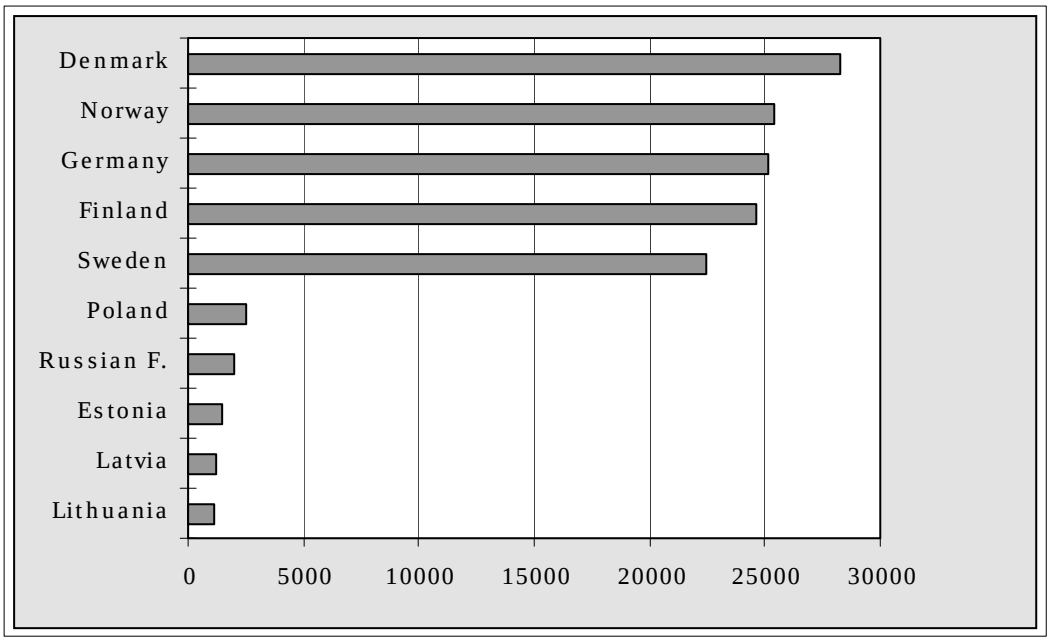


Table 3: CO2 and NOX emission.

	Air Poll.	Air Emissions, total (tonnes) (a)	Air Emissions of the Transport sector, abolut (tonnes)	% of the Transport sector	Transport Emissions per capita (tonnes)
Denmark	CO2	61607068	13268676	22%	2.561
	NOx	321149	162218	51%	0.0313
Estonia	CO2	19009473	1110752	6%	0.712
	NOx	42592	15788	37%	0.0101
Finland	CO2	60106887	13782394	23%	2.6997
	NOx	308709	168499	55%	0.033
Germany	CO2	896765175	186693791	21%	2.234
	NOx	3862482	2282454	59%	0.0273
Latvia	CO2	10190673	2232962	22%	0.904
	NOx	51629	31739	61%	0.0128
Lithuania	CO2	15408347	2389330	16%	0.654
	NOx	68957	33961	49%	0.0093
Poland	CO2	314005503	27362011	9%	0.708
	NOx	1308425	388732	30%	0.01
Norway	CO2	37600000	12200000	32%	2.82
	NOx	222100	127100	57%	0.029
Russian F.	CO2	1419888416	63827664	4%	0.4307
	NOx	6653453	905528	14%	0.0006
Sweden	CO2	58988984	21926183	37%	2.4636
	NOx	372704	268062	72%	0.0301

Source: SEI-Boston Center (1997); data are taken from the Energy Statistics of OECD Countries, 1993-1994; Energy Balances of OECD Countries, 1993-1994 of the International Energy Agency (IAE) (1996), Paris, Norway: national source

Table 4a: CO2 emission per capita.

	Transport CO_2-Emissions per capita (kilogr.)
Russian F.	431
Lithuania	654
Poland	708
Estonia	712
Latvia	904
Germany	2234
Sweden	2464
Denmark	2561
Finland	2700
Norway	2820

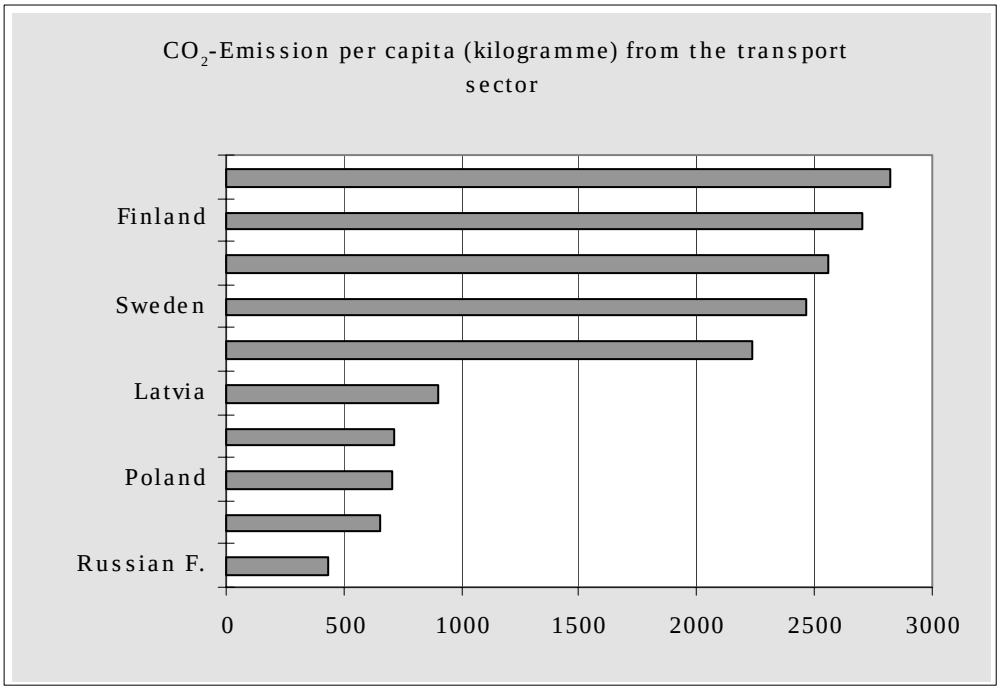
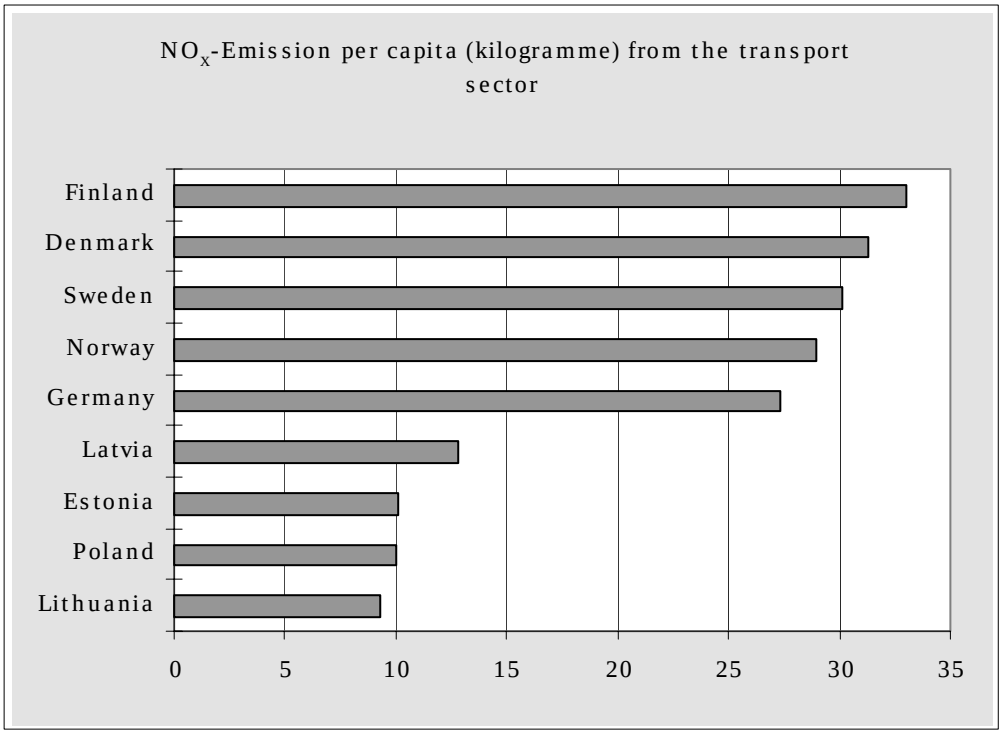


Table 4b: NOX emission per capita.

	Transport NO_x-Emissions per capita (kilogr.)
Russian F.	0.6
Lithuania	9.3
Poland	10
Estonia	10.1
Latvia	12.8
Germany	27.3
Norway	29
Sweden	30.1
Denmark	31.3
Finland	33



Annex 3

1: Data overview: Questionnaire
2: Additional motor vehicle data - Denmark
3: Additional motor vehicle data - Estonia
4: Additional motor vehicle data - Finland
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12: PPP and car density
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15: Data-Denmark 1995-2030: Questionnaire
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20: Data-Sweden 1995-2020: Questionnaire
21: Passenger car prognosis - selected countries
22: CO_2 prognosis - selected countries
23: NOx prognosis - selected countries

Table 1: Data overwiew: Questoinnaire

Road Transport	Subject		Unit	Den-mark	Estonia	Fin-land	Ger-many	Latvia	Lithuania	Nor-way	Poland	Ru. F.	Sweden
	Infrastructure	Highway, 4 lanes	Kilometre	786	.	.	11143	0	394	.	2000	.	1140
		Main Roads, 2/4 lanes	Kilometre	4550	.	.	41800	1614	.	26452	46400	.	(m)
		other paved roads, km	Kilometre	65985	.	.	175700	6213	.	63810	137200	.	(m)
	Vehicle Stock	Passenger cars	Number in M	1,674	0,383	1,912	40,112	0,251593	0,718469	1,6847	7,517	.	3,63
		Two Wheelers	Number in M	0,052	0,003	.	4,253	0,015792	0,171292	0,1586	0,929	.	0,117387
		Buses	Number in M	0,014	0,007	0,008	0,084	0,005269	0,017584	0,0325	0,085	.	0,014572
		Trucks	Number in M	0,333	0,065	0,252	3,033	0,068668	0,108891	0,3495	1,354	.	0,308429
	Vehicle-km	Passenger cars	Kilometre in M	32176	.	.	536900	4979	.	24204	67000	.	59100
		Two Wheelers	Kilometre in M	333	.	.	12200	0	.	676	1450	.	.
		Buses	Kilometre in M	528	.	.	3900	673	.	332	2350	.	800
		Trucks	Kilometre in M	7568	.	.	88200	926	.	3860	20700	.	2300
	Transport Activity	Passenger cars	pass.-km in M	59200	2179	50060	744400	.	.	42365	.	.	92600
		Two Wheelers	pass.-km in M	.	.	.	.	.	.	724	.	.	628
		Buses	pass.-km in M	10600	.	.	77400	1835 (h)	3334	3752	34024	.	9500
		Trucks	t-km in M	10900	.	26444	271100	1834	5180	9654	51200	.	29234
	Fuel Consump-tion	Gasoline	Thousand Tonnes	1791	330	(e)	28368	197	491	2204	4749	.	.
		Diesel	Thousand Tonnes	1486	352	(e)	20593	206	497	1622	5255	.	.
	Emissions	CO2	Thousand Tonnes	6133	2211,8 (p)	10392	155453	(i)	2405	.	22900	.	16755
		NOX	Tonnes	69000 (b)	.	132000	965798	(k)	33600	73400	300000	.	139000
Rail Transport	Subject												
	Infra-structure	Main lines, two lines	Kilometre	2840 (a)	(c)	496	17600	300	557,7	115	7938	.	1354
		Other lines, single lines	Kilometre	.		5363	27100	2108	1444,1	3908	16048	.	9444
	Transport Activity	Passengers	pass.-km in M	5000	309	3184	63600	1373	1130	2681	26635	.	6219
		Goods Transport	t-km in M	1300	3900 (d)	9293	70900	9757	7686	1647	69116	.	18973
	Energy Consump-tion	Diesel	Tonnes	.	.	53700	653000	62343	73535	32217	212000	.	.
		Electric Energy	MWh	.	.	422000	10154 (f)	57988	10,8	393253	.	.	.
	Emissions	CO2	Thousand Tonnes	397	.	282	7353	262	.	.	640	.	116
		NOX	Tonnes	5800 (b)	.	3540	39672	4587	6560	1500	11100	.	3000
Water Transport	Subject												
	Ocean Shipping		t in Million	.	4,9	71,1	(g)	(q)	(l)	162	23,169	.	84,533 (n)
	Coastal Shipping		t in Million	.	.	5,8	(g)	(q)	(l)	140	.	.	60,258 (o)
	Baltic Sea Shipping		t in Million	.	.	30,6	.	(q)	(l)	.	1,799	.	.
	Energy Consump-tion	Diesel, Marine F., Bunker F.	Thousand Tonnes	.	.	.	2926	140	126,32	.	706	.	.
	Emissions	CO2	Thousand Tonnes	443	.	.	2257	.	562	2300	2175	.	2800
		NOX	Tonnes	9000 (b)	.	.	28671	.	500	45400	41000	.	69400
		SO2	Tonnes	2500 (b)	.	.	1861	.	100	1600	29400	.	21800
Air Transport	Subject												
	Transport Activity	Passengers	pass.-km in M	500	.	10432	25500	.	330,4	3573	4633	.	8700
		Freight	t-km in M	.	.	230,9	522,4	302	38,09	21	74	.	210

. = datas are not available; a: Rail lines in total; b: 1990; c: length of lines operated: 1021 km; d: 1996; e: fuel consumption total: 3897 thousant tons; f: GWh; g: National Ocean and Coastal Shipment (t in M): 198,0; h: Trolley buses (pass-km in M): 626; i: Transport Emission C02 (Thousand Tonnes): 5660,6; k: Transport Emission NOx (Tons): 65833; l: all maritime shipment (tons in M): 5,8; m: further open roads for the public (in km): 208850 km; n: to and from the swedish coast; o: including foreign goods; p: WI calculation; q: Ocean, Coastal and Baltic Shipping in total: 33050 Mio tonnes;
Source: Questionnaire, transport datas from 1995

Table 2: Additional motor vehicle Data - Denmark

	Unit	1990	1991	1992	1993	1994	1995
Vehicles in use							
* Passenger cars	Number	1598900	1590600	1627000	1604500	1662300	1729405
* Buses and coaches	Number	8109	9989	11261	12978	13564	13502
* Lorries and Vans	Number	237999	242954	248374	255527	265705	274962
* Road Tractors	Number						
* Two wheelers	Number	44111	45362	46024	47405	47070	49082
Average annual distance travelled							
* Passenger cars	in km per year	17477	18107	18488	18615	18716	19900
* Trucks	in km per year	24870	24680	27486	26824	27247	24800
Motor fuel consumption							
* Petrol	in 1000 t	1570	1669	1754	1804	1869	1889
* Diesel fuel	in 1000 t	3868	4014	3823	3813	3786	3788
Road Network							
* Road	in km						
* Rail	in km						
Ratios							
Cars per 1000 inh.	Number	311	309	315	309	319	340
Average petrol consumption of cars	in t per year	0,98	1,05	1,08	1,08	1,12	

Source: VDA 1996; IRF 1997; CIA 1997

Table 3: Additional motor vehicle Data - Estonia

	Unit	1990	1991	1992	1993	1994	1995
Vehicles in use							
* Passenger cars	Number	242000	261086	283469	317425	337812	383444
* Buses and coaches	Number	8910	8628	8409	8663	6340	7009
* Lorries and Vans	Number	80000	77057	74567	62971	53733	65598
* Road Tractors	Number						
* Two wheelers	Number	104000	100196	99952	97133		
Average annual distance travelled							
* Passenger cars	in km per year						
* Trucks	in km per year						
Motor fuel consumption							
* Petrol	in 1000 t	491	449	228	235	286	330
* Diesel fuel	in 1000 t	629	527	385	414	373	353
Road Network							
* Road	in km						14771
* Rail	in km						1018
Ratios							
Cars per 1000 inh.	Number	151	167,1	185,8	210,8	226,4	260
Average petrol consumption of cars	in t per year						

Source: VDA 1996; IRF 1997; CIA 1997

Table 4: Additional motor vehicle Data - Finland

	Unit	1990	1991	1992	1993	1994	1995
Vehicles in use							
* Passenger cars	Number	1909000	1938900	1922500	1936300	1872588	1900855
* Buses and coaches	Number	9287	8930	8665	8255	8054	8083
* Lorries and Vans	Number	261495	261622	262563	253109	249400	272301
* Road Tractors	Number						
* Two wheelers	Number	59617	61778	63843	64025	64487	59525
Average annual distance travelled							
* Passenger cars	in km per year	17500	17300	18800	18800	19000	19100
* Trucks	in km per year	51400	51500	50400	54500	56300	71450
Motor fuel consumption							
* Petrol	in 1000 t	1926	1944	1951	1838	1880	1859
* Diesel fuel	in 1000 t	1863	1475	1459	1425	1487	1462
Road Network							
* Road	in km						47588
* Rail	in km						5895
Ratios							
Cars per 1000 inh.	Number	382	383	382	381	367	371
Average petrol consumption of cars	in t per year	1,01	1,01	1,01	0,95		

Source: VDA 1996; IRF 1997; CIA 1997

Table 5: Additional motor vehicle Data - Germany

	Unit	1990	1991	1992	1993	1994	1995
Vehicles in use							
* Passenger cars	Number	30152000	35795000	36909000	38286000	39202000	40499442
* Buses and coaches	Number	70370	69710	86230	88746	87421	85434
* Lorries and Vans	Number	1388505	1499748	1937947	2068554	2167898	2251326
* Road Tractors	Number	1756488	1756488	1868159	1894001	1898909	1901760
* Two wheelers	Number	1413674	1480489	1726419	1935105	2121099	2304253
Average annual distance travelled							
* Passenger cars	in km per year	14500	141000	13800	14100	12700	12700
* Trucks	in km per year	27900	28300	27800	24600	26600	26600
Motor fuel consumption							
* Petrol	in 1000 t	30779	30987	31089	31528	29801	29381
* Diesel fuel	in 1000 t	21465	22706	23738	25084	25550	21884
Road Network							
* Road	in km						636282
* Rail	in km						43966
Ratios							
Cars per 1000 inh.	Number		447	458	472	480	494,6
Average petrol consumption of cars	in t per year	0,89	0,86	0,85	0,84		

Source: VDA 1996; IRF 1997; CIA 1997

Table 6: Additional motor vehicle Data - Latvia

	Unit	1990	1991	1992	1993 (e)	1994 (e)	1995
Vehicles in use							
* Passenger cars	Number	282688	328436	350000	388000	415000	331837
* Buses and coaches	Number	11722	12660	18000	20500	24800	5755
* Lorries and Vans	Number	11722	70597	75000	78700	82900	79378
* Road Tractors	Number	19227	18084	16941	15800	14700	40976
* Two wheelers	Number	202860	200859	223190	230000	247000	15729
Average annual distance travelled							
* Passenger cars	in km per year		5361			20402	20412
* Trucks	in km per year		23239				
Motor fuel consumption							
* Petrol	in 1000 t	549,13	516	269	459		395
* Diesel fuel	in 1000 t	192,51	167,44	159,18			
Road Network							
* Road	in km						66718
* Rail	in km						2412
Ratios							
Cars per 1000 inh.	Number		123,6	134,3	150,1	163,2	132,7
Average petrol consumption of cars	in t per year						

Source: VDA 1996; IRF 1997; CIA 1997 (e) = best possible estimate

Table 7: Additional motor vehicle Data - Lithuania

	Unit	1990	1991	1992	1993	1994	1995
Vehicles in use							
* Passenger cars	Number	492978	530824	565320	597735	652810	718469
* Buses and coaches	Number	15157	15627	16284	16339	17103	17052
* Lorries and Vans	Number	83035	84341	87321	89530	93593	101422
* Road Tractors	Number	7752	7728	8911	9241	7467	7469
* Two wheelers	Number	192123	196075	192148	180452	172946	171292
Average annual distance travelled							
* Passenger cars	in km per year						
* Trucks	in km per year						
Motor fuel consumption							
* Petrol	in 1000 t	1038		611,52	450,9	521,73	578,277
* Diesel fuel	in 1000 t	1058		362,848	420,496	366,76	340,816
Road Network							
* Road	in km						55603
* Rail	in km						2002
Ratios							
Cars per 1000 inh.	Number		141,7	151,3	160,5	175,6	193,6
Average petrol consumption of cars	in t per year						

Source: VDA 1996; IRF 1997; CIA 1997

Table 8: Additional motor vehicle Data - Norway

	Unit	1990	1991	1992	1993	1994	1995
Vehicles in use							
* Passenger cars	Number	1613037	1614623	1619438	1633088	1653678	1684664
* Buses and coaches	Number	21222	23288	26760	29134	30547	32515
* Lorries and Vans	Number	308299	311063	314882	319768	335779	349502
* Road Tractors	Number	778061	787017	794669	—	—	—
* Two wheelers	Number	203505	201827	202705	198812	196640	197824
Average annual distance travelled							
* Passenger cars	in km per year	14100	13900	13700	13700	13700	13400
* Trucks	in km per year						
Motor fuel consumption							
* Petrol	in 1000 t	2414	2346	2292	2274	2247	2204
* Diesel fuel	in 1000 t	1283	1301	1398	1548	1485	1622
Road Network							
* Road	in km	88922	89135	89737	90502	90178	90261
* Rail	in km						
Ratios							
Cars per 1000 inh.	Number	457,07	456,01	456,17	458,26	464,58	473,03
Average petrol consumption of cars	in t per year	1,50	1,45	1,42	1,39	1,36	1,31

Source: VDA 1996; IRF 1997; CIA 1997

Table 9: Additional motor vehicle Data - Poland

	Unit	1990	1991	1992	1993	1994	1995
Vehicles in use							
* Passenger cars	Number	5260000	6112000	6504000	6771000	7153141	7517266
* Buses and coaches	Number	92080	86951	86578	86154	86852	85413
* Lorries and Vans	Number	1044641	1242699	1257222	1275688	1344616	1386865
* Road Tractors	Number				46702	51404	74443
* Two wheelers	Number	1356553	1235640	1134336	1067634	1008410	929269
Average annual distance travelled							
* Passenger cars	in km per year	6500	10000	11250	10800	10500	10000
* Trucks	in km per year	25000	25000	30930	29400	29500	29500
Motor fuel consumption							
* Petrol	in 1000 t						
* Diesel fuel	in 1000 t						
Road Network							
* Road	in km						71420
* Rail	in km						25166
Ratios							
Cars per 1000 inh.	Number	127	138	159	169	176	194,7
Average petrol consumption of cars	in t per year						

Source: VDA 1996; IRF 1997; CIA 1997

Table 10: Additional motor vehicle Data - Russia

	Unit	1990	1991	1992	1993 (e)	1994 (e)	1995 (e)
Vehicles in use							
* Passenger cars	Number	8677000	12938000	12940000	13550000	13549000	13550000

* Buses and coaches	Number						
* Lorries and Vans	Number				9860000	9860000	9860000
* Road Tractors	Number						
* Two wheelers	Number						
Average annual distance travelled							
* Passenger cars	in km per year						
* Trucks	in km per year						
Motor fuel consumption							
* Petrol	in 1000 t						
* Diesel fuel	in 1000 t						
Road Network							
* Road	in km						934000
* Rail	in km						154000
Ratios							
Cars per 1000 inh.	Number				91,1	90,9	90,3
Average petrol consumption of cars	in t per year						

Source: VDA 1996; IRF 1997; AAMA 1996; Stat. Bundesamt 1990

Table 11: Additional motor vehicle Data - Sweden

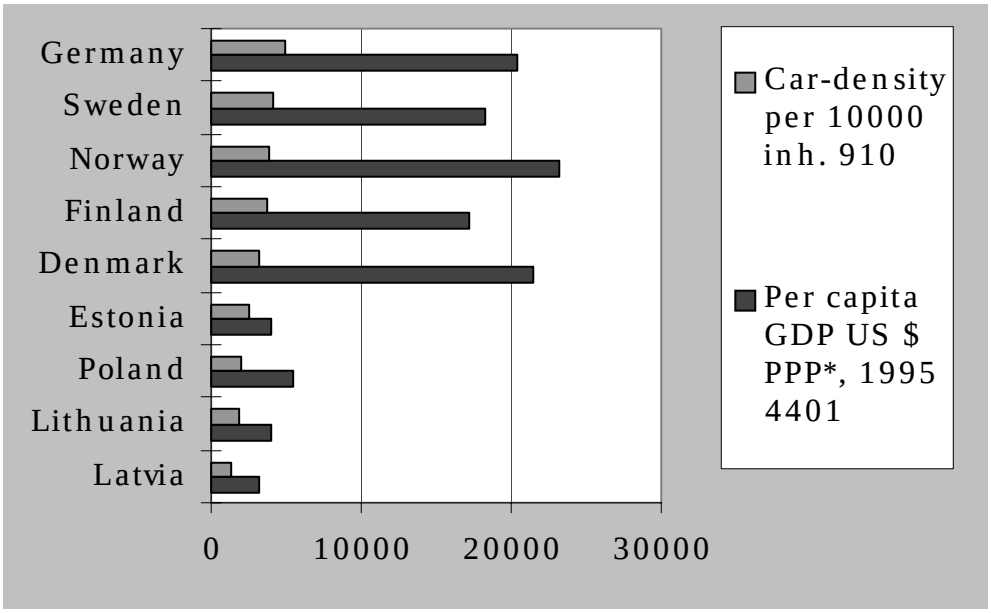
	Unit	1990	1991	1992	1993	1994	1995
Vehicles in use							
* Passenger cars	Number	3578000	3600500	3619400	3586700	3566000	3630760
* Buses and coaches	Number	14850	14555	14249	14127	14293	14577
* Lorries and Vans	Number	314000	309531	304988	301687	303541	307709
* Road Tractors	Number						
* Two wheelers	Number	98000	102545	109450	113940	115196	117387
Average annual distance travelled							
* Passenger cars	in km per year	14900	14919	15257	15214	15409	15634
* Trucks	in km per year	16000	16109	16577	16606	16848	17033
Motor fuel consumption							
* Petrol	in 1000 t	5630	5751	5878	5589	5655	5763
* Diesel fuel	in 1000 t	1670	1570	1800	1800	2000	2000
Road Network							
* Road	in km						135859
* Rail	in km						12624
Ratios							
Cars per 1000 inh.	Number	420	419	419	413	407,8	410,9
Average petrol consumption of cars	in t per year	1,57	1,6	1,62	1,56		

Source: VDA 1996; IRF 1997; CIA 1997

Table 12: PPP and car density

Countries	Per capita GDP US $ PPP*, 1995	Car-density per 10000 inh.

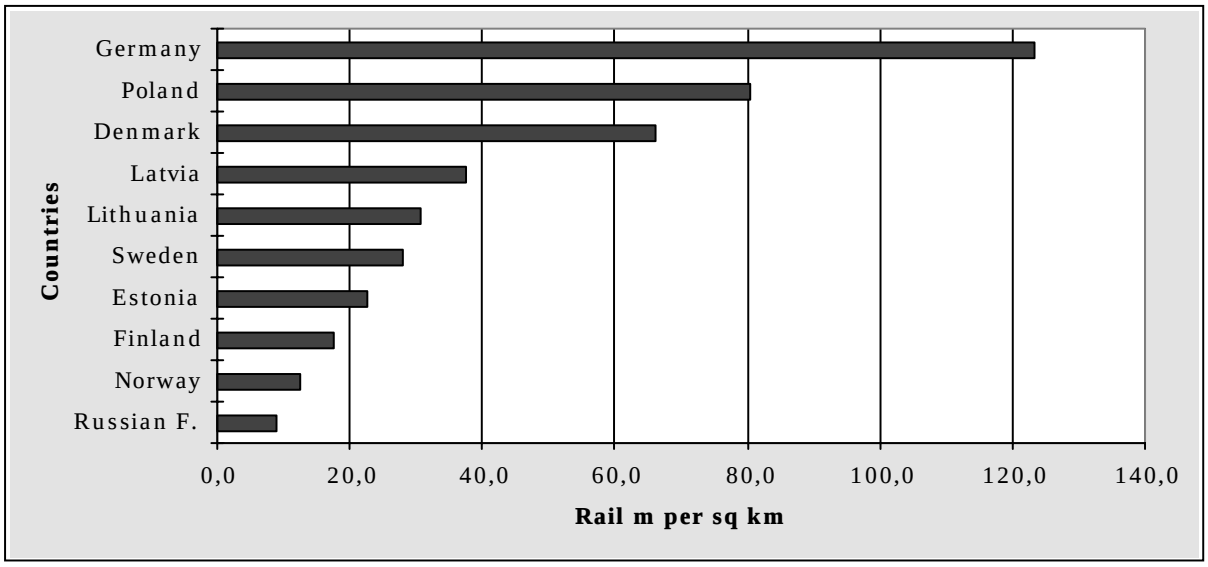
Russian Federation	4401	910
Latvia	3261	1270
Lithuania	4014	1910
Poland	5478	1960
Estonia	4035	2510
Denmark	21502	3230
Finland	17188	3760
Norway	23202	3843
Sweden	18201	4160
Germany	20370	4930



***Source: Statistical Yearbook of the Economic Commission for Europe (UNECE) (1997): Trends in Europe and North America, Genf**

Table 13: Rail m per km²

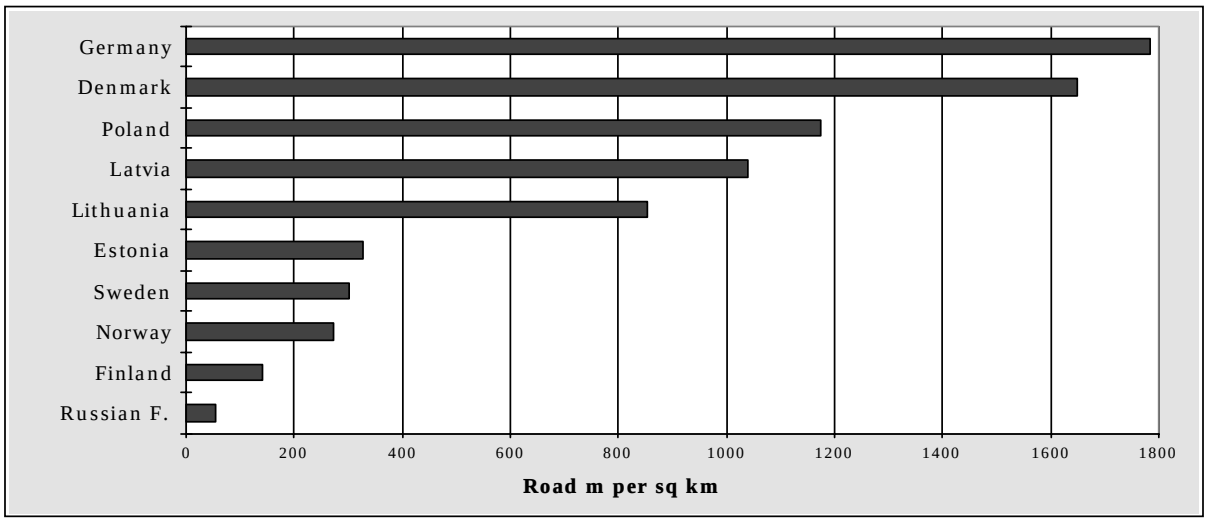
Countries	sq km	Rail Network (km)	Rail m per sq km
Russian F.	17000000	154000	9,1
Norway	324220	4027	12,4
Finland	337030	5895	17,5
Estonia	45100	1018	22,6
Sweden	449964	12624	28,1
Lithuania	65200	2002	30,7
Latvia	64100	2412	37,6
Denmark	43070	2848	66,1
Poland	312683	25166	80,5
Germany	356910	43966	123,2



Source: CIA (1996): The World Fact Book, Washington (Datas are from 1995); WI calculation

Table 14: Road m per km^2

Countries	sq km	Road Network (km)	Road m per sq km
Russian F.	17000000	934000	55
Finland	337030	47588	141
Norway	324220	88922	274
Sweden	449964	135859	302
Estonia	45100	14771	327
Lithuania	65200	55603	853
Latvia	64100	66718	1041
Poland	312683	367000	1174
Denmark	43070	71042	1649
Germany	356910	636282	1783



Source: CIA (1996): The World Fact Book, Washington (Datas are from 1995) WI calculation

Table 15: Data-Denmark 1995 - 2030: Questonnaire

Denmark	Road Transport	Subject		Unit	1995	2005	2030
		Infrastructure	Public roads	Kilometre		.	.
		Vehicle Stock	Passenger cars	Number in M	1,674	2,2	3
			Two Wheelers	Number in M	0,052	.	.
			Buses	Number in M	0,014	.	.
			Trucks	Number in M	0,333	.	.
		Vehicle-km	Passenger cars	Kilometre in M	32176	.	.
			Two Wheelers	Kilometre in M	333	.	.
			Buses	Kilometre in M	528	.	.
			Trucks	Kilometre in M	7568	.	.
		Transport Activity	Passenger cars	pass.-km in M	59200	.	.
			Two Wheelers	pass.-km in M	.	.	.
			Buses	pass.-km in M	10600	.	.
			Trucks	t-km in M	10900	.	.
		Fuel Consumption	Gasoline	Thousand Tonnes	1791	.	.
			Diesel	Thousand Tonnes	1486	.	.
		Emissions	CO2	Thousand Tonnes	6133	6536	7153
			NOX	Tonnes	69000	24500	.
	Rail Transport	Subject					
		Infrastructure	All lines	Kilometre	2840	.	.
		Transport Activity	Passengers	pass.-km in M	5000	.	.
			Goods Transport	t-km in M	1300	.	.
		Energy Consumption	Diesel	Tonnes	.	.	.
			Electric Energy	MWh	.	.	.
		Emissions	CO2	Thousand Tonnes	397	354	.
			NOX	Tonnes	5800	2300	.
	Water Transport	Subject					
		Ocean Shipping	Goods	t in Million	.	.	.
		Coastal Shipping	Goods	t in Million	.	.	.
		Baltic Sea Shipping	Goods	t in Million	.	.	.
		Energy Consumption	Diesel, Marine F., Bunker F.	Thousand Tonnes	.	.	.
		Emissions	CO2	Thousand Tonnes	443	232	263
			NOX	Tonnes	9000	5100	.
			SO2	Tonnes	2500	500	.
	Air Transport	Subject					
		Transport Activity	Passengers	pass.-km in M	500	.	.
			Freight	t-km in M	.	.	.
		Emissions	CO2	Thousand Tonnes	.	654	109
			NOX	Tonnes	.	1700	.

Table 16: Data-Finnland 1995 - 2030: Questonnaire

Finland	Road Transport	Subject		Unit	1995	2010	2020

		Infrastructure	Highway, 4 lanes	Kilometre	.	.	.
			Main Roads, 2/4 lanes	Kilometre	.	.	.
			other paved roads, km	Kilometre	.	.	.
		Vehicle Stock	Passenger cars	Number in M	1,912	.	.
			Two Wheelers	Number in M	.	.	.
			Buses	Number in M	0,008	.	.
			Trucks	Number in M	0,252	.	.
		Vehicle-km	Passenger cars	Kilometre in M	.	.	.
			Two Wheelers	Kilometre in M	.	.	.
			Buses	Kilometre in M	.	.	.
			Trucks	Kilometre in M	.	.	.
		Transport Activity	Passenger cars	pass.-km in M	50060	.	.
			Two Wheelers	pass.-km in M	.	.	.
			Buses	pass.-km in M	.	.	.
			Trucks	t-km in M	26444	.	.
		Fuel Consumption	Gasoline and Diesel	Thousand Tonnes	3897	3492	.
		Emissions	CO2	Thousand Tonnes	10392	11586	.
			NOX	Tonnes	132000	63000	.
	Rail Transport	Subject					
		Infrastructure	Main lines, two lines	Kilometre	496	650	.
			Other lines, single lines	Kilometre	5363	5400	5400
		Transport Activity	Passengers	pass.-km in M	3184	.	.
			Goods Transport	t-km in M	9293	.	.
		Energy Consumption	Diesel	Tonnes	53700	.	.
			Electric Energy	MWh	422000	.	.
		Emissions	CO2	Thousand Tonnes	282	.	.
			NOX	Tonnes	3540	.	.
	Water Transport	Subject					
		Ocean Shipping	Goods	t in Million	71,1	90	.
		Coastal Shipping	Goods	t in Million	5,8	.	.
		Baltic Sea Shipping	Goods	t in Million	30,6	.	.
		Energy Consumption	Diesel, Marine F., Bunker F.	Thousand Tonnes	.	.	.
		Emissions	CO2	Thousand Tonnes	.	.	.
			NOX	Tonnes	.	.	.
			SO2	Tonnes	.	.	.
	Air Transport	Subject					
		Transport Activity	Passengers	pass.-km in M	.	.	.
			Freight	t-km in M	.	.	.
		Emissions	CO2	Thousand Tonnes	.	.	.
			NOX	Tonnes	.	.	.

Table 17: Data-Germany 1995 - 2030: Questonnaire

Germany	Road Transport	Subject		Unit	1995	2010	2020
		Infrastructure	Highway, 4 lanes	Kilometre	.	.	.
			Main Roads, 2/4 lanes	Kilometre	.	.	.
			other paved roads, km	Kilometre	.	.	.
		Vehicle Stock	Passenger cars	Number in M	40,112	46,272	48,036
			Two Wheelers	Number in M	4,253	5,052	
			Buses	Number in M	0,084	0,075	0,075
			Trucks	Number in M	3,033	4,224	4,423
		Vehicle-km	Passenger cars	Kilometre in M	536900	670100	704400
			Two Wheelers	Kilometre in M	12200	16900	17700
			Buses	Kilometre in M	3900	4800	5000
			Trucks	Kilometre in M	88200	102400	107600
		Transport Activity	Passenger cars	pass.-km in M	744400	927500	.
			Two Wheelers	pass.-km in M	.		.
			Buses	pass.-km in M	77400	103700	.
			Trucks	t-km in M	271100	325300	.
		Fuel Consumption	Gasoline	Thousand Tonnes	28368	28605	25742
			Diesel	Thousand Tonnes	20593	25021	26514
		Emissions	CO2	Thousand Tonnes	155453	170262	165912
			NOX	Tonnes	965798	315461	221943
	Rail Transport	Subject					
		Infrastructure	Main lines, two lines	Kilometre	17600	.	.
			Other lines, single lines	Kilometre	27100	.	.
		Transport Activity	Passengers	pass.-km in M	63600	65700	.
			Goods Transport	t-km in M	70900	107700	.
		Energy Consumption	Diesel	Tonnes	653000	.	.
			Electric Energy	GWh	10154	.	.
		Emissions	CO2	Thousand Tonnes	7353	.	.
			NOX	Tonnes	39672	.	.
	Water Transport	Subject					
		Ocean & Coastal Shipping	Goods	t in Million	198	.	.
		Baltic Sea Shipping	Goods	t in Million	.	.	.
		Energy Consumption	Diesel, Marine F., Bunker F.	Thousand Tonnes	2926	.	.
		Emissions	CO2	Thousand Tonnes	2257	.	.
			NOX	Tonnes	28671	.	.
			SO2	Tonnes	1861	.	.
	Air Transport	Subject					
		Transport Activity	Passengers	pass.-km in M	25500	.	.
			Freight	t-km in M	522400	.	.
		Emissions	CO2	Thousand Tonnes	.	.	.
			NOX	Tonnes	.	.	.

Table 18: Data-Latvia 1995 - 2030: Questonnaire

Latvia	Road Transport	Subject		Unit	1995	2010	2020
		Infrastructure	Highway, 4 lanes	Kilometre	0	.	.
			Main Roads, 2/4 lanes	Kilometre	1614	.	.
			other paved roads	Kilometre	6213	.	.
		Vehicle Stock	Passenger cars	Number in M	0,251593	.	.
			Two Wheelers	Number in M	0,015792	.	.
			Buses	Number in M	0,005269	.	.
			Trucks	Number in M	0,068668	.	.
		Vehicle-km	Passenger cars	Kilometre in M	4979	.	.
			Two Wheelers	Kilometre in M	0	.	.
			Buses	Kilometre in M	673	.	.
			Trucks	Kilometre in M	926	.	.
		Transport Activity	Passenger cars	pass.-km in M	.	.	.
			Two Wheelers	pass.-km in M	.	.	.
			Buses	pass.-km in M	1835	.	.
			Trucks	t-km in M	1834	.	.
		Fuel Consumption	Gasoline	Thousand Tonnes	197	.	.
			Diesel	Thousand Tonnes	206	.	.
		Emissions	CO2	Thousand Tonnes	.	.	.
			NOX	Tonnes	.	.	.
	Rail Transport	Subject					
		Infrastructure	Main lines, two lines	Kilometre	300	365	.
			Other lines, single lines	Kilometre	2108	2047,7	.
		Transport Activity	Passengers	pass.-km in M	1373	1300	.
			Goods Transport	t-km in M	9757	20100	.
		Energy Consumption	Diesel	Tonnes	62343	90000	.
			Electric Energy	MWh	57988	50000	.
		Emissions	CO2	Thousand Tonnes	262	380	.
			NOX	Tonnes	4587	6000	.
	Water Transport	Subject					
		Ocean Shipping	Goods	t in Million	(a)	.	.
		Coastal Shipping	Goods	t in Million	(a)	.	.
		Baltic Sea Shipping	Goods	t in Million	(a)	.	.
		Energy Consumption	Diesel, Marine F., Bunker F.	Thousand Tonnes	140	.	.
		Emissions	CO2	Thousand Tonnes	.	.	.
			NOX	Tonnes	.	.	.
			SO2	Tonnes	.	.	.
	Air Transport	Subject					
		Transport Activity	Passengers	pass.-km in M	.	1,3784	2,03
			Freight	t-km in M	302	794	1450

a: Ocean, Coastal, Baltic Sea Shipping in total: 33050 tonnes in M

Table 19: Data-Poland 1995 - 2030: Questonnaire

Poland	Road Transport	Subject		Unit	1995	2010	2020
		Infrastructure	Highway, 4 lanes	Kilometre	200	2000	2600
			Main Roads, 2/4 lanes	Kilometre	46400	46400	47000
			other paved roads, km	Kilometre	137200	137200	165400
		Vehicle Stock	Passenger cars	Number in M	7,517	15,5	18
			Two Wheelers	Number in M	0,929	0,97	0,77
			Buses	Number in M	0,085	0,085	0,085
			Trucks	Number in M	1,354	1,53	1,7
		Vehicle-km	Passenger cars	Kilometre in M	67000	180000	230000
			Two Wheelers	Kilometre in M	1450	1600	1200
			Buses	Kilometre in M	2350	2400	2400
			Trucks	Kilometre in M	20700	29000	27000
		Transport Activity	Passenger cars	pass.-km in M	.	234800	330000
			Two Wheelers	pass.-km in M	.	.	.
			Buses	pass.-km in M	34024	64200	65000
			Trucks	t-km in M	51200	90100	135000
		Fuel Consumption	Gasoline	Thousand Tonnes	4749	9280	.
			Diesel	Thousand Tonnes	5255	8560	.
		Emissions	CO2	Thousand Tonnes	22900	.	.
			NOX	Tonnes	300000	280000	.
	Rail Transport	Subject					
		Infrastructure	Main lines, two lines	Kilometre	7938	8060	8200
			Other lines, single lines	Kilometre	16048	.	.
		Transport Activity	Passengers	pass.-km in M	26635	55600	.
			Goods Transport	t-km in M	69116	114400	.
		Energy Consumption	Diesel	Tonnes	212000	70000	.
			Electric Energy	MWh	.	.	.
		Emissions	CO2	Thousand Tonnes	640	.	.
			NOX	Tonnes	11100	.	.
	Water Transport	Subject					
		Ocean Shipping	Goods	t in Million	23,169	33	40
		Coastal Shipping	Goods	t in Million	.	.	.
		Baltic Sea Shipping	Goods	t in Million	1,799	5,4	8
		Energy Consumption	Diesel, Marine F., Bunker F.	Thousand Tonnes	706	.	.
		Emissions	CO2	Thousand Tonnes	2175	.	.
			NOX	Tonnes	41000	.	.
			SO2	Tonnes	29400	.	.
	Air Transport	Subject					
		Transport Activity	Passengers	pass.-km in M	4633	22200	.
			Freight	t-km in M	74	.	.

Table 20: Data-Sweden 1995 - 2030: Questonnaire

Sweden	Road Transport	Subject		Unit	1995	2010	2020

		Infrastructure	Highway, 4 lanes	Kilometre	1140	.	.
			Further open roads	Kilometre	208850	.	.
		Vehicle Stock	Passenger cars	Number in M	3,63	4,12	4,63
			Two Wheelers	Number in M	0,117387	.	.
			Buses	Number in M	0,014572	.	.
			Trucks	Number in M	0,308429	.	.
		Vehicle-km	Passenger cars	Kilometre in M	59100	70300	75300
			Two Wheelers	Kilometre in M	.	.	.
			Buses	Kilometre in M	800	800	800
			Trucks	Kilometre in M	2300	2700	2700
		Transport Activity	Passenger cars	pass.-km in M	92600	106800	114400
			Two Wheelers	pass.-km in M	628	.	.
			Buses	pass.-km in M	9500	10400	10800
			Trucks	t-km in M	29234	35000	35100
		Fuel Consumption	Gasoline	Thousand Tonnes	.	.	.
			Diesel	Thousand Tonnes	.	.	.
		Emissions	CO2	Thousand Tonnes	16755	14585	14047
			NOX	Tonnes	139000	38000	17000
	Rail Transport	Subject					
		Infrastructure	Main lines, two lines	Kilometre	1354	.	.
			Other lines, single lines	Kilometre	9444	.	.
		Transport Activity	Passengers	pass.-km in M	6219	.	.
			Goods Transport	t-km in M	18973	.	.
		Energy Consumption	Diesel	Tonnes	.	.	.
			Electric Energy	MWh	.	.	.
		Emissions	CO2	Thousand Tonnes	116	55	32
			NOX	Tonnes	3000	1000	0
	Water Transport	Subject					
		Ocean Shipping	Goods	t in Million	84,533 (n)	.	.
		Coastal Shipping	Goods	t in Million	60,258 (o)	.	.
		Baltic Sea Shipping	Goods	t in Million	.	.	.
		Energy Consumption	Diesel, Marine F., Bunker F.	Thousand Tonnes	.	.	.
		Emissions	CO2	Thousand Tonnes	2800	2875,8	2906,6
			NOX	Tonnes	69400	19300	19500
			SO2	Tonnes	21800	6400	6400
	Air Transport	Subject					
		Transport Activity	Passengers	pass.-km in M	8700	.	.
			Freight	t-km in M	210	.	.

Table 21: Passenger car prognosis - selected countries

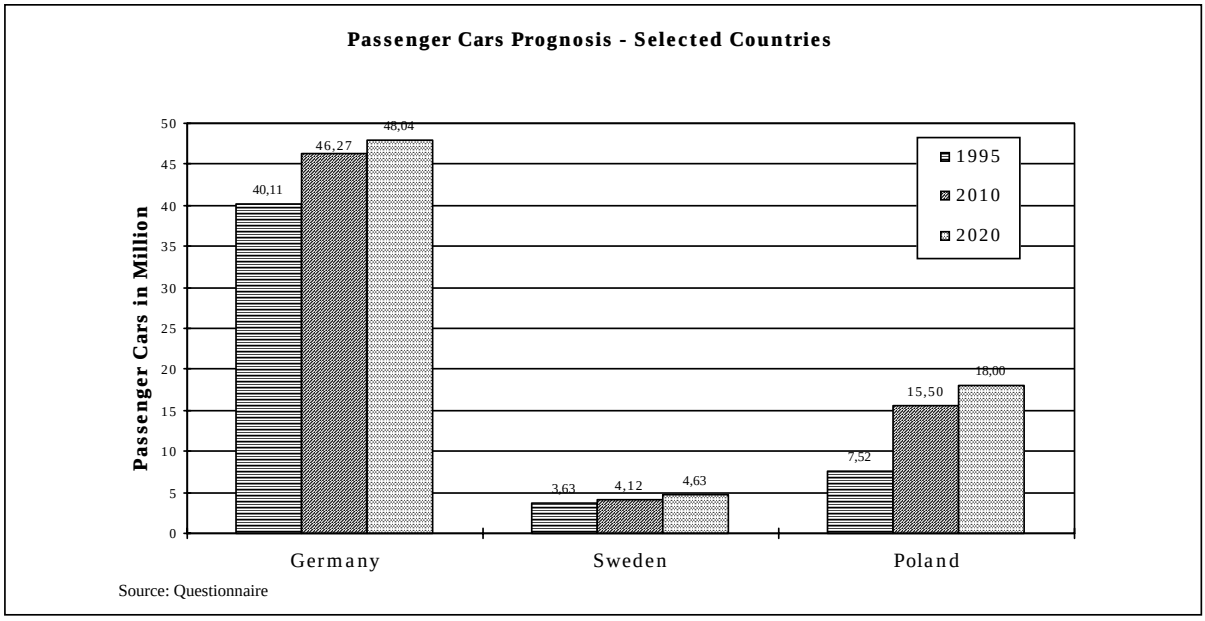


Table 22: CO_2 prognosis - selected countries

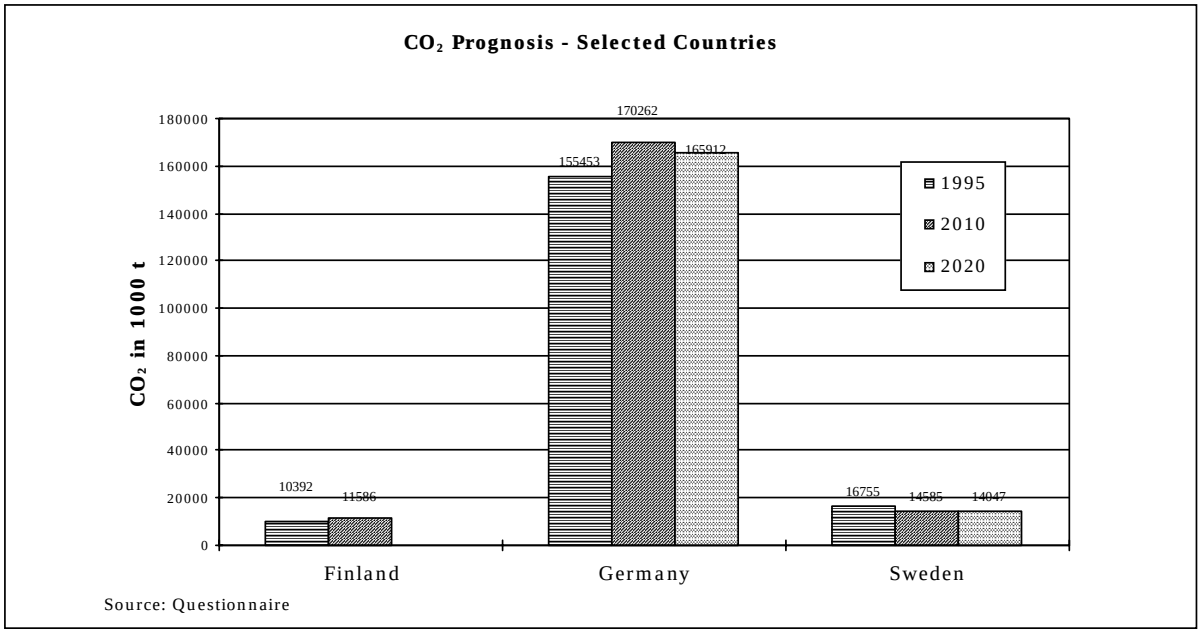
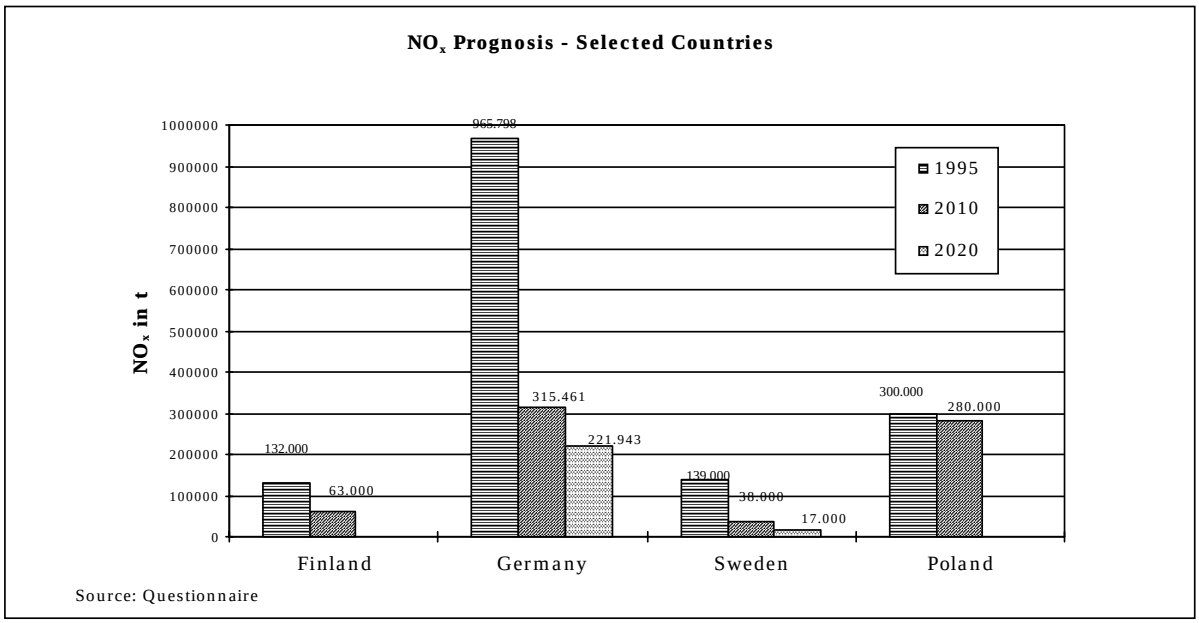


Table 23: NO_X prognosis - selected countries



Source: Questionnaire

Annex 4: Policy Analysis

Overview about answering towards Questionaire Part II

	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Norway	Poland	Russian F.	Sweden
Question 1										
Transport Policy	n. s.	n. s.	n. s.	n. s.	*	*	n. s.	n. s.	n. s.	*
Question 2										
Environmental Policy	n. s.	n. s.	*	n. s.	n. s.	*	n. s.	*	n. s.	*
Question 3										
Spatial and urban planning regulation	n. s.	n. s.	*	*	n. s.	n. s.	n. s.	*	n. s.	*
Question 4										
a) government programme,	n. s.	n. s.	*	*	*	*	n. s.	*	n. s.	*
national transport masterplan										
b) investments in road infrastructure	n. s.	n. s.	*	n. s.	*	*	n. s.	n. s.	n. s.	*
c) investments in rail infrastructure	n. s.	n. s.	n. s.	n. s.	n. s.	*	n. s.	n. s.	n. s.	*
d) investments in harbours and airports	n. s.	n. s.	*	n. s.	n. s.	*	n. s.	n. s.	n. s.	*
e) taxes applied on fuel	n. s.	n. s.	*	*	*	*	n. s.	*	n. s.	*
Question 5										
a) financing of the public transport system	n. s.	n. s.	*	*	n. s.	*	n. s.	*	n. s.	*
b) shares of modes	n. s.	n. s.	*	*	n. s.	n. s.	n. s.	*	n. s.	*
Question 6										
a) ambient air pollution and noise standarts	n. s.	n. s.	*	*	n. s.	n. s.	n. s.	*	n. s.	*
b) monitoring of air pollution and noise	n. s.	n. s.	*	*	n. s.	n. s.	n. s.	*	n. s.	n. s.
c) exceedances and information	n. s.	n. s.	*	*	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.
d) vehicle emission standarts	n. s.	n. s.	*	*	*	n. s.	n. s.	*	n. s.	*
e) vehicle emission check	n. s.	n. s.	*	*	*	*	n. s.	n. s.	n. s.	*
f) regulation on EIA	n. s.	n. s.	*	*	n. s.	n. s.	n. s.	*	n. s.	n. s.
g) targets set on environmental policy	n. s.	n. s.	*	*	n. s.	*	n. s.	n. s.	n. s.	*
Question 7										
a) activities of the World Bank, EBRD	n. s.	n. s.	n. s.	n. s.	*	*	n. s.	*	n. s.	*
in the transport sector										
b) sustainability and environment in the projects	n. s.	n. s.	n. s.	n. s.	*	*	n. s.	n. s.	n. s.	*

n. s. = no statement; * = answered; Source: Questionnaire

Annex 5 - Indicators to Measure Progress

1. Indicator Concept

The ideal regional indicators for sustainable transportation support the monitoring of progress and indicate whether the region is on the ”right way” or not, since they are derived from agreed on goals or desired trends. The ideal indicator set

- covers all three dimensions of sustainability: environment, economy and social aspects,
- is based on available data and is comparable in time and among countries or regions and,
- can easily be understood not only by experts.

The ”right way” can be characterised by effective and efficient measures (process oriented indicators or ”response” indicators) or by their results (outcome oriented indicators). While the outcome is directly linked to agreed on goals, the choice of adequate measures and policy instruments is under intensive discussion and depends on the particular political, cultural and economical situation of each country. Thus indication of measures is important to the assessment of trends, however it does not provide unequivocal information regarding progress made in meeting the sustainability goals. The proposed indicator set in section 3 is therefore based on outcome oriented indicators linked to goals. The measures considered to be important in the Baltic Sea Region are mentioned as well in section 3, but indicators have not been defined due to the reasons mentioned above.

Since we talk about pathways towards sustainable transportation rather than to characterise the ”right way” by agreed on aiming points (goals and targets in a narrow sense), the indication of trends is more important compared to the absolute figures. Thus, most of the objectives listed in section 3 are not defined by concrete target values.

2. Aims and Strategies for Sustainable Transport in the Baltic Sea Region

Access to people, places, goods, and services is important for the social and economic well- being of communities. Transportation is a key means of ensuring access. It is particularly important for the development of a strong co-operation within the Baltic Sea region.

The overall aim with regard to sustainable transport must have two components: (i) to retain transport’s ability to serve the economic and social development of the Baltic Sea region; and (ii) to protect the environment and in particular the sensitive ecosystems of the region, including those of forests and lakes and of the Baltic Sea itself.

The Baltic Sea is a shipping way and the basis for tourism. It is also a barrier to linking the densely populated areas of the region by rail and road. The development of efficient, sustainable transport is a challenge for all

Baltic nations.

The development of transportation systems in the Baltic Sea region must:

- provide mobility of people and goods, that inter alia allows all individuals to participate in society's life without any social restrictions,
- ensure that the social burdens caused by transport activity are minimized,
- stay within the carrying capacity of the ecosystems at local, regional, and global levels, and
- ensure that non renewable resources are used to the least extent possible.

Attaining these will require significant changes in institutions, policies, and communication styles. The increasing movement of both people and goods could deteriorate the quality of life. This would happen on account of increases in:

- the number and severity of accidents;
- emissions of air pollutants and greenhouse gases, and the amount of noise;
- pollution of the Baltic sea, fragmentation of natural and other landscapes, losses of biodiversity; and
- consumption of fossil fuels without sufficient development of renewable substitutes.

As well as a growing overall demand for transport in the Baltic Sea region, there is a shift towards use of environmentally less favorable modes. These include private cars, road cargo transport, air traffic, and high-speed ferries. Rail transport, conventional water transport, and even public transport can also be a threat to the environment if they are based on outdated technology or use dirty fuels.

The situations of the south-east and north-west Baltic region are different. In the countries of the south east, economic development is associated with rapidly growing traffic volumes for which transport infrastructure must be developed. Progress towards sustainable transport must accommodate traffic growth and infrastructure development while mitigating their negative effects on the environment. In the countries of the north west, the focus must be on reduction in motorized transport activity and on shifts to more eco-efficient modes.

Table 1: Different Situations in the Countries Bordering the Baltic Sea

	North West Baltic Sea Region	South East Baltic Sea Region
Situation Today	high transport activity	Lower transport activity
	cleaner, but energy consuming vehicles	Polluting , but smaller vehicles
	high density of transport infrastructure	Lower density of infrastructure
	good shape of road, rail and harbours	Bad shape of road, rail and harbours
Current Trends	growing activity especially regarding air transport and fast ferries	Very rapid increase of activity and number of road vehicles
	Transportation activity grows faster than technical improvement	Technical improvement is slowed down due to import of old vehicles
Envisaged Solutions	reduce demand for transportation	Allow but control increase of activity
	shift of transport modes to rail and public transport	Stabilise rail and public transport modes
	improve traffic management	Improve traffic management
	improve vehicle and system technology	Improve vehicle and system technology
	maintain the existing infrastructure	Repair and improve roads, rail, harbours and airports
	Shift modes of passengers and freight transport between the countries bordering the Baltic Sea to the most efficient and environmental sound means of transport.	

The policies selected for implementation must be those that target the driving forces behind the current trends. They will be based on the following strategies:

- Develop the necessary institutional and legal framework to integrate transport and land-use planning so as to reduce or mitigate transport demand in the medium and long term.

- Ensure that sustainable transport supports attainment of sustainable development in other sectors by being efficient and timely.

- Give priority to modes of transport that meet needs in the most 'eco-effective' manner.

- Raise public awareness about the environmental, social, economic, and safety-related consequences of excessive motorized transport; provide information and promote public discussion of sustainable transport.

- Apply the polluter-pays principle by internalizing external costs so that each transport mode bears its current and future social and environmental costs.

- Promote the use of cleaner and more fuel-efficient transportation technologies by use of fiscal instruments and legal standards.

- Improve the overall operational efficiency of transport systems.

Implementation of these strategies goes far beyond the environment or the transport sector policies. Economical, financial or planning policies are to be involved as well. Each of the sector institutions needs to build the capacity (number of staff and education) to integrate aspects into its own policy which up to now have been considered to be outside the institution's responsibility. Each sector's policy must be assessed in the light of its contribution to a sustainable transportation development.

3. Draft Indicator Set for Sustainable Transportation

The pathway to a sustainable transport systems in the region may be described by the following goals and the indicators based on them.

Table 2: Different Types of Indicators and Related Goals or Measures

1.Indicators with regard to primary goals for sustainable transport	1.1 Provide access to goods, people, locations 1.2 Reduce or mitigate pressures on health and environment 1.3 Reduce or mitigate the use of non renewable resources 1.4 Reduce casualties and environmental impacts by accidents
2. Indicators with regard to institution, instruments and measures	2.1 Integrate environmental concerns into spatial planning 2.2 Apply the principles of sustainability in decision making on investment in infrastructure projects and transport planning 2.3 Strengthen institutional capacity (Gos and NGOs) 2.4 Apply the polluter pays principle 2.5 Implement pollution control requirements
3. Indicators with regard to the transport system and transportation activity	3.1 Observe the development of the transport activities 3.2 Observe its contribution to the overall problems in the Baltic Sea Region

The social benefit with regard to sustainable transport is expressed by the term "getting access" (1.1) for the time being. The social burdens are characterised by air pollution, noise and casualties in traffic accidents (1.2 - 1.4). The economical dimension has not been addressed by any indicator, since adequate methods to measure the economical benefit of transportation have not yet been identified.

4. Primary Goals and Indicators for Sustainable Transport

4.1 Enable Participation of Individuals in Society's life without Social Restriction

Objectives	**Indicators ****

1.The public transport system provides mobility at reasonable quality to all people of a certain region. (The level of mobility is generally different in urban areas compared to rural areas)	1 Length of public transport net (rail and buses) *
2. The basic services and goods are accessible in such distances that do not demand motorised transportation.	2 Number of food shops in a certain area. *

* The net length is only one of the factors that determine the performance of the public transport system. The indicator must be evaluated carefully.
The access to food shops is one example to characterise the settlement structure.

4.2 Reduce or Mitigate Pressures on Environment and Health

Objectives	Indicators**
3.Transport related NOx emissions in the Region have been reduced to the extent, that the objectives for ambient NO_2 levels as well as for nitrogen deposition on the terrestrial and marine ecosystems are met.	3a NOx emission by total sector and by road, rail, air and sea transport. 3b (Mean) annual NO2 concentration in central urban areas 3c Average deposition of nitrogen per hectare
4.Emission of VOCs and NOx have been reduced to the extent that excessive ozone levels are avoided and emission of carcinogenic VOCs from all movements of all vehicles have been reduced to meet acceptable risk levels (1 case of cancer among ..... people).	4a Hour average concentration of ozone in suburban areas 4b (Mean) annual concentration of benzene in central urban areas
5.Emissions of particulate matter have been reduced to the extent that harmful ambient air levels are avoided.	5 Mean annual concentration of particles in central urban areas
6. National per capita carbon dioxide emissions from transportation are consistent with the global protection goals for the atmosphere. (Dk)	6 Emission of fossil CO2 by total transport sector and by road, rail, air and sea transport.
7.Frequency and speed of ship movements and the development of harbours in the region are limited such that the objectives for ecosystem protection are met (Gk, AA).	
8.Land surface is used for the movement, maintenance, and storage of motorised vehicles (including public transport) such that the objectives for ecosystem protection are met.	8a Length of railways and main roads 8b Share of areas larger 100 qkm not separated by motorways
9.Noise caused by transportation does not result in outdoor noise levels that present a health concern or serious nuisance.	9 Day- and night-time noise value in residential, mixed and industrial areas

** In order to compare different countries or regions among each other, the length of nets, the number of stocks, the consumption of resources, the emission of pollutants or greenhouse gases can be expressed as tons or km per capita , per km^2 or per GDP (indexed indicators).

4.3 Reduce or Mitigate the Consumption of Non Renewable Resources (Fossil Fuels, Metals)

Objectives	Indicators
10 Resource consumption by the **production** of vehicles/ships is reduced or stabilised, for example by reusing or recycling material from end of life vehicles/ships at a level consistent with such goal. (Dk)	10 Percentage of reused or recycled part of different types of end of life vehicles.
11 Resource consumption by building and construction of transport infrastructure is reduced or stabilised. (Dk)	
12 The consumption of fossil fuels by the transport sector has been stabilised or reduced to an extent that it is consistent with the global goals for the protection of the atmosphere (AA).	12 Final energy consumption by road, rail, air and water transport and fuel type

4.4 Improve Transport Safety

Objectives	Indicators
13 Number of casualties is reduced by ..... % until	13 Number of fatalities and injuries per year in transport.
14 The rate of large oil or chemicals spills on the Baltic Sea, at the harbours, on roads and rail is reduced by ..... % until	14 Number of cases of serious pollution or health effects

5. Indicators with regard to Institutions, Instruments and Measuress (DK)

5.1 Integration of Environmental Concerns into Spatial Planning (Dk)

Measures	Indicators
Spatial and urban planning gives high priority to the development of structures avoiding excessive demand for transportation.	

5.2 Apply the Principles of Sustainability in Decision Making with Regard to Transport Planning and Infrastructure Investment

Measures	Indicators
Criteria for sustainable transportation are applied in the decision- making processes on investments and transport plans.	

5.3 Institutional Capacity

Measures	Indicators
The sector policies have been integrated to an extent that it opens the pathway towards sustainable transportation. This includes the ability of institutions to act flexible.	
The lobby promoting means of public and non-motorised transportation has been strengthened to an extend that it is able to influence policy on national, regional and urban level.	
Public awareness and early disclosure of information has resulted in participation.	

5.4 Application of the Polluter-Pays-Principle

Measures	Indicators
1.The fuel prices are high enough to 1) cover present and future costs of transport, 2) to shift modes to more eco-efficient transport and 3) to promote the development of energy efficient vehicles.	
2.The price per ton-km in road transport is high enough to cover present and future costs, to prevent long transport distances for goods and to promote a shift of modes to less polluting means of freight transport.	
Alternative: The polluter pays principle is applied and external costs are charged in the transport sector. (Dk)	
3. Public Transport is attractive enough to prevent excessive use of private cars. Alternative: Improve attractiveness of public over private transport. (Dk)	

5.5 Implementation and Enforcement of Pollution Control Requirements

Measures	Indicators
1. In ..... years all ships on the Baltic Sea meet at least the .... standard.	
2. In ..... years all aeroplanes in the region meet at least the .. standard.	
3. In ..... years all trains in the region meet at least the .... standard.	
4. In .... years all road vehicles in the region meet at least the ..... standard.	

5.6 Observe the Development of the Transport Activities

• Length of main (all) roads and rail tracks • Vehicle stock (different kinds) • Traffic volumes from road, rail, air, sea (vehicle kilometres) • Total passenger and cargo turnover by air, ship, road, rail; mode shifts; • Investment and maintenance costs with regard to road, rail, harbour and air infrastructure • Investments dedicated to environmental protection

5.7 Transport Sector Contribution to the Overall Regional Problems

• Contribution to the overall NOx emission in percent • Contribution to the overall nitrogen input to the Baltic Sea in percent
• Contribution to the overall emission of VOC
• Contribution to the pollution of the Baltic Sea with hydrocarbons
• Contribution to the overall CO_2 emission (greenhouse gas emission)
• Contribution to the final energy consumption

6. Examples for Target Values with Regard to Sustainable Transportation

ISSUE	TARGET	REFERENCE
NOx Emission, total	- ... % (..... - .....)	
Carbon dioxide emission, total	- ... % (1990 - .....)	
urban (suburban) air quality • NO_2 • particulate matter • benzene • 1,3 Butadiene • PAH • ozone (suburban) • noise residential areas	 < 40 µg/m^3 mean annual < 15-20 µg/m^3 mean annual < 2 µg/m^3 mean annual < 0.1 µg/m^3 mean annual < 0.5 µg/m^3 mean annual < 120 µg/m^3 (8-hour average) < 55 dBA (day) < 45 (night)	examples by OECD 95 EST Project
airborne N-Nutrient load to the Baltic Sea	- 50% (1990 – 1995) ?	HELCOM
N-deposition • forests • bogs	 3-15 kg/ha per year 3-5 kg/ha per year	UN ECE critical

Ozone (accumulated hours > 40 ppb in the vegetation period) • forests • crops	 10,000 ppb hours 5,300 ppb hours	UN ECE critical
Traffic Safety Casualties	 - 50%	OECD EST example

ANNEX 6 - Actions to be elaborated

Annex 6 contains the proposals for action made during the process. Those which have been included in the action program are marked with v.

Baltic Sea Region Agenda 21 - Transport Sector Berlin Workshop, October 13-14, (revised according to comments by Dk)

List of Action - Brainstorming Group 1

- Baltic 21 should speed up HELCOM and UN-ECE activities. Helcom was seen as the main focus (.....). .... BA21 should focus on public involvement, **reduction of transport demand** generated in other sectors and strengthening the subsidiary in the Baltic sea region. It was considered, whether BA 21 should concentrate on recommendations for action rather than to launch new ones.

√ Assessment of sustainability should be a prerequisite for decision making by the international banks to finance transport projects. Projects of different countries should be bundled rather than developed in competition to each other.

√ ./.

√ know-how transfer to overcome shortcomings of public transport in the south east Baltic region (Comment: Finances needed !)

- regional activities to improve the Baltic railways (Comment: not always in line with sustainability !)
- ensure safety and quality (including environmental behaviour) of truck transport (proposal: quality = support multimodal transportation with shortest possible lead time by reducing administrative (“paper”) obstacles).

List of Action - Brainstorming Group 2 (clustered during re-writing**)**

√ support *sustainable* short sea shipping between the countries bordering the Baltic Sea, shift modes to water transport (goods transport in particular).

√ develop small and large harbours in order to enable Baltic Sea transport activity, support harbour management (fast customs, efficient loading/unloading procedures, multi-modal transport).

√ identify the most appropriate (*sustainable* and efficient) transport links between the cities in the Baltic Sea region and support shift of modes accordingly.

- make good's rail transport attractive as an competitive alternative to road transport (especially with regard to paper works).
- develop a separate system of rail lines for undisturbed goods transport (investment, joint planning, technical harmonisation).
- optimise freight transport logistic by identifying good streams and creating a common network of transport systems.

√ identify and compile "success stories" in order to motivate and enable similar action at elsewhere.

- involve stakeholders (front-runners) to implement cleaner transport technology (for example ship owners).
- launch single pilot projects to demonstrate the potential of new technologies.
- run busses with bio-fuels in order to raise public awareness on alternative fuels.

√ launch pilot projects for practical application of strategic assessment of transport plans.

√ organise regional annual meetings among the governmental institutions responsible for transport development, environment and spatial planning and NGOs in order to promote policy integration.

√ further develop the common set of indicators for sustainable transportation (as drafted by the BA21 workgroup meetings) as a communication tool in the region; publish an indicator based report every year.

- include Local Agenda 21 activities in the process and action program for Baltic 21.
- promote integrated planning in the areas along the multimodal, transeuropean corridors as decided on 19 ..... by ..... at their meeting on Crete.

√ give priority to *sustainable* public transport, make public transport as attractive as possible and competitive to private cars.

√ support local governments in planning transport infrastructure. (Cmment: How ?)

√ establish close co-operation and exchange of experience among the Baltic cities with regard to urban transport. (Comment: How ?)

- promote citizen's participation, encourage innovative solutions (see "success stories" as well !) (Comment: What is the idea ?)

√ support low emission zones in city areas (see "success stories" as well !) (Comment: Idea ?)

- make use of electronic communication to substitute travelling between and inside the countries

√ invite regional trading companies to carry out eco-auditing for their transport logistic and management in order to demonstrate the practicability and benefits of this tool.
- introduce environmental risk assessment (not only for dangerous goods) in the transport sector.

√ introduce stricter emission standards for ships, aeroplanes and locomotives having regard to the particularities of the Baltic Sea ecosystem.
√ introduce environmental permissions for high speed ferry routes and the ferries themselves (for conventional ferries as well).
√ introduce noise standards for high speed and conventional ferries.

√ use road pricing for truck traffic as a practical application of the polluter-pays-principle.

√ establish barriers (agreements) against the import of old polluting vehicles.
- support retrofit (upgrading) programs for old, polluting vehicles.

Baltic Sea Region Agenda 21 - List of Action - Riga Workshop August 29/30

The following issues were identified as to be suitable for joint action in the subregion:

- Common rail system development (e.g. solving cross border problems),
√ Establish co-operation among cities regarding the development of urban public transport systems (co-ordination of bus investment in order to lower the costs, exchange of experience regarding local tax policy),
- Joint action regarding road safety (especially trucks) among the Baltic States, Poland and Russia,
√ Solve border crossing problems (road, rail) in order to shorten transportation time (remark: this is not a strategy towards sustainability if only the road transport is speeded up without any additional pricing),
- Invest in the improvement of short distance transportation means in border region in order to promote regional, cross border economical development,
- Stabilise public transport in rural areas,
√ Popularisation of LPG (liquefied petrol gas) and unleaded gas.

List of Action - added by Sweden on 15/1/98

- improve fuel quality
- introduce alternative fuels
- improve vehicle inspection and registration
√ develop and support multimodeal transport solutions
- development of freight freeways
- introduce Intelligent Transport Systems