Transport analysis

Actions for an efficient European transport policy

Report 2010:2

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Preface

An efficient and sustainable transport system is of crucial importance to materialise the internal market in the EU.

The European Commission has started work on a White Paper on EU transport policy covering the period 2010-2020. Within this framework, Transport Analysis (*Trafikanalys*), together with the Ministry of Enterprise, Energy and Communications, has produced a number of prioritised proposed measures to present to the Commission as a basis for further work on the White Paper.

Transport Analysis would, in particular, like to thank the representatives of the Swedish Rail Administration and the National Road Administration, now merged as the Swedish Transport Administration, as well as the Swedish Transport Agency, the Swedish Maritime Administration and the Swedish National Road and Transport Research Institute, VTI, for constructive comments in the reference group associated with the project. Transport Analysis is, however, solely responsible for the analyses and conclusions of the report.

Backa Fredrik Brandt has been the project manager at Transport Analysis. Krister Sandberg has also participated in the project.

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Brita Saxton
Director-General

Contents

1 The internal market requires efficient transport

The internal market with free circulation of goods, services, capital and people, is of fundamental importance for EU collaboration. Ultimately, this is about creating the conditions to develop prosperity for the citizens of the EU. The internal market has, for instance, expanded the labour market for EU citizens by enabling them to look for work throughout the EU, but it has also strengthened businesses by providing them with access to a larger market. At a macroeconomic level, the internal market contributes by increased competition to increase economic efficiency leading to increased growth and greater global competitiveness.

Although a lot has already been achieved in developing the internal market, much remains to be done. The Monti Report, produced at the request of the Commission to provide renewed vigour to strengthen the single market, points out the need for a more comprehensive strategy.[1] Creating an efficient transport system is part of this strategy. A particular problem which the report draws attention to is that the transport system has developed within the framework of the national state, and is thus not adapted to serve a European market. This is clearest in the case of the railways where different signal systems and gauges create difficulties in cross-border traffic. Similar problems exist for other modes of transport even if they are not so apparent.

Future EU transport policy must include a strategy that indicates in very concretely a viable way to create an integrated transport system. Transport Analysis (*Trafikanalys*) considers that the main tool in a strategy of this kind should be the creation of a defined European core network. This strategy is a clear confirmation of the systemic perspective for transport and prioritisation of freight transport previously referred to.

The European transport system and its functions is an important prerequisite for the performance of the European market and growth. At the same time, increasing global trade makes ever greater and new demands for sustainable transport solutions. The formulation of transport policy is an important component for achieving an efficient transport system.

The Commission has started work on a White Paper on EU transport policy for the period 2010-2020. One tangible result of this work is the report ”A sustainable future for transport” which presents a number of important trends and

[1] Monti, M. (2010): *A new strategy for the single market; at the service of Europe´s economy and society,* Report to the President of the European Commission.

challenges that should be dealt with by future transport policy.[2] These trends include an ageing population, environmental challenges and continued urbanisation. The report also contains some objectives and important policies for achieving a sustainable transport system. Examples of important objectives are quality transport that is safe and secure, well integrated between modes of transport and between countries. Smart price signals should also be used to guide the transport system in a sustainable direction. Within the framework of the work with the White Paper, Sweden has earlier presented the SWOT analysis made by SIKA.[3] This analysis now needs to be supplemented by proposals focusing more on the actions to be adopted. This report is therefore intended to present a number of concrete actions which can make an effective contribution to achieving the goals of EU transport policy.

In the SWOT analysis, SIKA identified a number of important concepts which should be part of the basis for the work on a new White Paper. These are presented below.

Aceessibility

Ever since the Rome Treaty of 1957, accessibility has been something of a lodestar for EU policy. Transport policy has also been imbued by the objective of increased mobility.

With accessibility as an objective, the focus is placed on the actual purpose of a journey – to obtain access to a function. For the individual citizen, this may be access to work, service and leisure activities. For the business sector, it may entail access to labour, customers and raw materials. The objective for long-term European transport policy should therefore be to achieve high accessibility. Mobility – the possibility of transport –is, however, a means to achieve the benefit of accessibility. In other words, policy should endeavour to achieve increased efficiency in the transport system to reduce the negative consequences of transport in the form of congestion, while retaining accessibility, safety and the environment.

A system perspective on transport and the prioritisation of freight transport

The development of welfare depends on a well-functioning system both for passenger and freight transport. The development of the transport networks was for a long time a purely national interest, which results in the cross-border links being few. The European transport system therefore suffers from there being ”gaps” between the national networks, which the individual Member States do not feel any responsibility for filling. The EU therefore has a given task to create

[2] European Commission (2009): A sustainable future for transport; towards an integrated technology-led and user-friendly system, Brussels.

[3] SIKA (2009): Starting points for European transport policy after 2010, SIKA report 2010:1, Östersund.

an *integrated* European network for both passenger and freight traffic within the framework of TEN-T. This network should not have too many branches but should serve as a core network. A more limited and prioritised network will grow more quickly if the grant proportion from the Community is large. Financial carrots have previously proven to be an effective means of hastening planning and implementation.

Even though the designation of corridors can be regarded as an expression of central control, the basic principle of transport policy should none the less be far-reaching decentralised decision-making. It is mainly the individual citizens and the business sector which should govern the development of the transport system through their choices. An important jigsaw piece is that transport purchasers shall also pay for the cost in the form, for example, of congestion and environmental damage which transport causes. An internalisation of these costs contributes to increasing efficiency within the transport system.

Large investments have been made in rail traffic, inter alia, within the framework of TEN. Special freight corridors should be designated to strengthen the competitiveness of rail transport as a freight carrier. Within these prioritised corridors, special investments should be made on increased carrying capacity and maintenance. Prioritisation of train paths should be made on the basis of the usefulness of the transport. Within international freight corridors, the socio-economic valuation should be similar. International transport should be given a higher value than national in order to safeguard the business sector's international trade and competitiveness.

Pricing policy

A well-designed pricing policy is an important jigsaw piece to achieve an efficient long-term sustainable transport system. The internationalisation of external effects should be based on marginal cost pricing. Correct pricing is a prerequisite for decentralised decision-making, i.e. the purchaser of transport is the best suited to determine how transport is to take place. The EU has a responsibility for the systemic effects in the design of financial instruments in future freight corridors and TEN-T being taken into account.

Indicators and follow-up

From an EU and international perspective, it is important that knowledge is developed which concerns cross-border transport. For example, it is mentioned in the action plan for freight logistics that result indicators for freight logistics chains are useful instruments to promote the quality of services and that that they can be used to measure the environmental and social consequences. The Commission also states that there is to date no common system of result indicators of different modes of transport or for freight logistics[4]. Statistics within the EU are still largely based on NUTS 2 or 3 and aggregated at the national

[4] Commission of the European Communities (2007): Freight Transport Logistics Action Plan, C*OM (2007) 607 final*, Brussels.

level. Cross-border statistics, for example, for a transport chain or link, as well as between two countries are poorly developed. Only in maritime transport is there statistics for cross-border transport. Proposed improvements of international statistics must be regarded in the light of all concerned countries reaching agreement. Development is therefore taking place slowly in small steps.[5]

In the work of analysis and planning, the effects of financial instruments on traffic development have an important role. However, there is a clear need of methods and model systems which can describe effects of different types of changes on different modes of transport, for example, with regards to the introduction of different types of regulations and instruments, changed fuel prices, changed evaluations, new technology and different types of infrastructural changes. Changes in traffic and transport performance serve as the basis for calculations of, for example, emissions and other factors that have an impact on socio-economic efficiency. It is therefore of key importance to be able to assess expected changes in traffic and transport performance as well as possible, independent of mode of transport.

Power of decision

Opinions differ among the Member States with regard to the division of responsibility between the Community level and the national level. There seems to be some consensus, however, on the following principles:

- Implementation issues should be left to individual countries. This may, for example, concern how the railways' noise problem can be solved
- Cross-border issues should be left to the EU

From this, it follows that problems that arise as a result of local activities and which also have local effects should be dealt with by the individual Member States at an appropriate level. If problems, however, arise as a result of the activity or lack of activity of other Member States, the problem should be dealt with by the EU. In practice, however, it has been shown that there is no simple answer to this question. This applies, for example, to the creation of the internal market. Important issues in this area are, for example, to tackle bottlenecks in the transport system or incompatibility between different technical systems or incompatibility between different technical systems. Interventions from the EU which entail deterioration locally can, however, be sensitive. For examples, countries with a lot of transit traffic are sensitive to EU decisions that may entail a further increase in environmentally disruptive traffic.

The power of decision on aspects of accessibility which concern location and land use usually lie with a municipality or city. It is not appropriate for the EU to describe in detail how individual Member States are to work with accessibility. Control of this kind would be very inefficient through not being adapted to local conditions. However, the EU can spread good examples of how, for example, different cities work with accessibility issues. In the U.K., for example, access-

[5] SIKA (2008) Regleringsbrevsuppdrag, Analysunderlag avseende utveckling och tendenser i länderna i Östersjöregionen. SIKA Reg. No.: 264-200-08 , Östersund.

ibility issues have been addressed within the framework of local transport plans, and the new Swedish public transport act call for coordination between public transport and urban planning.[6]

Implementation of decisions

A well-functioning transport system will not materialise unless the extent and pace of implementation of the different transport policy decisions can be increased at the national level. Financial instruments have, for instance, a swift and great potential to reduce emissions from the transport sector. The introduction of such instruments should, however, to have a great impact and to increase legitimacy, be combined with actions that offer alternatives. In order for the effects of any regulations of fuel use (for example, in the form of increased prices) and other financial instruments not to lead to a deterioration in accessibility between society's functions, it is required that there are alternatives to change to. A combination of the stick in the form of internalisation of external effects and a carrot in the form of positive actions that offer freedom of choice is therefore preferable. The introduction of, for example, a congestion tax should thus be combined with expanded public transport or similar.

Energy

Fossil-based fuels will predominate at least until 2030 but will be successively replaced by a number of different types of energy sources. The EU should not designate any particular source of energy or fuel, but this should be dealt with by the market. The EU can, however, assist in phasing in alternative fuels by setting a ceiling for emissions and using powerful financial instruments. The EU can also support research activity on a small scale by, for example, developing the infrastructure for new fuels along the green corridors. Another area which the EU should promote is research on energy efficiency improvement.

Harmonisation issues

The decisions made within the Member States must be compatible with transport policy at EU level. EU transport policy should therefore consist of harmonisation in a framework containing clear rules which enable competition on equal terms between different modes of transport, as well as technical, social and fiscal respects in the transport sector.

Supporting actions that lead to simplification of administrative procedures which facilitate use of different modes of transport in transport chains, for example, common consignment notes for different modes of transport, is a way of increaseing the efficiency of the transport system. Harmonisation of rules along railway corridors should also be implemented to facilitate crossing borders and removal of other physical barriers. The administrative burden for local maritime transport is particularly heavy since a ship that carries goods between two

[6] Regeringens proposition 2009/10:200: Ny kollektivtrafiklag.

European ports is automatically classified as international transport today. This involves customs declarations and administrative procedures that make maritime transport less competitive. Harmonisation of technical standards (load carriers, vehicle lengths, etc.), rules and taxes should be improved. If issues relating to harmonisation within the EU were solved, this would benefit the working of the internal market.

2 A European core network

Several initiatives have already been taken within the EU that can serve as a basis for the work of defining an overarching European Union core network for transport. Based on the work with the Trans-European Transport Network, green transport corridors, motorways of the sea and rail corridors for freight, it should be possible to define a core network of this kind. The core network should include both passenger and freight transport although these do not necessarily have to coincide.

By focusing on a limited core network, the costs can be kept down, making it possible to finance a greater proportion with EU funds. This will enable an integrated network to develop more quickly and EU grants to particular projects to be sufficiently large to serve as substantial carrots. This is needed to provide Member States with sufficient carrots to give priority to the European perspective over the national. The core network concept fits well with the ideas about a smaller but integrated TEN-T that were given prominence in the Green Paper on a review of the TEN strategy.[7]

Efficient transport policy requires efficient financing, which has been drawn attention to both by the European Parliament's rapporteur and Monti.[8][9]It is necessary for the EU to provide sufficient financial resources to quickly bring into being the European core network.

The accessibility of the core network should be very good with a high standard of the infrastructure, not least through it being possible to use longer and heavier vehicles on this network than is permitted by current European legislation. Furthermore, new advances in intelligent transport systems (ITS) could be tested and evaluated within this network. The infrastructure for alternative fuels can be developed within the core network in the form of various demonstration projects.

The hubs in the core network also play a key role to achieve an efficient European transport system, where transhipment takes place between different modes of transport. Ports play a particularly important role here since a considerable proportion of the imports and exports of the EU take place by sea transport.

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[7] Commission of the European Communities (2009): Green paper; TEN-T: a policy review; towards a better integrated Trans-European transport network at the service of the common transport policy, *COM (2009) final,* Brussels.

[8] European Parliament (2010): Draft report on a sustainable future for transport, *2009/2096 (INI),* Committee on transport and tourism, Brussels.

[9] Monti, M. (2010): *A new strategy for the single market; at the service of Europe´s economy and society,* Report to the President of the European Commission.

Terminals for transhipment between different modes of transport are also important as this makes it possible to use the most efficient mode of transport.

One important component in the future transport policy is that it should be sustainable. The most important measure to achieve this is for the purchaser of transport to pay for the costs in the form of, for example, impact on the environment, congestion and accidents caused by transport. Pricing policy is another prerequisite for creating a sustainable market-governed transport sector where the transport purchasers through their choices govern the supply in the transport market. Decentralised decision-making of this kind will only lead to an efficient transport system if the transport purchasers receive the correct price signals. The future transport policy must therefore include a robust pricing policy.

Proposed strategy

- Create a European core network by adopting an integrated approach to work within the EU on the Trans-European Transport Network, green transport corridors, motorways of the sea and the work on rail corridors for freight

The following section presents a number of actions that should be introduced as soon as possible in the European core network.

2.1 Long and heavy vehicles by road and railway

Long and heavy vehicles on the roads

The measure long vehicles relates to road and rail traffic, although dealing initially with road traffic. The largest permitted dimensions for road vehicles within the EU are regulated by the Council Directive 96/53/EC with the adopted amendments in the Directive 2002/7/EC of the European Parliament and of the Council. According to these directives, the maximum permitted dimension for articulated vehicles is 16.5 metres and for road trains 18.75 metres, with a maximum width of 2.55 metres. The weight of the road train may not exceed 40 tonnes, with the exception of domestic transport combined with railway where a 40 foot container is transported where the weight may amount to 44 tonnes. The Member States also have the right to permit longer vehicle dimensions within their own territory provided that they are based on the European Module System (EMS) or do not manifestly affect international competition, i.e. that they only relate to domestic freight transport. EMS is a flexible system where different modules can be linked together to vehicle combinations of varying length[10].

Sweden and Finland have exemptions from these rules where dimensions are permitted within EMS with a maximum length of 25.25 metres and a maximum gross weight of 60 tonnes. Trial activity is taking place with similar vehicles in the

[10] Mellin, A. and Ståhle, J. (2010): Omvärlds- och framtidsanalys; längre och tyngre väg- och järnvägsfordon, *VTI report 676,* Linköping.

Netherlands, Germany, Norway and Denmark[11]. The permitted vehicle dimensions vary around the world (**Table 2.1**).

Table 2.1: Vehicle dimensions and weights in different countries[12]

Country	Axle pressure (tonnes)	Gross weight (tonnes)	Length (m)	Height	Width
EU	10	40 (44)	18.75	4	2.55
Sweden	10	60	24 (25.5)	-	2.55 (2.6)
Australia	9	(125.2)	(53.5)	4,3	2.5
Brazil	10	45 (74)	19.8 (30)	4,4	2.6
Canada	9.1	62.5 (63.5)	25 (38)	4,15	2.6
Mexico	-	66.5 (75.5)	31	-	-
USA	9.1	36.3 (74)	19,8 (35.2)	-	2.6

Source: Mellin, A. and Ståhle, 2010

The effects of longer vehicles are assessed on the basis of their effects on road safety, infrastructure, congestion and the environment. In the case of road safety, several studies indicate that many accidents are caused by the human factor.[13] The causes can be tiredness, drugs, incorrect manoeuvres, careless driving or speeding. Furthermore, the requirements do not always differ in many countries for drivers who drive longer and heavier vehicles and those with smaller lighter vehicles. Longer vehicles are considered to entail a higher risk of accidents at intersections and when overtaking, although this needs to be studied in greater depth. It should also be investigated whether safety railings and other types of safety barriers can cope with higher gross weights in the event of a collision[14]. If the longer vehicles are only driven in a designated core network, it would be possible to maintain a high level of road safety by, for instance, adapting intersections and safety barriers to the special needs of long vehicles.

The design and driving features of the vehicle also affect road safety. A longer vehicle combination also has a considerably greater turning circle[15]. Stability is another area that is affected negatively by longer and heavier vehicles, although this can be affected by the number of axles and the length of the towbar. Thanks

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[11] Vierth, I. (2008): Långa och tunga lastbilars effekter på transportsystemet; redovisning av ett regeringsuppdrag, *VTI Report 605,* Linköping.

[12] The figures in brackets indicate the maximum dimensions and weights. For example, the maximum width of vehicles in Sweden is 2.60 metres, while the limit in EMS is 2.55 metres with the exception of superstructures of conditioned vehicles where a maximum width of 2.60 metres is permitted.

[13] OECD (2010): Effect of adapting the rules on weights and dimensions of heavy commercial vehicles as established within Directive 96/53/EC, Paris.

[14] Mellin, A. and Ståhle, J. (2010): Omvärlds och framtidsanalys; längre och tyngre väg- och järnvägsfordon, *VTI report 676,* Linköping.

[15] Aurell, J. and Wadman, T. (2007): Vehicle combinations based on the modular concept, *NVF Report 1/2007 Committee 54: Vehicles and Transports*.

to technical advances in the field of brakes, longer heavier vehicles should not affect braking characteristics significantly[16]. As for the risk of accidents, research indicates that there is a slightly higher risk of accidents although as the number of vehicle kilometres decreases due to larger vehicles being able to carry larger quantities, the number of accidents will diminish for the same quantity of transported freight.

The effect of longer and heavier vehicles on the infrastructure depends on considerably more factors than the dimensions of the vehicle. These include the climate, road maintenance, and the construction material of the road. In general, wear and tear on the road surface increases with the increased gross weight of the vehicle at the same time as it decreases with an increased number of axles given that the gross weight is unchanged. The long vehicle is considered to create problems on smaller roads with many bends since they are difficult to overtake and can therefore contribute to increased congestion as they are driven at a lower speed than car traffic. On the other hand, longer vehicles can reduce congestion by making it possible to reduce the number of vehicles.

With regard to the environmental effects of longer and heavier vehicles, it is generally the case the fuel consumption increases with increased gross weight, which means that heavier vehicles produce more emissions in comparison with lighter vehicles. Model-based calculations show, however, that the amount of emissions of longer and heavier vehicles per tonne km are less or the same as shorter or lighter vehicles (Table 2.2). Other studies have also indicated that there is a potential to reduce emissions by using longer and heavier vehicles. However, this assumes that no significant shift takes place of transport from other modes of transport with a lower environmental impact.[17] The noise problem may increase with the number of axles, although the effect differs for different types of road surfaces. As in the case of the emissions, noise can decrease with longer/heavier vehicles given that these reduce transport performance and that speed remains unchanged.[18]

Table 2.2: Emissions from different vehicle dimensions

Length (m)	Weight (tonnes)	CO_2 (g/tonne km)	NO_x (g/tonne km)
16.50	44	37.146	0.207
25.25	60	36.447	0.202
34	82	29.119	0.162

Source: Knight et al 2008

[16] Knight et al (2008): Longer and/or longer and heavier goods vehicles (LHVs) – a study of the likely effects if permitted in the UK; final report, *Published project report 285,* Transport Research Laboratory.

[17] OECD (2010): Effect of adapting the rules on weights and dimensions of heavy commercial vehicles as established within Directive 96/53/EC, Paris.

[18] Nagl, P. (2007): Longer Combination Vehicles for Asia and the Pacific region; some economic implications, UNESCAP working paper, WP/07/02.

A socio-economic analysis conducted by OECD showed that it is socially efficient to permit longer and heavier vehicles. This calculation included the following items: Transport demand for different modes of transport, security and safety, infrastructure maintenance and strengthening of bridges, emissions of carbon dioxide and nitrous oxides. Four scenarios were tested in the calculations:

- *”Business as usual”.* In this reference scenario, no changes were assumed in the regulatory framework applying to the size of vehicles. However, the forecast development of the economy and transport demand were included.
- *Permitted throughout the EU*. It will be permitted throughout the EU to use 25.25 m long and 60 tonne heavy vehicles. These vehicles are permitted on motorways although there may be certain restrictions on regional roads.
- *Limited number of countries*. Permitted to use 25.25 m long and 60-tonne heavy vehicles in a number of designated countries on motorways with certain restrictions on regional roads. The designated countries are the Netherlands, Belgium, Denmark, Sweden, Finland and Germany. The current restrictions apply in other countries with 18.75m and 40 tonnes.
- *Transitional scenario*. It will be permitted throughout the EU to use 20.75 m long and 44 tonne heavy vehicles. The scenario is to reflect a gradual changeover to heavier vehicles.

All scenarios show a positive societal effect compared with the comparison alternative (Table 2.3). The greatest benefit arises within scenario two where longer and heavier vehicles are permitted in all EU Member States. The main reason is that it costs less to transport the same quantity of freight. In this scenario, transport performance increases (+1%) at the same time as traffic performance decreases (-12,9%). The reduced traffic performance also explains the positive effects on the environment and road injuries. The negative effects arise as a result of the costs of maintenance of the infrastructure. Some shift of freight from railway and shipping to the roads is expected. The shift from the railway is sufficiently limited, however, so as not to threaten the growth of rail traffic. However, it cannot be excluded that there will be a strong impact on rail traffic on certain routes.

Table 2.3: The result of the socio-economic calculation (million €)

		Svenario2 vs 1	Scenario 3 vs 1	Scenario 4 vs 1
Benefits of operating costs	Total road expenditures	23 991	5 117	6 560
	Total rail expenditures	2 676	1 075	1 201
	Total inland waterway expenditures	51	41	22
Road safety	Low cost/standard risk	415	43	559
	Low cost/reduced risk	1 492	192	1 668
	High cost/standard risk	1 491	207	814
	High cost/reduced risk	2 180	307	1 777
Infrastructure - maintenance	Low value	-785	-163	-733
	High value	-785	-163	-1 729
Infrastructure - bridges	Low value	-572	-119	-534
	High value	-2 288	-475	-5 041
CO_2-emissions	Low cost	104	21	-10
	Medium cost	469	95	-44
	High cost	1 041	211	-98
Noxious emissions: NO_X	Low cost	169	57	11
	Medium cost	460	155	30
Noxious emissions: PM	Low cost	64	22	13
	Medium cost	186	63	39
CBA Total	**LOW value**	24 397	5 737	1 587
	HIGH value	29 228	6 687	8 265

Source: OECD 2010

The results of the socio-economic calculations shall, however, be handled with some caution since they are affected by the elasticities chosen in the model. Although it is based on the most recent literature, more sensitivity analyses would be needed to test the robustness of the results. The results are, however, in line with what has been shown in other studies of the Swedish lorry market and what would happen if Sweden introduced the smaller European normal dimensions for trucks. This would, in fact, lead to a socio-economic loss.[19]

[19] Vierth, I. (2008): Långa och tunga lastbilars effekter på transportsystemet; redovisning av ett regeringsuppdrag, *VTI Report 605,* Linköping.

Longer and heavier rolling stock on the railways

The EU has worked actively to increase the competitiveness of the railways. This has, for example, taken place through the three rail packages intended to expose both passenger and freight transport to competition by breaking up the national monopolies. Another focus has been on increased interoperability, where a development of operating compatibility in technology, safety, traffic regulation and accessibility for all new rolling stock and new track are regulated at EU level through the European Rail Agency (ERA). This work includes establishing transnational freight transport corridors.

As the building up of the rail network has been a purely national concern for a long time, there are a number of different standards in the EU. There are also different standards within countries. In Sweden, rolling stock which complies with load profile A (maximum width 3.40 m and maximum height 4.65 m) can operate throughout the rail network with certain exceptions. With regard to weights, STAX 22.5 tonnes is standard for the Swedish railway network, although there is an ongoing upgrade to STAX 25 and STAX 30 applies to certain parts of the network. The load profile also varies in other countries within the EU although the UIC profile (maximum height 4.28 m and maximum width 3.15) is the most common. Within Sweden and the rest of the EU, the highest permitted train length varies on different routes depending, inter alia, on the length of passing stations and the braking group. In the United States and Australia, there are considerably longer trains than those operating in Europe (**Table 2.4**). Note that there may be deviations in particular sections of track.

Table 2.4: Train dimensions and weights in some different countries

Country	Train length (m)	Axle load (tonnes)	Width (m)	Height (m)	Load (tonne/m)
Sweden	650 (700)	22.5 (30)	3.6	4.65	6.4 (12.2)
Finland	(925)	22.5	3.40	5.30	8
Denmark	835	22.5	3.15	4.65	8
Germany	740	22.5	3.15	4.65	8
Australia	(1800)	22.7	2.5-3	6.3	
South Africa	(2500)		3.05	3.96	
USA		(35.7)		(Triple stacks)	

Source: Mellin and Ståhle, 2010

With regard to the effects of longer trains, this issue has not had so much light shed on it as in the case of the roads. In Sweden, the National Rail Administration, together with SJ, has conducted a study with pilot tests with train sets that were 1,500 m long. It was hoped that this would reduce the number of trains where capacity utilisation is high and also reduce operating costs. Model calculations have been made within the EU project DIOMIS of the effects of running longer and heavier trains in a number of selected corridors. The outcome depends on whether a number of technical and operational obstacles such as investments in passing places and coordination of timetables can be overcome.[20]

Traffic safety in connection with longer trains is not discussed to the same extent as in the case of longer road vehicles. Long trains may contribute to increased safety if the number of trains can be reduced. Braking technology is crucial for safety with the traffic safety characteristics of long freight trains.

The infrastructure is crucial for the ability to operate longer and heavier trains. The possible train length is determined mainly by the length of terminal tracks and sidings.[21]An increase in the axle load should be possible without a substantial increase in wheel and rail wear. The dynamic effects on the track can be reduced by using better running material (axles and soft bogies). In other words, it is possible to increase the axle load without special track actions being required. It may also be of interest to introduce certain speed reductions.[22]An increase in the axle load can also entail quite a sharp increase in the track position deterioration rate, and increased wear can be expected on routes with many curves. To sum up, this means that an increase in the permitted axle load can have different consequences depending on the type of track and which trains traffic the route. The present signal system may be an obstacle for introducing longer and heavier trains as they will have to be adapted to the new types of trains. In the case of international traffic, which is in the focus of this presentation, the different load profiles, axle loads and train lengths create a problem.

Noise is perhaps one of the most serious environmental problems which rail traffic has to deal with. Increased axle loads do not seem to have any impact on the noise level. Longer trains will, however, increase the equivalent noise level. According to a basic rule, if the length of the train is doubled, the noise level rises by 3 dB. [23]

With regard to transport economy, studies indicate that there are efficiency benefits to obtain by running longer and heavier trains. Calculations carried out in Sweden show that an increase in the axle load from STAX 22.5 to 25 tonnes would make it possible to reduce the transport costs by 9 per cent per tonne of transported freight. Further increases in the axle load would reduce transport costs even more.[24]Intimately connected with STAX is STVM (Greatest Permitted Truck Weight per Metre) which is affected by the load capacity of the railway.

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[20] Mellin, A. and Ståhle, J. (2010): Omvärlds och framtidsanalys; längre och tyngre väg- och järnvägsfordon, *VTI Report 676,* Linköping.

[21] Nelldal, B-O, Lindfeldt, O. and Troche, G. (2008): Godstrafikens utvecklingsmöjligheter som en följd av en satsning på Europakorridoren, KTH Railway Group, Stockholm.

[22] Nelldal, B-O (2005): Effektiva tågsystem för godstransporter – en systemstudie, *KTH Railway Group Report 504,* Stockholm.

[23] Mellin, A. and Ståhle, J. (2010): Omvärlds och framtidsanalys; längre och tyngre väg- och järnvägsfordon, *VTI Report 676,* Linköping.

[24] Nelldal, B-O, Lindfeldt, O. and Troche, G. (2008): Godstrafikens utvecklingsmöjligheter som en följd av en satsning på Europakorridoren, KTH Railway Group, Stockholm.

Increased load capacity makes it possible to use shorter trucks, which therefore weigh less than longer trucks. This makes it possible to increase the utility load and the load factor for trains with the same quantity of freight. The point is that this makes it possible to increase the commercial load and the load factor of the trains by the same quantity of freight. It is above all an advantage for compact and heavy trains such as ore and steel trains.[25] The costs of a truck and for train propulsion only increase marginally with a higher axle load and weight, which means that the transport cost decreases the greater the load that the truck can carry.[26]An additional benefit with an increased metre weight is that the dynamic forces are reduced by shortening train lengths, with the result that wear and tear is reduced and thus also maintenance costs.

Increased metre weight would also thus be an alternative to longer trains with the advantage that passing places would not have to be lengthened. The Swedish Rail Administration has studied the investments that would be required to make it possible to run longer, heavier and wider trains as well as whether these investments would be socially efficient. The results indicate that all actions are socially efficient, but that it is most profitable to invest in long trains (Table 2.5).

Table 2.5: Costs and benefits of investments in heavier, longer and wider rolling stock

Measure	Investment cost (SEKm)	SEK benefit (SEKm)	NNV-ratio
Heavy	404	841	0.8
Long	500	1 038	1.1
Wide	260	355	0.3
Total	1 164	2 284	0.96

Source: Swedish Rail Administration 2008

Conclusions on longer and heavier rolling stock

To conclude, it can noted that there are both obstacles and driving forces for longer and/or heavier vehicles and rolling stock on roads and railways (Table 2.6). One important obstacle is, of course, the high investment costs associated with adapting the infrastructure to longer and heavier rolling stock and vehicles. It is reasonable in the first phase to adapt a smaller core network to the larger types of vehicles and rolling stock. If a particular country wishes to expand this core network for heavier vehicles and rolling stock, the EU should not create any obstacles for this. The forest industry, for example, might be interested in running large vehicles/rolling stock on the capillary network. The investment costs are higher for the railway than the road and there is therefore a still more evident need to restrict expansion to a selected route. It is also very important for port and terminal capacity to be adapted to traffic in the core network. Without efficient transhipment hubs, it will not be possible to use the full potential of the

[25] Skoglund, M. and Bark, P. (2007): Tunga tåg – Studie för skogstransportkommittén, *TFK Report 2007:9,* Stockholm.

[26] Fröidh, O. and Nelldal, B-L. (2008): *Tåget till framtiden – Järnvägen 200 år 2056,* KTH, Division for Transport and Logistics, Stockholm.

respective mode of transport, and co-modality is an increasingly important lodestar for EU transport policy.

Perhaps the most important driving force is for transport economy to be improved allowing firms' total costs to be reduced. There is also a potential for more positive effects on the environment and climate through reduced fuel use and congestion by making transport more efficient. These benefits can, however, be "eaten up" to some extent by increased demand as transport costs fall as a result of efficiency improvement.

Table 2.6: Obstacles and driving forces for longer and heavier road vehicles (ro) and railway rolling stock (ra)

Factor	Obstacle	Driving forces
Transport economy		Reduced total costs for firms (ro/ra) Reduced transport costs (ro/ra)
Environment and climate	Efficiency gains are ”eaten up” by increased demand (ro)	Increased fuel prices Reduced fuel consumption/tonne (ro/ra) Reduced congestion (ro/ra) Reducded noise (fewer vehicles/less rolling stock(ro/ra)
Policies	Lobby groups against LTF (ro) Legislation (ro)	Co-modality principle (ro/ra)
Road safety	More serious accidents (ro) Shortage of experienced drivers (ro)	Fewer vehicles → increased safety (ro)
Infrastructure	Infrastructure investments (ro/ra) Port and terminal capacity (ro/ra)	Designated network → limited investments in road network (ro)
Technical development		ITS and standardised load carriers for increased intermodality (ro/ra)

Source: Mellin and Ståhle 2010

Proposed actions

- Adapt legislation to make it permissible to drive lorries that are 25.5m long and 60 tonnes heavy. Adapt the infrastructure of the European core network for these vehicles. The increased dimensions are permitted within the framework of EMS.
- The European core rail network should be adapted for longer and heavier trains with a load profile that allows large volumes. A common definition for this network should be produced as soon as possible and legislation in the sphere of railways adapted accordingly.

2.2 Efficient and sustainable freight transport in the core network

In this report, the measure of allowing long and heavier vehicles and rolling stock has been highlighted as a means of increasing the efficiency of the freight transport system. Some additional actions are listed below.

Actions in the marine core network

With a view to achieving increased marine safety, a development is now taking place of the fairway infrastructure towards increased traffic separation. Steering traffic in one-way routes reduces the number of meetings and risk components. At the same time, there is a price to pay for this as traffic is less able to choose the closest route. The consumption of bunker oil increases. The possibilities of choosing a route according to the weather also decrease. The system that is now being developed in sea transport can be compared to some extent with the traffic regulation that applied in air transport until some years ago.

With the system of ship identification (AIS, automatic information system) that is now compulsory on board of all larger ships, combined with the maritime authorities' systems for collecting this information, there are prerequisites for a sophisticated system of marine traffic management. A system of this kind can combine very good maritime safety, optimal choice of route, environmental adaptation and efficient information management. The system can be compared with current flight management where the flight is led to the best (often shortest) route.

The Swedish Maritime Administration has proposed in a concept study that certain areas, where there are high requirements on maritime safety and efficiency, be defined as e-navigation areas. The Baltic Sea and the North Sea could be areas of this kind. This system means that all large ships that sail into the area or are on the way to leaving port in an area of this kind notify their destination and intended time of arrival to a traffic management centre. An electronic report of this kind includes information about the ship's draught etc. In the light of these data, knowledge about all other ships' planned movements in the area, navigation warnings and weather forecasts, the ship will be given a route to follow. This route is described as a corridor which the ship is to keep to, combined with times when the ship is to pass different passage lines. This makes it possible to plan sufficient safety margins for other traffic, and to check at any time that the ship is where it should be. Deviations can be immediately followed up. This system can also enable the captain on a ship's bridge to obtain detailed information about the intention of other ships in the area. Reduced emissions can be achieved by optimizing the route choice in light of the prevailing weather, currents and appropriate time of arrival at port.

In a developed system, the traffic management centre can be given the task of a ”single-window” for example in line with the strategy proposed by the EU project

MarNIS[27]. The ship may then not need to send similar information to more than one actor, but information, including updated and estimated time of arrival, is passed on to authorities, such as the customs, as well to ports etc. Ordering of pilots and port services can be automated. This type of development work carried out within the project EfficienSea[28] should be encouraged and followed up at the political level.

Proposed actions

- Support introduction of a sophisticated maritime traffic management system in the core network.
- Introduce e-navigation areas with particularly high requirements for maritime safety and efficiency.
- Start work on developing traffic management centres into a ”single-window”

Transit transport and free cabotage

One reason for opening up the national freight transport markets for road cabotage in the early 1990s was to increase transport efficiency. A potential was seen to reduce empty transport runs, to increase the extent of utilisation and to reduce the transport costs. A questionnaire survey[29] of hauliers showed that cabotage in particularly took place to reduce empty runs on the return journey from an international transport shipment, or to increase utilisation during waiting periods (as a rule at ports).

A fully liberalised transport market is probably not possible within the foreseeable future, However, in a core network, there may be further efficiency gains to be made. It would be possible to permit free cabotage in a core network and in its vicinity to make possible loading and unloading of freight outside the core network.[30]

Since its introduction, the extent of cabotage has steadily increased, although it is still to date a minor part of the national transport performance. Every quarter for the past four years, transport performance in Europe has totalled between 400 and 500 billion tonne kilometres. Domestic transport performance accounts for the largest share, around 60-70 per cent. Transit (cross trade) and cabotage

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[27] www.marnis.org.

[28] www.efficiensea.org.

[29] Commission of the European communities (2006): Study on Road Cabotage in the freight transport market, *Final report. Framework contract TREN/A1/56-2004*. Lot 2: Economic assistance activities, Brussels.

[30] A less attractive alternative would be to co-ordinate the goods in special logistics centres in the core network where lorries could collect and unload goods and thus transport within the framework of free cabotage. The disadvantage of the latter solution would probably be more expensive transhipment costs and increased administration. There would also probably be some loss of flexibility.

is relatively small in comparison and accounts for a total of just below 7 per cent (Figure 2.1).

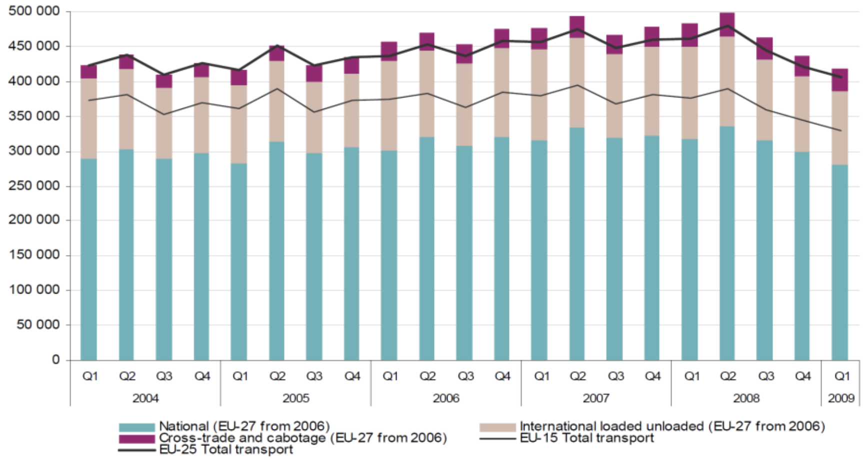

Figure 2.1: Transport performance per quarter, million tonne km.
Source: Eurostat, Statistics in focus 86/2009

It may be of interest to investigate whether hauliers in certain countries are more specialised in cabotage business than in other countries. Cabotage as a share of a haulier's total transport performance illustrates this. Hauliers from Luxembourg clearly predominate. Other countries with a high level of cabotage business are Ireland, Belgium and the Netherlands. Cabotage is defined as cabotage carried out in another country. For example, Swedish hauliers carried out 222 million tonne km of cabotage during 2008.

The above information thus does not say anything about how large cabotage is in the respective country but states which country has carried out the cabotage. The size of cabotage in the respective country is shown in Table 2.7. Moreover, the size of the share in the national transport in the respective country carried out as cabotage (penetration rate) is shown in Figure 2.2. In Sweden, the share amounted to just under 2 per cent in 2008. The highest shares are in Belgium and Denmark with just under 4.5 per cent and just under 3.5 per cent respectively. The average for EU27 was just under 1 per cent in 2007.

Table 2.7: Cabotage, reported by country where it takes place 2004-2006, million tonne km

	2004	2005	2006
BE	574	588	701
BG	11	0	15
CZ	27	34	68
DK	184	214	203
DE	3 794	3 659	3 237
EE	0	1	2
IE	122	148	177
EL	60	73	136
ES	929	1 162	1 032
FR	4 586	4 648	4 264
IT	1 001	879	1 037
CY	0	:	:
LV	20	1	2
LT	5	6	4
LU	11	27	18
HU	29	28	34
NL	257	278	391
AT	245	245	284
PL	42	36	22
PT	69	56	23
RO	22	53	26
SI	2	9	0
SK	7	39	22
FI	14	22	26
SE	356	517	520
UK	1 855	1 875	1 729
EU-27	14 221	14 599	13 973
LI	0	:	:
NO	197	71	152
CH	51	67	65
HR	1	5	2
MK	:	:	16
TR	6	25	25

Source: Eurostat, Statistics in focus 97/2008

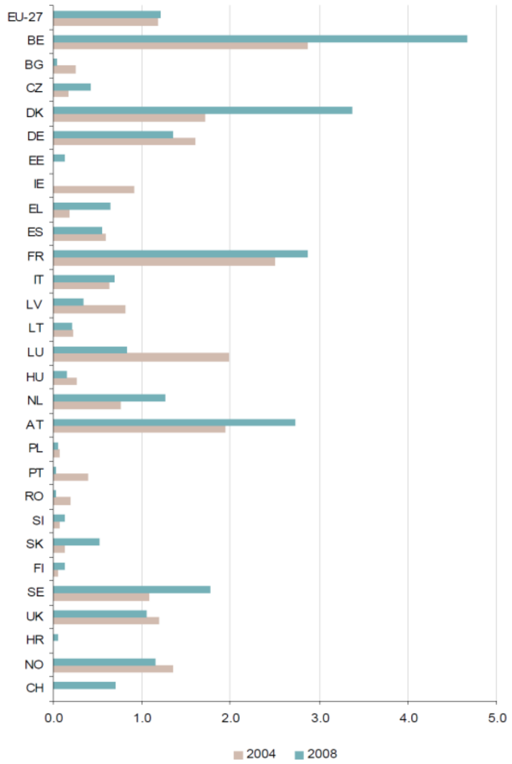

Figure 2.2: Share of national transport performance carried out as cabotage, 2004 and 2008

Source: Eurostat, Statistics in focus 86/2009

Cabotage business is accordingly not especially extensive in the EU, even though there is some variation between countries. According to current legislation, it is required that the transport shipment should be of a temporary kind for it to be legal. There are four criteria which have to be met for cabotage to be legal according to current legislation. The Commission have clarified how ”temporary” is to be interpreted.[31]The following four critieria apply:

- Frequency, measured as a number of cabotage operations carried out during a month or a year
- The time period, i.e. how long (weeks, months) a haulier carries out one or more cabotage operations. According to CIC, the most important thing is to obtain clarity whether it is a permanent or temporary occurrence.
- Periodicity, indicating how recurrent cabotage is carried out. This should not be confused with frequency.
- Continuity, does the haulier concentrate completely on cabotage during a particular period?

In reality, it is difficult, however, to determine whether an activity is temporary. In some EU Member States[32], it has therefore been decided to specify in more detail what is meant by temporary. The proposed measure of introducing free cabotage for hauliers with a licence to use the core network, i.e. they are allowed to carry out domestic transport commissions abroad independently of frequency , time period, periodicity or continuity. The only restriction is that the transport must take place within a limited area from the core network.

Proposed actions

- Introduce free cabotage for hauliers with a licence to use the core network, i.e. they may perform domestic transport abroad regardless of frequency, time period, periodicity or continuity.

ITS – road traffic management and demonstration

Technological advances play, of course, a prominent role with regard to achieving an effective transport system. As regards road traffic management, there are good examples of suitable e-tools for use within the core network. These may, for example, be traffic lights, barriers, speed limits and signs with variable messages. Since the core network is to maintain a high standard, it is self-evident that ITS will be used to a great extent, for instance, to increase road safety and reduce disruption in the event of accidents.

Besides the core network being equipped with well-tested technology, the concept is for the whole or parts of the core network to be used to test new technical systems. In this section, a number of actions are presented which would be suitable for use in the core network. Further on in this report, there is a

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[31] Commission of the European communities (2005): Commission Interpretative Communication on the temporary nature of road cabotage in the movement of freight (2005/C 21/02), Journal of the European Union, Brussels..

[32] France, Italy and the United Kingdom

chapter which deals with innovation and renewal in a broad sense. The purpose of a demonstration project is to contribute to speed up the necessary harmonisation and standardisation.

A project can take the form of a standardised description for the terminals in the core network. The content of a description of this kind is in the first place up to the appropriate authorities and trade organisations to discuss. It may entail whether there is any limit on the type of freight they can handle, or what modes of transport they use, costs, etc. In an initial phase a database will be built up where information is stored digitally to be able to be made available.

For the safety and security of both drivers and goods, it is important that there are secure parking places in the core network for commercial traffic. It should be easy to obtain information electronically as to where these parking places are and the service that they offer. It should be possible to book a place electronically.

Proposed actions

- Develop ITS for traffic management in the core network.
- Use the core network as an ”experimental workshop” for testing new concepts, for example standardised description of terminals which is disseminated digitally .

2.3 Green approach to aircraft landings

The green approach is an optimized landing approach that significantly reduces the amount of fuel used during arrival and approach operations, thereby reducing CO_2 and NO_x emissions. Each green approach reduces carbon dioxide emissions by at least 150 kg[33]. Green approaches also deliver measurable noise reduction for the surrounding communities.

With new software air traffic controllers are able to decide the direction of approach and landing time right after takeoff. This will hopefully be the end of the so called holding pattern, where aircraft are made to fly in circles and use a lot of fuel, while they are waiting for their turn to land. With a green approach the aircraft can immediately coast all the way down to the runway, rather than in stages as happens now with a burst on the throttle in between.

The green approach to aircraft landings has been partially implemented in Sweden and a few other countries. One drawback is that the system currently is used only during off-peak hours and is limited to the use of aircrafts and air traffic controllers that could handle the technology.

Proposed actions

Introduce green approach landings on all airports in the core network.

[33] www.swedavia.se

3 Innovation and renewal

3.1 Efficient pricing policy

There are in principle two reasons to introduce charges for transport. One is to finance investments in infrastructure, and the other is to internalise external costs based on marginal cost to achieve efficient resource use. This means that the producer of pollution or congestion should pay for it. This pricing policy is moreover a prerequisite for decentralised decision-making. In an increasingly complex environment, the transport purchasers are best suited to decide how they want to travel or to send their freight. When the transport purchasers make their decisions, it is important that the choice is based on the best possible information. It is therefore desirable for all costs to be internalised to provide transport purchasers with an idea of the real cost of transport.

The effects of internalising costs have been studied in a number of research projects over the years. The Commission has, for example, funded an analysis of the effects of introducing the most recent Eurovignette directive. This analysis was carried out for seven corridors within the EU for eleven types of goods over a number of sectors (Figure 3.1).

Corridor	Operating costs Average (min, max) €/trip	Total external cost charges Average (min, max) €/trip	Average[3] external cost charges / tolls	Average increase % (av. external cost charges / av. operational costs)	Maximum increase % (max external cost charges / av. operational costs)
1. Sines – Paris	2038	54.38 (50.74-62.06)	39,1%	**2.7 %**	**3.0 %**
2. Lyon – Bratislava	1580	67.24 (60.49-82.48)	35,4%	**4.3 %**	**5.2%**
3. Catania – Holyhead	3438	145.96 (123.25-209.96)	79,3%	**4.2 %**	**4.5%**
4. Milano – Lübeck	2100	64.37 (55.04-79.08)	51,9%	**3.1 %**	**3.8 %**
5. Rotterdam – Köln – Rotterdam	497	25.72 (20.37-42.58)	91,9%	**5.2 %**	**8.6%**
6a. Stockholm – Odense (bridge)	1097	20.73 (16.48-29.28)	13,3%	**1.9 %**	**2.7 %**
6b. Stockholm – Odense (ferry)	1126	20.53 (15.98-30.61)	27,4%	**1.8 %**	**2.7%**

Figure 3.1: Impact on operating cost of an internalisation of costs, basic scenario.
Source: Christidis and Brons, 2009

The increased transport costs will be shifted on to the price of the final product to an extent that will depend on how large a share of the price of the product accounted for by transport costs and ability to adapt through new price signals. As the cost of transport accounts as a rule for only a small part of the price of the final product, internalisation of the external effects will as a rule only lead to very small increases in the price of the product. In most cases, the price increase will only amount to some tenths of a per cent.[34]Overall, this means that the effect on the price of the final product is usually negligible. If there is any great effect, these would be concentrated on areas which either produce or consume bulk goods such as raw materials or agricultural products.

It is undoubtedly the case that the welfare effects of pricing policy are positive at an aggregated EU level. However, this kind of policy may have regional consequences since benefits and costs are not evenly distributed.

- Peripheral regions would be affected by increased costs for the imports and exports which would not be fully compensated for by the increase in welfare through reduced externalities in the region.
- Regions with a large share of transit traffic would benefit from both reduced externalities and increased charges from charges on trade crossing their territory.

Examples of areas that would be disadvantaged are northern Sweden and Finland, the Baltic states, Ireland, Bulgaria, Scotland and southern Spain. Examples of areas that would benefit are Austria, northern Germany, Denmark, England, northern Italy and southern France.[35]

These regional consequences have served as the starting point for some of the criticism of the introduction of the most recent Eurovignette directive. Another starting point has been the focus of the directive on freight traffic despite road congestion being mostly caused by cars. Partial implementation of a pricing policy of this kind is not efficient on congested sections of road. To put it simply, people and businesses base their transport choices on the generalised travel cost, i.e. they take into account both the monetary cost and travel time. A charge for freight traffic on the roads would increase the generalised travel cost and thus reduce the number of lorries on the section of road. On congested sections of road, this would mean that accessibility would improve for cars. The generalised travel cost would then decrease as a result of shorter travel time, which would lead to an increase in the number of cars on the section of road. The increased number of cars means that the externalities of car traffic will increase if charges are introduced for freight traffic.[36] The policy conclusion is that car traffic should also be covered by the pricing policy.

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[34] Christinis, P and Brons, M (2009): Impact of the proposal for amending directive 1999/62/EC on road infrastructure charging – an analysis on selected corridors and main impacts, Joint Research Centre, Technical note, Sevillia.

[35] Proost, S. et al (2007): The socio-economic impacts of transport pricing reforms, Delivery 9 of GRACE, ITS, University of Leeds, Leeds.

[36] Calthrop, E., de Borger, B. and Proost, S. (2006): Externalities and partial tax reform: does it make sense to tax road freight (but not passenger) transport?, University of Antwerp, Antwerp.

Another issue that should be dealt with is the method that is most suitable for internalising various external effects. Proost et al (2007) have studied a number of alternatives that include various combinations of fuel and kilometre tax. The policy conclusion is that it is not sufficient to introduce a fuel tax to internalise the external effects but that some form of kilometre tax should also be introduced.

One danger of an incorrectly designed pricing policy is that it may open the way to monopoly pricing. Centrally located countries can with the present proposals in the Eurovignette directive exploit their geographic location to charge high fees. This is one of the reasons for the proposal being blocked.

Not to become involved in the formulation of pricing policy is a dangerous strategy when an increasing number of countries introduce charges. Assume that all countries bordering on country A have introduced road charges. In this situation, it will be difficult for country A to rely solely on financing the infrastructure by national taxes. When a haulier from country A carries out transport in other countries, they pay both tax in the home country and are affected by road charges in the other countries. Foreign hauliers in country A are thus not contributing to financing the infrastructure in country A which will eventually mean that tax has to be raised in country A to finance the infrastructure. It will eventually probably be necessary either to introduce some form of charge for foreign hauliers in country A. Instead of passively being forced to introduce a charge, it is preferable to participate actively in designing a European pricing policy.

The way forward for pricing policy – some alternatives

Before we sketch a suitable development path, it is important to take into consideration a number of trends that should affect the design. Although the world economy is at present undergoing a crisis, it is none the less reasonable to assume that the level of income will increase and thus also demand for transport. The first important trend is therefore that congestion will increase in the future and thus demand for accessibility, which means that the willingness to pay to be able to travel quickly and safely (no congestion) as well as for being to travel in an environmentally friendly way will increase. The second important trend is that technological development will lead to a reduction in costs for ITS and thus also the cost of introducing highly differentiated road charges. The third trend is that new fuels will increase in extent and this will affect the possibilities of increasing government income through fuel taxes. In a future with a lot of electric cars, it will be impossible in principle to charge a specific fuel tax. Charges on transport both for reasons of finance and efficiency must be made in alternative ways.

Figure 3.2 summarises the reasoning about pricing policy this far. The starting point is the current Eurovignette directive with its possibility of charging heavy goods vehicles. It would not be altogether unreasonable to accept a policy of this kind on the basis of the reasoning that the introduction of a partial charge of this kind will contribute to increased welfare. However, it has been shown that a policy of this kind is not efficient, which argues in favour of trying to find a more comprehensive approach. Current proposals are not either attractive from the perspective of peripheral countries since centrally located countries can make use of their geographic location for monopoly pricing, which indicates that they will continue to block such proposals.

With a more comprehensive policy, the external effects would be internalised both for cars and for goods vehicles. This policy could be focused on the congestion component. Another alternative is to design a component that would handle the environmental impact. Unlike congestion, the environment is also affected by other sectors than traffic. In the best of all worlds, these sectors should also be covered by the pricing policy.

One important issue is how to best prevent anyone making use of the possibility for monopoly pricing. An effective method is probably to expose those who make choices to the pricing policy, i.e. the same charge both for local and transit traffic. The traditional method of dealing with monopoly is for the state to own and regulate charges. Earlier in this presentation, it has, however, been shown that this is not an optimal solution if countries compete for income. In the current Eurovignette directive, the possibilities of monopoly pricing have been limited by the charge not being allowed to exceed an average of the infrastructure cost. The disadvantage of a method of this kind is that it is not efficient since it is based on average pricing and not marginal costs.

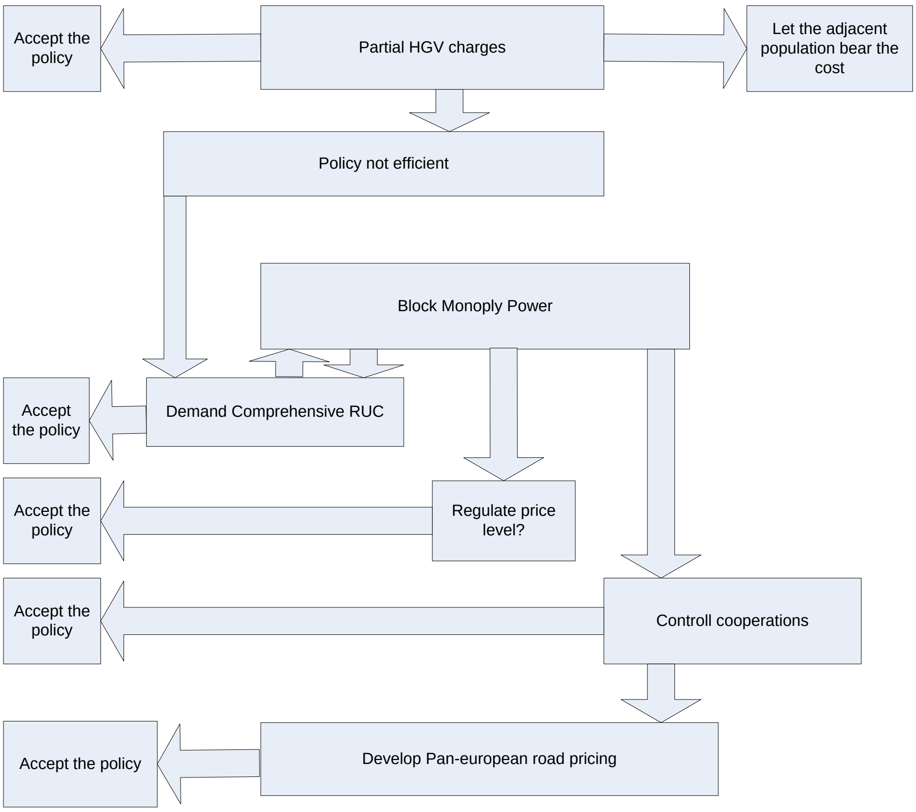

Figure 3.2: Development paths for argumentation on pricing policy
Source: Lindberg 2010

Proposed actions

The EU legislation on charges policy should be reviewed. A review should focus on the following policy conclusions.

- To be efficient, the pricing policy should apply to all modes of transport and both passenger and freight transport (even if the potential for transfers should not be exaggerated). One important conclusion is that it is difficult to use the fuel tax as the only instrument to address externalities.
- Implement actions that limit the possibility of monopoly pricing
- Initiate collaboration on development of cost-efficient systems for making charges

3.2 Statistics and monitoring

One general measure which is linked to monitoring of licences, development and implementation o f decisions at the EU level is to improve statistics. This is a large area and at present large quantities of statistics are collected, processed and published to shed light on the transport sector in various ways. However, these statistics have deficiencies, mainly through their national structure. Each Member State has its own statistical activity which sheds light on the particular country's transport sector. These statistics are provided to Eurostat for further processing and clarification at the EU level. This approach may be said to have two overarching deficiencies.

In the first place, an aggregation of the statistics of 27 Member States is not necessarily the same as EU statistics. Double counting may occur as well as exclusion of data due to different methods of collection in different countries, etc. In a number of areas in statistics, there are well-formulated definitions, which do not appear to be fully applied in all countries by all those involved. Relatively inexpensive quality-increasing actions can be made in this area. Goal-oriented actions would be needed to raise awareness that definitions must be applied in the same way if the statistics are to enable comparisons between countries.

Secondly, cross-border statistics are very deficient or in many cases completely lacking in principle today.[37] Investigations are lacking, methods are deficient[38] and secrecy restrictions exist. International statistics on flows in border regions are weakly developed therefore. There is a key focus on cross-border transport shipments only in the maritime sphere although in this case too there may be secrecy problems, for example, on movements from one port to another. What

[37] SIKA (2008) Regleringsbrevsuppdrag, Analysunderlag avseende utveckling och tendenser i länderna i Östersjöregionen, *SIKA Dnr: 264-200-08*, Östersund.

[38] It is important to note that the ordinary methods, for example, Transport Analysis's commodity flow survey, are not particularly suited to measure border crossings. The question of where goods sent to or coming from abroad have crossed a national border, which was included in the previous commodity flow survey in 2004/2005 was removed from the 2009 study. Few if any product owners are aware of where the border crossing point for the goods.

exists is based on small samples and has therefore a relatively low level of reliability.

EU-wide investigations should be tested, for example, European travel and freight flow surveys. One risk that should be taken into account, however, is that the sample is small in the case of peripheral countries and results can therefore be obtained with large confidence intervals. For national purposes, it is, however, important that this type does not always replace a joint survey. The survey can moreover be expensive as shown by a survey in southern Sweden focused on international freight transport[39]. Furthermore, it should be taken into account that there is an EU-wide endeavour to reduce the regulatory burden on businesses. Proposals for increased statistics should therefore be regarded in the light of a total reduction of the burden of providing information.

If the limited resources that actually exist are used in such a way as to give the best return, it may be possible to agree that road transport is the mode of transport which it is most motivated to focus on, in the light of the ongoing debate on emissions. Other countries take an interest in the Swedish statistics on traffic performance, based on meter readings. A cost-effective development would be to introduce this method in other countries. High quality data on traffic performance will also lead to high quality statistics on emissions.

In general, statistics are developed in accordance with the principle of the least common denominator. It is accordingly desirable that all countries should agree before changes or supplements are implemented. The country that has the greatest difficulty in accepting the changes then has good opportunities of braking or preventing this development. This is worth bearing in mind when it is desired to suggest improvements in statistics.

Furthermore, policy-relevant statistics/indicator-based monitoring, for example of implementation should be developed. Current statistics are largely based on licences and development in the transport sector. Through an expanded perspective, the transport sector is placed in a larger context to show how the transport system affects and is affected by other sectors of society. The DPSIR system, (Figure 3.3), is intended to complement the description of the status of the transport system by indicators that show the underlying driving forces, for example, transport demand, and actions that describe the public instruments applied to affect the choice of mode of transport and other aspects of the transport system. The method is used in following up environmental targets and by the European Environmental Agency EEA.

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[39] Vägverket (2006): Kartläggning av godstransporter genom Skåne och Blekinge, Vägverket Region Skåne, publikation 2006:109, Borlänge

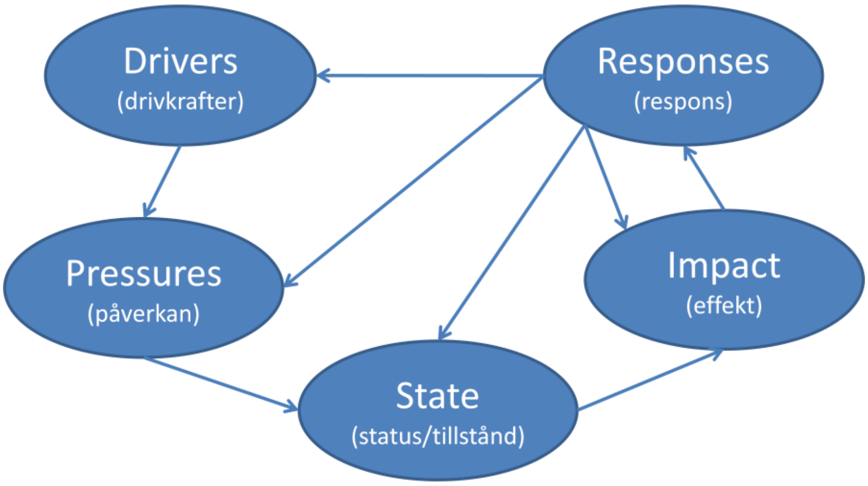

Figure 3.3: The different types of indicators in a DPSIR-system.
Source: based on Smeets and Weterings et al, 1999.

Indicator-based monitoring is based on a selection of relevant data being processed and presented to provide as comprehensive picture as possible of the transport system, without losing overview. This selection of indicators shall be of such a kind as not to distort the impression or lead to incorrectly targeted instruments that optimise indicator outcome but sub-optimise the system. Indicator-based monitoring therefore needs to be continuously developed and refined although the objective is for a limited number of core indicators to be monitored for a longer period of time.

Proposed actions

- Improved statistics for monitoring implementation
- Increase knowledge of cross-border transportation
- Surveys made at EU level – for example, a European commodity flow survey

3.3 Alcolocks and other detection systems for safer road traffic

We know from a survey conducted in Sweden that a relatively small proportion of drivers drive under the influence of alcohol. Of the 25,000 car and light truck drivers approximately 0.24 per cent of traffic performance is carried out by drivers under the influence of alcohol.[40] Despite the fact that a relatively small part of traffic performance is carried out by drivers under the influence of alcohol, these are involved in around 15 per cent of fatal accidents. The few people who

[40] Forsman, Å, Gustavsson, S och Varedian, M (2007): Rattfylleriets omfattning; en metodstudie i Södermanlands, Örebro och Östergötlands län, *VTI rapport 599,* Linköping.

drive under the influence of alcohol thus cause a relatively large number of fatal accidents.[41]

In the case of Sweden, statistics are available for 2006 on drivers of various kinds of motor vehicles who were involved in accidents where people were injured, which were reported to the police and whom the police suspected were under the influence of alcohol or other drugs. The share of drivers under the influence was highest among moped riders (7.1 per cent) and motorcyclists (6.5 per cent) which may be compared with three per cent of car and light lorry drivers. The lowest share was for drivers of buses/coaches and heavy goods vehicles where the proportion of drivers under the influence was less than 1 per cent. An accident involving heavy vehicles or vehicles with many passengers can, however, have very serious consequences. An increasing number of transport companies quality assure their transport by alcolocks to guarantee sober transport. Alcolocks in commercial traffic and public transport have gain increasing acceptance since introduction of the technology and its use apace with experiences gained. The companies that have installed alcolocks have in many cases been able to prevent people driving under the influence of alcohol.

The number of alcolocks in commercial traffic has gradually increased since 1999, and now amounts to around 33,000 units in public transport and commercial traffic in Sweden (year-end 2007/08), most of them as quality assurance tools to prevent people driving under the influence of alcohol. New solutions such as alcolock cabinets and alcolocks together with barriers at ports have become elements of interest in preventive work. In Sweden, there are around 4.8 million cars, buses/coaches and lorries in traffic, providing great potentials for alcolocks in a short-term perspective. The alcolocks used by those driving under the influence after conditional withdrawal of driving licence are technically advanced and have a number of safety functions that increase the cost compared with a simpler alcolock. This type of advanced alcolock is also used in the quality assurance of businesses and public authorities.

It is especially important to target the group of those driving under the influence In the light of the fact that many of them have problems with alcohol, and since a large proportion of them repeat the offence of drunk driving.

In a Swedish commission of enquiry on alcolocks (SOU 2008:84), a proposal was presented that persons who had been sentenced for drunk driving should not have their driving licence withdrawn but should be allowed to continue to drive a car provided that they only used their own car and that it was fitted with an alcolock. A trial activity, with the option of choosing an alcolock instead of withdrawal of a drivers licence has been under way since 2003. The commission recommends that this trial (with certain adjustments) be made permanent.

Based on the proposals of the commission, Transport Analysis has calculated the socio-economic costs of installing alcolocks, compared with withdrawing

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[41] Government Bill 2008/09:60 Safer drivers on mopeds, snow scooters and off-road vehicles (Säkra förare på moped, snöskotrar och terränghjulningar)

driving licences for sentenced drunk drivers (Appendix 1).The results of the calculation indicate that installation of alcolocks instead of withdrawing driving licences for persons sentenced for drunk driving can be profitable. This is particularly the case if the alternative with alcolocks contributes to positive health effects from a more sober lifestyle, besides the positive effects for the person sentenced for drunk driving of being able to continue to drive a car, and for society in the form of a reduction in expected future cost of accidents if the person sentenced does not relapse into drunk driving for a longer period in the future.

Europe

A brief overview is given here to obtain a picture of the situation in the rest of Europe. According to the commission's report[42] , alcohol is involved in every fourth fatal accident in Finland and about every sixth accident where someone is injured. In 2006 88 people died in drunk driving accidents, of which 63 were drunk drivers.

In the Netherlands, 791 people died in road accidents in 2007. Approximately 25 per cent of the accidents were considered as being alcohol-related. During 2007, 4,615 people died in France, of which 1,241 in alcohol-related accidents. Finally, in Norway, alcohol and drug-related accidents account for around 25 per cent of all fatal accidents.

In Sweden, SIKA[43] stated that 839 car drivers were suspected of being under the influence of alcohol in road traffic accidents reported to the police where people were killed, seriously or lightly injured in 2008. The number of accidents reported to the police in the same year where persons were injured amounted to just over 18,000. In a European perspective of, Sweden has a low number of fatalities, both in absolute figures and measured per million inhabitants. In 2007, 471 people died in Sweden totally or 52 people per million inhabitants. The corresponding figure for EU27 was 42,496 and 86 people per million inhabitants.[44]

A very general conclusion is then that, given the relative low rate of fatalities and alcohol-related accidents according to the above calculation, it is probably socially efficient to install alcolocks for drunk drivers compared with withdrawal of driving licences. There is accordingly reason to conclude that it should be profitable in other European countries.

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[42] Näringsdepartementet (2008): Alkolås för rattfyllerister och körkortsprov i privat regi, *SOU 2008: 84,* Stockholm.

[43] SIKA (2009): Vägtrafikskador 2008; Utdvidgat tabellverk enl äldre publicering. http://www.trafa.se/Statistik/Vagtrafik/Vagtrafikskador

[44] Eurostat's database. http://epp.eurostat.ec.europa.eu/portal/page/portal/transport/data/database

Proposed actions

- Install alcolocks in cars for persons sentenced for drunk driving.
- Subsidise part of the costs associated with installation and operation of the alcolock.

The calculations indicate that it is socially efficient to install alcolocks instead of withdrawing driving licences, i.e it is socially efficient for the state to subsidise the cost of installation and operation of alcolocks for persons sentenced for drunk driving. The result of the calculation shows that a subsidiary corresponding to SEK 20,000 to SEK 30,000 per alcolock would be justified from the point of view of social efficiency.

- Introduce a mandatory requirement for alcolocks or other technology to prevent drunk driving in all new buses and coaches from 2010 by amending EU rules as well as for lorries in commercial traffic.
- Introduce stricter procurement requirements so that alcolocks are successively installed in public vehicles or transport.
- Invest in innovation of various detection systems. As new technology can detect and warn if the driver is affected by one or several factors such as alcohol, drugs, tiredness or illness can be standard in all new vehicles. Today's alcolocks are advanced and require a lot of the user. A simpler technology, which is reliable, inexpensive and user friendly must be developed in order for technical support of this kind to be broadly used by the public. Continuous development is taking place in this area and several interesting products have been produced or are being developed. The level of ambition to develop technology which warns if the driver is affected by alcohol/drugs, tiredness or sickness shall be higher than before. Technology for systems that prevent a vehicle starting will need to be developed.

3.4 Electric cars, plug-in hybrids and charging infrastructure in a European core network

There is an increasing number of electric cars and plug-in hybrids[45] in Sweden and the rest of Europe. An overview and evaluation is provided below, based on previous studies, of the prerequisites, possibilities and proposed actions identified as being important for the large-scale introduction of electric vehicles.

[45] A hybrid car is a car with both a combustion engine and an electric motor to drive the car. The hybrid car also has a battery or another energy store to make use of, for example, brake energy. The plug-in hybrid is a hybrid car where the battery can also be charge from the electricity grid.

In EU-27, the vehicle fleet amounted in 2007 to around 230 million cars. Of these, an approximate average of 6.8 per cent is replaced every year. [46] Of newly-registered cars in 2008, the main fuel used was diesel (51.4 per cent) and petrol (47. 3 per cent) in 2008. The proportion of the new vehicles driven with an alternative fuel was 1.3 per cent.[47]

Norway has for a long time been involved in development of electric operation, for instance, with the car Think. There are now quite a lot of charging stations in Norway and many are being expanded for the just under 2,800 electric vehicles in Norway. An estimate of the costs can be obtained by the Norwegian state making available NOK 50 million (EUR 6.4 million) to fully finance 1,900 charging points. Around 10 per cent of these have now been installed.

The Swedish Energy Agency reports in its long-term forecast that the number of electric cars and plug-in hybrids in Sweden with the current instruments is expected to be 85,000 in 2020 with an electricity consumption of around 0.17 TWh. The electricity industry and the Royal Swedish Academy of Engineering Sciences (IVA) have a more ambitious vision of 600,000 electric vehicles by 2020. In this scenario, electricity consumption would amount to around 1.5 TWh, or approximately 1 per cent of current electricity consumption in Sweden.

Electric cars have low energy consumption, 0.24 kWh/km including losses is mentioned in a report from the Energy Authority[48] If the major part of today's car transport was to take place using electricity as fuel, consumption would be 10-15 TWh. According to a Danish study[49] just over 500 sea-based wind power plants of 2 MW each would suffice to provide the whole of the Danish car fleet of 1.9 million vehicles with environmentally friendly electricity. Recalculated for Swedish conditions, around 300 sea-based wind power stations of 5 MW each would be needed for 2 million plug-in hybrids.[50]

The way in which electricity is produced is very important for the size of the environmental benefit. If a marginal valuation of electricity is made, a marginal valuation of the comparison fuel should also be made. In a report from the Swedish Energy Agency[51], it is assumed that the value of coal-produced electricity, 1,000 kg CO2/MWh and marginal oil from value is 850 kg CO2/MWh. A diesel car is assumed in the example to have a consumption of 0.4 litres per

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[46] Eurostat (2009): *Pocketbook 2009; Energy, Transport and environmental indicators*, Luxembourg

[47] Commission of the European communities (2009): Report from the comission to the European Parliament and the Council. Monitoring the CO2 emissions from new passenger cars in the EU: data for the year 2008, *COM (2009)713 final*, Brussels.

[48] Energimyndigheten (2009): Knowledge base for the market in electric vehicles and plug-in hybrids, *ER 2009:20*, Eskilstuna

[49] El & Energi Nr:3, February 2007

[50] Bergman, S. (2008): Plug-in hybrider; Elhybridfordon för framtiden, *Elforsk rapport 08:10,* Stockholm.

[51] Energimyndigheten (2008): *Koldioxidvärdering av energianvändningen; vad kan du göra för klimatet*, Underlagsrapport, Eskilstuna.

10 km, which recalculated gives a carbon dioxide emission of 3.4 kg. The corresponding figure for an electric car with an electricity consumption of 0.24 kWh/km would produce emissions of 2.4 kg of carbon dioxide. There is some overlap in efficiency, however, between electricity and fossil-based operation and it is not automatically the case that electric ca rs are more efficient than fossil-driven cars, which is illustrated in Figure 3.3. The high emission levels in the bar with one passenger corresponds to the marginal reasoning above. The lowest figures are for electricity with a good environmental choice and for the diesel car the emissions of conventional oil

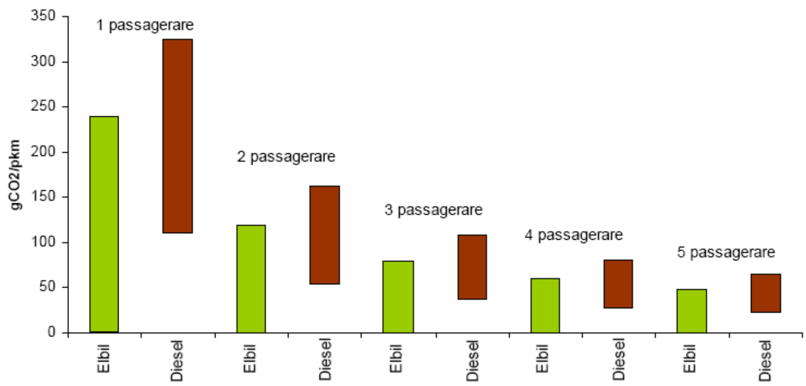

Figure 3.4: Carbon dioxide emissions as a function of vehicle use. Comparison of an electric car with a very efficient diesel car from different perspectives of emissions calculations.
Source: Energy Agency ER 2009:20.

Corridors with charging infrastructure

To start with limited actions are needed in the form of investment in battery charging infrastructure. There is also a need to identify places and situations where, in particular, owners of electric cars can obtain a real benefit from the opportunity to charge, i.e. in situations where it is planned to stop for a longer period at the same place before continuing the journey.

Continued work on building up the battery charging infrastructure can take place in various forms. In Sweden and other countries where there are a relatively large number of engine preheater points, these can be used for normal charging. Ordinary power sockets can usually be used for this type of charging. However, fast charging requires different equipment and there is no common standard at present. To be able to rely on fast charging, charging must really be quick, not take much longer time than an ordinary filling up with petrol and there must be a well-developed network of stations.

Fast charging shall in the first place be regarded as a complement to normal charging although it may be psychologically important to know that it is possible to charge a vehicle away from home. Projects are now in process with development of the battery charging infrastructure, for instance the450 km long Green

Highway[52] where charging stations are introduced at public environments along the E14 highway between Sundsvall in Sweden and Trondheim in Norway.

Developing infrastructure for electric cars should primarily be expanded nationally, in urban areas with environmental ambitions and along corridors. At the European level, it is closest to hand for development of the infrastructure of charging points to take place in the ”green corridors”, which can advantageously be linked to TEN-T. To facilitate a shift to electric operation of heavy traffic, special efforts should be focused on development of the charging infrastructure for this category. Investing in a battery charging infrastructure in certain corridors is justified by the current lack of standards for fast charging and that there may be some resistance to the large-scale introduction of charging infrastructure. In these corridors, demonstration programs could be built up; with different types of fast charging, compatibility requirements are necessary to ensure long-term operation of the vehicle the regardless of its location within the EU. A green corridor would also require that the electricity supplied was ”green electricity”.

The need for standardisation

Standardisation work for electric vehicles and battery charging infrastructure is taking place internationally within IEC and ISO. In Sweden, work is taking place in SEK Elstandard (working in relation to IEC) and SIS (working in relation to ISO). [53] Some of the points of view raised relate to:

- Avoidance of ”locking-in” effects with different choices of components and systems
- It should be possible to use simple solutions and existing standard plugs and power points

Safety standards have been produced within IEC which show designs considered to comply with reasonable personal safety. These standards comply with the low voltage directive. The IEC-standards show several suitable solutions for charging vehicles; as electric vehicles have to date been a local phenomenon, this has not been a great problem. As regards cable connection and plugs and power points, considerable freedom has been left for national deviations since there a large number of different national rules and standards.

In the event of a more large-scale introduction of electric cars and plug-in hybrids which are to be charged, the existing standards will be insufficient as it must then be taken into account that these must be charged regardless of location. Furthermore, demands will be made for a faster charge and thus for production of components in the charging systems. There is a need for standardisation that enables charging with both 1- and 3-phase, as well as enabling slower and more rapid charging.

With current standards for connections and cables, there is a large number of connecting possibilities, which means that one cannot be certain that charging is

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[52] Trondheim-Sundsvall

[53] Herbert, P.(2009): Standardisering för eldrivna fordon; Lägesrapport, *Elforsk Rapport 09:46*, Stockholm

possible without using adapters. There is thus a need for standardisation with regard to plugs, electric sockets and cables.

At the European level , there has been an agreement since the end of April 2009 on a rapid charging standard of 400V and maximum 63A. However, the rapid charging systems also have specific problems given that each type of battery has its special features regarding the possibility of rapidly receiving large quantities of energy. A communication between vehicle and battery charger may be necessary, or a system is conceivable where the vehicle owner indicates the relevant type of battery in the same way as the octane number is chosen when refuelling today. Fast charging of batteries is also associated with problems in the form of the risk of fire etc in the event of incorrect battery type choice. In order for the public to be able to use this type of high-tension current safely, the standard must be upgraded in terms of physical protection and training initiatives.

Regulations

It was not previously possible for the EU to grant approval to a type of electric vehicle on the basis of framework directive 70/156/EEC which only permits vehicles with combustion motors to receive EC type approval. As from 29 April 2009, the new framework directive 2007/46/EC came into force. It is still not formally possible for the EC to grant type approval of an electric vehicle as certain regulations are lacking, including on electrical safety. However, there are exemptions in the new regulation that make it possible to approve national small-batch vehicles provided that relevant alternative demands are made on the vehicle. However, a vehicle of this kind may not circulate freely in the EU.

With regard to electrical safety, there are regulations in UNECE R 100. However, these are not updated in relation to existing technology and modern standards. In other words, an update of the regulations is necessary before it is possible to apply them. This regulation is not included in the framework directive which means that EC cannot formally issue type approval of electric vehicles based on UNECE R 100.

Proposed actions

- Start by creating a core network for battery charging infrastructure, preferably with green electricity as a source of power
- Drive forward standardisation work for rapid charging
- Carry out the necessary legislative changes for type approval of electric vehicles

3.5 ITS – actions for an efficient freight transport system

There are a number of actions that need to be taken to obtain benefit from the full potential of ITS. Information and data exist within different transport management systems. Information is available there on the goods and on the sender and recipient. There is considerable interest on the part of the various stakeholders in the transport market to be able to track the consignment in real time, which increases demands for transparency in the flow of information. There is a great potential through establishment of open and common standards to integrate traffic management to optimise traffic and make possible an exchange of information over different modes of transport. One challenge is to link together individual transport management systems, public traffic management systems and disruption information provided by public organisations. The difficulty lies above all in transport management primarily taking place for commercial purposes which makes collaboration difficult.[54]

Different ITS solutions can contribute to increase the efficiency of intermodal transport shipments and to make transport more environmentally friendly. The most important barriers that obstruct use of ITS are as follows:[55]

- Lack of standards for information transfer, for communication between vehicles and traffic management and physical infrastructure.
- Insufficient and uneven information about traffic networks, terminals, etc. – important data to be able to plan transport. A common cross-traffic mode standard is lacking. It is also about offering simple on-line-solutions for convenient access to data.
- Insufficient travel time information. It is difficult or impossible to obtain references to other routes in the event of disruptions. Short-term forecasts are also lacking.
- Information is also lacking on the location of the goods.
- A flora of regulatory systems, which are not co-coordinated or harmonised.

It is important that the EU takes the initiative to remove the above barriers. One example of application of ITS that would facilitate international transport is the introduction of a digital intermodal consignment note.

Digital waybill

There are a number of benefits to introduce a digital consignment note, which is clearly shown by a description of the problems in handling a multimodal transport

[54] Vägverket (2010): En trafikslagsövergripande ITS; strategi och handlingsplan för Sverige, Borlänge.
[55] Vägverket (2010): En trafikslagsövergripande ITS; strategi och handlingsplan för Sverige, Borlänge

shipment. Today's flow of information and transfer takes place in such a way as to complicate and make difficult the work of the participants involved:[56]

- The transport document (the consignment note) is sent sequentially to the participants at the next stage.
  Problems: Different actors receive different information at different times at the same time as there is a risk of information being distorted in transfer between different actors
- Transport documentation information is registered manually by several actors in the chain.
  Problem: Additional work and a great risk of quality deficiencies in the information.
- Transport documents in several copies and versions depending on who has received the documentation.
  Problems: Different variants of the same document to keep in order.
- The information on the transport document is often incomplete, for example, missing documents or pages or incorrect information due to preregistration
  Problems: Additional work to track and match the goods with planned deliveries.
- Transport documents sometimes are completely missing
  Problems: Difficult to identify the goods, which is necessary since containers without documents may neither be accepted nor opened.

Production of an intermodal consignment note could remedy this unsatisfactory situation. A transport document of this kind could be created electronically according to an agreed international standard and be available for all parties which require it. All events are registered in the transport flow and made available for those who ask for them. Several positive effects would arise through introducing a digital consignment note. Information is available in the system so that all actors can obtain access to information when they require it. The transport time will be shorter through less administration and less risks of delay due to inadequate transport documentation. Furthermore, there is greater possibility of controlling the transport flow which may be used to increase the extent of utilisation by joint loading.

Achieving a digital consignment note is not solely a technical issue, however. The issue of liability and the applicable regulatory framework for a multimodal transport shipment with an intermodal consignment note must be resolved before digital consignment notes are introduced.[57]

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[56] Vägverket (2010): En trafikslagsövergripande ITS; strategi och handlingsplan för Sverige, Borlänge

[57] Commission of the European Communities (2009): Study on the details and added value of establishing a (optional) single transport (electronic) document for all carriage of goods, irrespective of mode, as well as a standard liability clause (voluntary liability regime), with regard to their ability to facilitate multimodal freight transport and enhance the framework offered by multimodal waybills and or multimodal manifest, TREN/CC/01-2005/lOT1/LEGAL ASSISTANCE ACTIVITIES, Brussels.

Proposed actions

- Decide which regulatory framework is to apply for a multimodal transport with a digital multimodal consignment note.
- Introduce a digital multimodal consignment note.

Flexible environmental zones

Environmental zone is not a standardised concept and is therefore used in various ways in different countries. In one environmental zone there may, for example, be restrictions on the types of vehicle that are considered to be environmentally damaging. Environmental zones with various designs exist in a number of Member States such as Germany, Sweden, the United Kingdom, and Italy. In most cases, the environmental zone aims to comply with the EU environmental quality standards. As a rule only heavy vehicles are subject to restrictions, although Italy and Germany have also introduced restrictions on cars. In Sweden there are environmental zones where it is not allowed to drive with studded tires.

The problems with non-compliance with environmental quality standards are often of a local nature and the most efficient solution of the problem is then often local in many cases. Environmental zones should therefore be designed locally in accordance with the principle of subsidiarity. However, the EU can contribute in the development of intelligent and flexible environmental zones. The finesse of such environmental zones is that they can be adapted to different needs. The downside of locally designed environmental zones is that it may be difficult for users to know which rules apply in the zones. With an intelligent system, the driver will automatically be informed whether the vehicle may be driven in the zone or not. This information is to be available when routes are planned and subsequently when following a route. Breaches are in principle to be impossible through automatic monitoring . A first step in introducing an environmental zone is to create a database which is continuously updated for all zones.

Proposed actions

- Produce a database for EU environmental zones.
- Develop intelligent and flexible environmental zones

3.6 ITS actions for an efficient passenger transport system

ITS also has many smart solutions for passenger traffic. Some important areas to develop are aids for travellers when choosing means of transport, travel times and routes. This type of measure has become increasingly important apace with the deregulation of the passenger transport market and its increasing fragmentation. The following areas are of interest for developing ITS solutions to develop passenger traffic.[58]

- Information and services to plan, book and pay for a multi-modal journey.
- Multimodal traffic information in the event of disruptions which don't just inform that there is a disruption but provide information about how to complete the rest of the journey.
- Information about terminals, stops – how to reach them where they are and whether they are adapted for persons with disabilities?

From an EU perspective, it is particularly important to be able to plan, book and pay for a multimodal journey for international journeys as well. It is not suitable to compel companies to join this service but it should be sufficiently attractive to make them join voluntarily.

Proposed actions

- The concerned public authorities and industry representatives together design a service to plan, book and pay for a multimodal journey.

3.7 Common language for rail traffic management

The existing regulatory framework for traffic management is an impediment for development of international passenger and goods rail traffic. Current legislation means that every locomotive driver must speak the language of the track manager in the countries that the train passes through. The language requirements are also pitched at such a level that would require at least a year's full-time study of the language, which, in practice, means that locomotive drivers by and large only work in their own country. For reasons of safety and security, it is, of course, important to avoid any misunderstandings arising from linguistic confusion. Work is taking place in the European Railway Agency to review the language requirements for locomotive drivers in international traffic.

It would be preferable to decide, in common with air and sea transport, that traffic management should take place in English. This would require a standardisation of the standard phrases used for rail traffic management. A measure of this kind would enable locomotive drivers to work throughout the EU.

Proposed actions

- Introduce geographically limited trials with English as the traffic management language

[58] Vägverket (2010): En trafikslagsövergripande ITS; strategi och handlingsplan för Sverige, Borlänge

4 Summary conclusions

The goal of the European transport policy is to establish a sustainable transport system that meets the society´s economic, social and environmental needs. The proposed actions can be categorised under the headings of *core network* and *innovation and renewal.* The creation of a core network is a strategy for achieving an integrated European network for passenger and freight traffic with limited financial resources. With a more limited network, the grant proportion from the Community can be increased in comparison with TEN-T, which is necessary to strengthen the European perspective in prioritisation of infra-structure by the Member States. The core network is an important concept to meet the need for a system perspective on transport in the EU. An appropriate starting point for definition of the core network is to adopt an integrated approach to the work with the Trans-European transport network, green transport corridors and the work with rail freight corridors.

Core network

While the core network is an instrument for the pursuit of the European transport policy, it must also be developed in a way that it becomes attractive to Member States as well as for users.

The core network consists of transport corridors and terminals where several modes of transport interact to provide an efficient transport system. Efficient terminals that link together modes of transport are essential for well-functioning co-modality, not least the link between ports and land-based transport systems is of key importance. If any waiting times arise, for example at terminals, hauliers can make use of the possibility of free cabotage which is proposed for hauliers on the core network.

The core network is to maintain a high standard, which is, inter alia, shown by the possibility of using longer and heavier road vehicles and railway rolling stock. This measure is accordingly in line with the objective of prioritising freight transport and has a great potential for increasing the efficiency of the transport system and reduce emissions. The core network can also be used as an experimental workshop for testing new technical systems. This may, for example, relate to the possibility of receiving information electronically about the terminals in the core network, which requires that there is a standardised description of these terminals.

In sea transport, a number of development projects are in process, which can be tested and evaluated in the core network. One example consists of a more sophisticated alternative for maritime traffic management combining good maritime safety and security, optimum choice of route and efficient information management. Reduced emissions can be achieved by optimizing the route choice in light of the prevailing weather, currents and appropriate time of arrival at port. Sea transport can be made more efficient by traffic management centres having the function of being a “single window”. This means that ship does not have to send similar information to more than one actor but that the information is automatically forwarded to public authorities, ports and others concerned.

In air transport the green approach to aircraft landings significantly reduces the amount of fuel used during arrival and approach operations, thereby reducing emissions of carbon dioxide and nitrogen oxides.

Innovation and renewal

Innovation and renewal has a given place in the future transport policy. An important aspect is harmonisation issues, i.e. to find common technical standards to, for example, make full use of the potential of intelligent transport systems. An intermodal digital consignment note is an important measure to increase logistical efficiency. One harmonisation issue, which is not of a technical nature, is to introduce a common language for rail traffic management.

In the case of passenger traffic, public authorities and representatives of the industry should together design a service for planning, booking and paying for a multimodal journey. There are examples of national services of this type, although it should, of course, be possible to book journeys throughout the whole of the EU.

The EU should support the development and use of alternative fuels, and be active in standardisation of different technologies when it comes to actions relating to future fuels. Even though the choice of future fuel shall mainly be a process of selection controlled by the market, it is reasonable for the EU to be involved and to support various demonstration projects. In this report, electric cars and the appurtenant infrastructure are pointed out as an interesting alternative, although there may also be others.

In the sphere of road safety, various actions are proposed to stimulate the use of alcolocks and other technical detection systems to achieve greater safety. Previously, the Achilles heel of this type of system was the high cost although this cost is now steadily falling.

In pricing policy, work should continue to internalise the external effects. There is a need for cooperation in this area to find cost-effective systems of collecting charges and implementing actions that restrict the ability for monopoly pricing. Furthermore, pricing policy should cover all modes of transport.

The introduction of environmental zones can be an effective measure to tackle deficiencies in accessibility and air quality in the cities. The EU should support the development of intelligent and flexible environmental zones that can be adapted to different needs. One downside of environmental zones is that they may restrict accessibility for commercial traffic and it can be difficult in advance to know what rules apply. An intelligent system can make it possible to obtain this type of information in advance.

It is important to monitor the effects of EU transport policy, which requires access to relevant statistics. There is a particularly acute need of improved statistics on cross-border transport. There is reason to consider the need for a European commodity flow survey. A summary presentation of the actions proposed is shown in Table 4.1.

Table 4.1: Summary presentation of proposed actions.

Focus on European core network	
Basic components	• Create a European core network by adopting an integrated approach to work within the EU on the Trans-European Transport Network, green transport corridors, motorways of the sea and the work on rail corridors for freight.
Longer and heavier road vehicles	• Adapt legislation to make it permissible to drive lorries that are 25.5 m long and 60 tonnes heavy. Adapt the infrastructure of the European core network for these vehicles. The increased dimensions are permitted within the framework of EMS.
Longer and heavier rail rolling stock	• The European core rail network should be adapted for longer and heavier trains with a load profile that allows large volumes. A common definition for this network should be produced as soon as possible and legislation in the sphere of railways adapted accordingly.
Actions in the maritime core network	• Support introduction of a sophisticated maritime traffic management system in the core network. • Introduce e-navigation areas with particularly high requirements for maritime safety and efficiency. • Start work on developing traffic management centres into a ”single-window”.
Transit transport and free cabotage	• Introduce free cabotage for hauliers with a licence to use the core network, i.e. they may perform domestic transport abroad regardless of frequency, time period, periodicity or continuity.
ITS road traffic management and demonstration	• Develop ITS for traffic management in the core network. • Use the core network as an ”experimental workshop” for testing new concepts, for example standardised description of terminals which is disseminated digitally.
Green approach	• Introduce green approach landings on all airports in the core network.
Innovation and renewal	
Efficient pricing systems	• To be efficient, the pricing policy should apply to all modes of transport and both passenger and freight transport (even if the potential for transfers should not be exaggerated). One important conclusion is that kilometre tax is required as a complement to fuel taxes to be efficient. • Implement actions that limit the possibility of monopoly pricing. • Initiate collaboration on development of cost-efficient systems for making charges.
Statistics and monitoring	• Improved statistics for monitoring implementation. • Increase knowledge of cross-border transportation. • Surveys made at EU level – for example, a European commodity flow survey .
Alcolocks and other detection systems for safer traffic	• Install alcolocks in cars for persons sentenced for drunk driving • Subsidise part of the costs associated with installation and operation of the alcolock. • Introduce a mandatory requirement for alcolocks or other technology to prevent drunk driving in all new buses and coaches from 2010 by amending EU rules as well as for lorries in commercial traffic. • Introduce stricter procurement requirements so that alcolocks are successively installed in public vehicles or transport. • Invest in innovation of various detection systems. As new technology can detect and warn if the driver is affected by one or several factors such as alcohol, drugs, tiredness or illness can be standard in all new vehicles.
Electric cars, plug-in hybrids and charging infrastructure in a European core network	• Start by creating a core network for battery charging infrastructure, preferably with green electricity as a source of power. • Drive forward standardisation work for rapid charging. • Carry out the necessary legislative changes for type approval of electric. vehicles.
Digital consignment notes	• Decide which regulatory framework is to apply for a multimodal transport with a digital multimodal consignment note. • Introduce a digital multimodal consignment note.
Flexible environmental zones	• Produce a database for EU environmental zones. • Develop intelligent and flexible environmental zones.
ITS actions for an efficient passenger transport system	• The concerned public authorities and industry representatives together design a service to plan, book and pay for a multimodal journey.
Common language for rail traffic management	• Introduce geographically limited trials with English as the traffic management language.

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Transport Analysis is a Swedish agency for transport policy analysis. We analyse and evaluate proposed and implemented measures within the sphere of transport policy. We are also responsible for official statistics in the transport and communication sectors. Transport Analysis was established in April 2010 with its head office in Stockholm and a branch office in Östersund.

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