Recommendations for greening freight transport

Policy Brief 1

This Policy Brief is intended to reflect the conclusions from the ETTAR (Environmental Technologies, Training and Awareness-Raising) project so far and develop policy recommendations based on these conclusions. The ETTAR project is a project under the 6th Framework Programme (financed by the European Commission) and deals with the promotion of environmental technologies in the freight transport sector. The Policy Brief has been agreed within the ETTAR team and is directed at stakeholders in the freight transport sector, such as policy makers, logistics associations and transport NGOs.

1 Background of the Project

Transport in Europe including freight and public transport is a growing business that has a strong impact on the environment and on energy demands. In 2005 emissions from the total transport sector (freight and passenger) represented 22% of total EU-27 greenhouse gas emissions. The European Council Presidency meeting[1] in March 2007 agreed on the need to integrate policies on climate change and energy. The Council committed itself to unilaterally reducing EU greenhouse gas emissions to 20% below 1990 levels by 2020. It further endorsed a reduction to 30% below 1990 levels subject to securing agreement on comparable reductions elsewhere. The recent meeting in Bali of the parties to the UN Framework Convention on Climate Change initiated the process to a post 2012 climate change agreement. In a "business as usual" scenario, emissions from the transport sector will increase 15% in the period 2010 – 2020. Achieving the Bali roadmap targets would demand limiting growth to between +4% and -2%. Freight transport is growing faster than the economy[2], and energy use and the associated carbon emission has been increasing more than in almost any other sector. Inland freight transport (road, rail and inland waterways) in the 32 member countries of the European Environmental Agency (EEA) increased by 30 % (2.7 % per annum), with the road freight segment witnessing the greatest percentage increase (38 %)[3] between 1995 and 2005.

Clearly achieving the Bali targets poses a major challenge to the freight transport sector. To date, only 35% of the Global Financial Times 500 companies' latest Corporate Social Responsibility reports mention transport initiatives among their climate change mitigation strategies[4]. Sustainability needs to be seen as a logistics and transport management issue which is being taken seriously. For some companies in the logistics sector, procurement, financial, environment and technical departments sometimes work in isolation. The business and cost benefits of adopting more sustainable technologies are not seen by some departments and not recognised or communicated by others. Technological improvements are seen as purely technical, disconnected from their wider implications for sustainable development – environmental, economic and social. The use of environmental technologies poses a particular challenge for small and medium-sized enterprises (SMEs). Though the communications between departments may be better, they often lack the resources to devise new technological strategies or to carry out a full cost-benefit analysis of proposed technology changes. Furthermore, while a large company may attribute a value to an intangible such as "brand image" smaller companies may confine their economic analysis to more concrete factors. A main, if not the most important, factor of improving the

[1] Council of the European Union, Presidency Conclusions of the Brussels European Council (8/9 March 2007), 7224/1/07, May 2007

[2] COM (2007) 607, Freight Transport Logistics Action Plan, p.2

[3] EEA Report No 1/2008, Climate for a transport change, p. 12

[4] www.corporateregister.com/pdf/CCCReport.pdf

environmental performance of freight transport is the interest of transport buyers in these issues and their motivation to demand sustainable transport solutions. They are - also numerically - a key group to influence freight transport patterns.

The European Commission is recognising the environmental burden that the (freight) transport sector presents and the role it needs to play in the way towards sustainable development. In its Communication on Freight logistics in Europe, the EC states that Europe's transport system needs to be optimised by means of advanced logistics solutions. Shifts to more environmentally friendly modes must be achieved when appropriate, especially on long-distance, in urban areas and on congested corridors. Furthermore, logistics measures are indispensable for maintaining and increasing European competitiveness and prosperity in line with the renewed Lisbon agenda on growth and jobs. Europe needs to rise to its transport challenges by integrating logistics thinking in its transport policy. The approach should be market-oriented, include social and environmental dimensions, and create a win-win situation for all actors[5].

To address these challenges, the EC is simultaneously launching several policy initiatives, in line with the 2006 mid-term review of the 2001 transport White Paper[6]. One of the main policy documents related to the freight transport is the Freight Logistics Action Plan[7], – suggesting a series of actions to promote freight and traffic management ensuring sustainable and competitive mobility in Europe. The Freight Logistics Action Plan includes a number of proposed actions that should lead to this objective:

- Promotion of E-Freight and Intelligent Transport Systems (ITS) using advanced information and communication technologies;
- Promotion of sustainable quality and efficiency of transport through identifying and overcoming logistics bottle necks, providing training and promotion of best practices;
- Simplification of transport chains, related to e.g. simplification of regulation;
- Vehicle dimensions and loading standards – requiring a review of standards regarding vehicle dimension and weight and proposing modifications that increase efficiency.
- Promote the development of "green" transport corridors for freight.

To implement these proposed actions from the EC, major initiatives are needed from the European freight transport sector to implement environmentally friendly technologies and approaches.

Against this background of insufficient deployment of environmental technologies, the **ETTAR (Environmental Technologies, Training and Awareness-Raising)** project has been established. ETTAR aims to build capacities in the European freight transport sector and to raise awareness along the supply chain of good environmental logistics practices and technologies, e.g. fuel switching, regenerative braking in hybrid vehicles, aerodynamic vehicles, load consolidation, transport mode optimisation, etc. The identification and assessment of training needs, methods and activities for the wider use of environmental technologies are core objectives of the project[8]. In a series of ETTAR workshops[9] buyers

[5] Freight Transport Logistics in Europe – the key to sustainable mobility [COM(2006) 336]

[6] "Keep Europe Moving: Sustainable mobility for our continent" COM(2006) 314 final

[7] Freight Transport Logistics Action Plan – COM(2007) 607 final

[8] ETTAR runs from April 2007 to September 2008 and is a coordinated action plan under the 6th EU Framework Program with contract No. 044244. It builds on action 22 and 23 of the Environmental Technologies Action Plan (ETAP) actions on targeted training and awareness raising. www.ettar.eu

[9] Gothenburg October 2007; Prague January 2008; Berlin April 2008; Concluding Conference Brussels September 2008

and sellers of transport services, politicians, NGO's, research institutions and think tanks have been discussing the obstacles for the wider take-up of environmental transport solutions.

This Policy Brief will discuss the business case for sustainability by examining business pressures in the medium and longer term and identifying the policy measures required to promote this case. The sector is uncertain of the changes it can make, and whether these will be economically or technically effective and accepted by customers, authorities and the community. Individual actors in the value chain are reluctant to take initiatives, unclear of the benefits and the impacts. Adopting a wider, system view of the value chain may show that changes in one area will benefit another, and that if the benefits are shared the cumulative gain can be significant.

As the above growth statistics show, policy makers have struggled to devise measures that will adequately address the challenges posed by the transport sector. Here the experiences with energy efficiency policy may be beneficial as there are more experiences and successes to be noticed. Past mistakes and successes in developing and implementing energy policy may possibly be translated to the complex web that is the freight logistics sector. A new policy of investment accompanied by stimulating and regulating policies from the EU is needed to decrease the freight sector's emissions and reduce pressure on the environment.

Four key messages have emerged from the workshops and our review of the background information:

It is often claimed there is no business case for the freight logistics and transport sector to change, that there is no clear way forward and there is confusion in relation to appropriate policies. Instead we assert:

- **there is a business case for change, but this case is either not yet recognised or acknowledged**.
- **Logistics providers and buyers (?) require more information, e.g. emissions, carbon footprints of different options, etc., so that they can make informed choices.**
- **viable management and technical improvement measures are already available**.
- **lessons may be learned from the decades of evolving energy management policy**.

2 The unrecognised business case

2.1 Drivers

The full cost of freight transport

The freight sector operates in an economic environment of fuel, equipment, buildings, labour, road tolls, vehicle taxes, insurance, etc. as costs and counter-balancing revenues from customers. Growth in transport has been driven by customer demands, but also by the realisation that it is cheaper to produce goods at a distance and to minimise inventory by adopting "Just in Time" practices, since the cost of transport is relatively low. Increasing transport costs to inhibit or reverse emission growth is seen as a potential policy instrument. One justification for this is the claim that the sector does not "internalise the external costs", i.e. does not directly bear the societal costs that are directly attributable to the sector and hence avoids the "polluter pays" principle.

Transport activities provide the benefits of mobility of passengers and goods but also cause negative effects to society. However, the transport user does not take these effects into account when making transport decisions and is thus faced with the wrong incentives for transport supply and demand, leading to welfare losses for society. The negative effects of transport activities can be split into several categories of externalities:

- Air pollution, e.g. human health, crop losses and building damages, etc.
- Climate change, e.g. prevention costs, damage costs, etc.
- Accidents, with negative effects on e.g. medical costs, production losses, loss of life, etc.
- Noise, e.g. human health, annoyance, rent losses, etc.
- Congestion, e.g. time and operating costs, increased environmental costs, etc
- Other effects, e.g. barrier effects of infrastructure in nature and urban areas, soil and water quality, up- and downstream processes across the whole energy cycle, etc.

Each of these effects has a corresponding financial cost, an "external cost", which may be added to the obvious cost of providing infrastructure when considering the true cost of transport.

These externalities impose large costs to society; yet, the exact amount is uncertain. The approach to quantify external costs involves a lot of uncertainties, such as the variability inherent in any set of emission data, the models used to convert emission quantities into damages and impacts, political and ethical issues, e.g. in setting values on human lives, and geographical and time scales that need consideration e.g. for climate change, etc. Hence, the external costs figures include uncertainty and inherit a great variation depending on the data assumed and models used. However, external costs can help provide an overview about the scale of the total footprints as well as the relevance of each type of externality and mode of transport, and with the publication of the IMPACT Handbook[10] there is convergence on the methodology. As the scale of these external costs becomes more transparent, there is a greater inclination for policy makers to transfer these costs directly onto the originator, applying the "polluter pays" principle, rather than allowing them to be borne by society in general.

A 2004 study by INFRAS/IWW[11] estimated:

- **Transport external costs in 2000 accounted for €650 billion, being 7.3% of total GDP in EU 15 plus Switzerland and Norway (excluding congestion, with high climate change shadow prices). Freight transport is responsible for one third of this external cost.**
- **Congestion accounts for a further 0.7% of GDP. Freight transport is responsible for one half of these costs, though freight represents only one fifth of the traffic demand.**

To put these external costs into perspective, the transport sector is itself estimated to have a value accounting for 7% of European GDP[12], i.e comparable with the external costs it originates.

[10] Maibach, M. et al, Handbook on estimation of external costs in the transport sector, IMPACT, CE Delft, Delft, 2007

[11] Schreyer et al, External costs of Transport, INFRAS/IWW Universitat Karlsruhe, Zurich/Karlsruhe, 2004

[12] European Commission, Keep Europe moving -Sustainable mobility for our continent: Mid-term review of the European Commission's 2001 Transport White Paper, COM(2006) 314 final, 2006

Further analysis of the costs associated with freight transport shows that road transport is by far the dominating mode and represents more than 94% of total external costs, followed by air transport (2.6%), rail (1.9%) and waterways (1.1%) (Figure 1). The most important cost categories of freight transport are related to air pollution and climate change which contribute 48% and 21% respectively to the total cost.

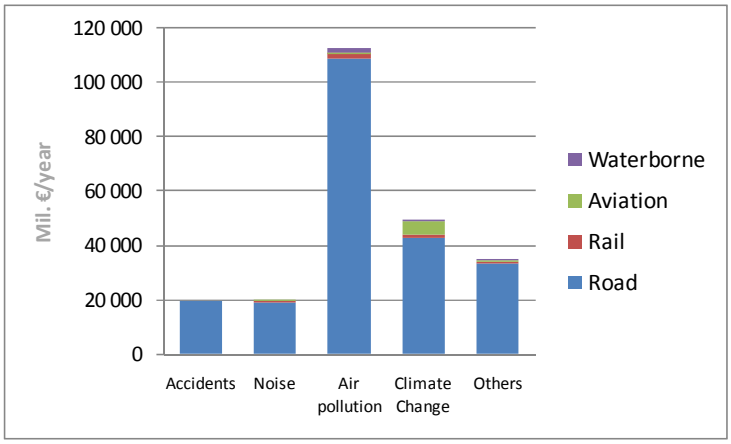

Figure 1 Total external costs 2000 (EU 15+2) from freight transport (excluding congestion) by cost category and means of transport. Source: Schreyer et al, INFRAS/IWW, 2004

The adoption of the so-called EURO norms for vehicles and fuel quality improvements has been very effective in reducing polluting transport emissions[13]. The transport sector's emissions of air pollutants like acidifying substances, ozone precursors and particulates decreased by 36 %, 45 % and 33 % respectively between 1990 and 2005 in the 32 EEA member countries. However, in urban agglomerations the concentration of nitrogen dioxide (NO_2) (2010 limit) and particles (PM10) (2005 limit) are still at or above the European air quality limits which can partly be explained by the increased use of diesel vehicles in urban areas. High air pollution levels, not all of which may be attributed to transport, cost 4 million life-years each year, hence there is a need for continued attention.

External costs due to road transport are considered further in Figure 2 which shows the average costs of each freight transport mode expressed in Euro per 1000 tkm.

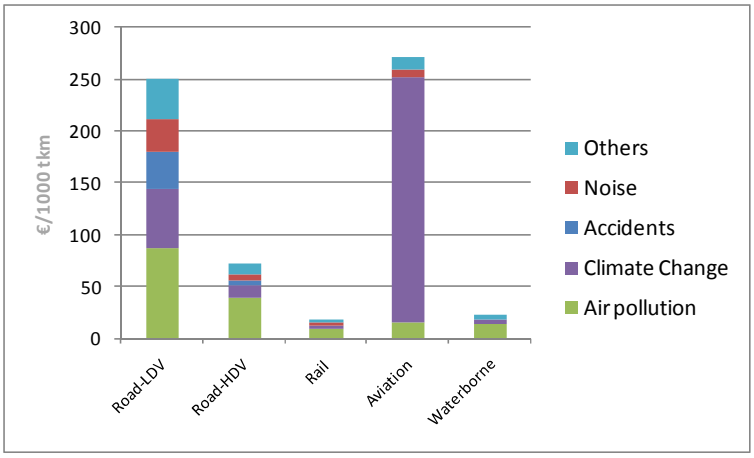

Figure 2 Comparison: Average External Costs of freight transport 2000 (EU 15+2) by transport means and cost category. Source: Schreyer et al, INFRAS/IWW, 2004

There are significant differences between light duty (LDV) and heavy duty (HDV) road vehicles. The average costs of LDV are €250 per 1000 tkm and are in the same magnitude

[13] European Environment Agency, Climate for a transport change. TERM 2007: indicators tracking transport and environment in the European Union, European Environment Agency, 2008.

as air freight while the average costs of HDV are significantly smaller (€71). The modes with the smallest average external costs are rail (€18) and waterborne (€22), due mainly to reduced air pollution and climate change impacts. This demonstrates the potential benefits of modal shifts from road to rail or water. It provides an initial estimate of the potential for assigning additional charges to freight transport and if updated to reflect advances presented in the IMPACT methodology and combined with Member State costs, provides a mechanism to introduce distance-based charging.

For the road sector, in the 2006 amendment of Directive 1999/62/EC (Eurovignette Directive) on road charges, the European Union allows Member States to levy tolls on all roads. The current Directive specifies that the revenues may not exceed related infrastructure costs. However, the Parliament has promoted the application of this Directive to include all external costs, and has requested the Commission to present a general model for the calculation of all external costs related to transport, analysing the expected economic, social and environmental impact of their internalisation for all transport modes, by 10 June 2008. Furthermore, the 2007 Green paper[14] on urban transport "Towards a new culture for urban mobility" raised the issue of enlarging the scope of the Eurovignette Directive by introducing an urban dimension to reflect the important role of environmentally sensitive and urban areas.

Fuel concerns: price & availability

Modifying fuel taxes would also provide a mechanism to internalise charges, but this is not the only potential pressure on fuel costs. Recent months have seen significant price rises in crude oil. It does not seem possible, technically or politically, to increase the oil supply.

The strategic managers of a business must consider also the future security of fuel supply, at a time when control of energy is seen as a political instrument in some regions, and questions are asked about the availability of reserves and the occurrence of "peak oil".

Changing transport buyers' concerns

Transport buyers via their commands decide which kind of transport enjoys high demand. Transport buyers are, thus, one key group that can influence the way in which goods are transported. Even so, the transport provider can influence their immediate customers in their choice by offering "sustainable" transport options in their product portfolio. The DHL "green parcel" is an example of that – DHL created and offered an environmentally friendly solution to customers.

In order to make the extent of transport operations more transparent, a measurement tool could be set up including parameters and indicators to identify and estimate the environmental impact of transport operations. A declaration on the environmental impact of transport could be made obligatory as a part of the environmental declaration, which is necessary for the EMAS certificate.

Changing customer concerns

At present, end consumers seem tolerant or even ignorant of transport's impacts, but this can change. A proposal for a Directive on the promotion of clean and energy efficient road transport vehicles[15] recommends that public authorities' procurement criteria include lifetime costs for energy consumption, CO_2 emissions, and pollutant emissions linked to the operation of transport service vehicles. In addition, the public are being more aware about the impacts of transport. They are becoming more focused on climate change and some question the suitability of transport mode, speed or distance from origin for items such as food or clothing. Major companies in the fast-moving consumer goods sector are conscious of retaining their markets and beginning to make small changes. They could even launch public campaigns explaining the connection between the mode of transport for goods and the

[14] European Commission, Green paper: Towards a new culture for urban mobility. COM (2007) 551

[15] European Commission, Proposal for a Directive on the promotion of clean and energy efficient road transport vehicles, COM(2007) 817 final

related climate change impacts thereby marketing their products transported in a suitable manner. Campaigns should also explain that slightly higher prices for such products are justified by sustainable production and/or transport of the goods in question. In this way, the customers have a clear choice of supporting such products.

Changing business & investor concerns

For many companies, image is a key selling point, both to customers and also to investors. Some businesses try to visibly demonstrate their role in the community by adopting and implementing Corporate Social Responsibility policies. Such companies, whether driven from the boardroom, by investors or with an eye to the customer, will seek sustainability – environmental as well as economic and social.

Changing business model

The business model is changing. Is the future in selling transport or in selling a service of mobility, access, value adding? In the energy field, energy providers have changed to become energy service companies, supplying not only energy, but also energy management to their customers, where profits are determined by efficient operation, not simply the sales of units of energy. When transport costs rise and the transport market is squeezed, profits will be earned from additional services as well as improved efficiency. Already, the logistics business is much more than transport, including aspects such as warehousing and packaging. Some companies seek to be the "first movers", gaining the advantage, restructuring, placing themselves in a key market position. Leading businesses seek to anticipate change, not to be obliged to reluctantly react. Whoever offers logistics with the smallest consumption of energy and resources will win.

Strategic decisions are needed by business to anticipate:

- **Increased costs from obligations to internalise external costs, possibly with distance-related charging or restrictions on access to urban areas.**
- **Rising fuel costs and uncertainty about availability.**
- **Changing demands from customers, investors and peers, placing new emphasis on environmental performance.**

2.2 Barriers

While some companies have taken initiatives to address the changing business case, many, if not most, have not. Participants in the ETTAR workshops have identified many of the economic and psychological barriers, which may be grouped as follows:

Perceived cost burden of new environmental technologies

The costs of change are more certain than the benefits. In one sense, the logistics sector is highly competitive, as a consequence service providers are commonly unwilling to invest in a new technology that might increase costs if the benefit, i.e. improved environmental performance, is not rewarded by the service buyer. On the other hand, the sector may be seen as non-competitive, in that fuel costs are common to all service providers and an increase to one is an increase to all, which will be uniformly passed on to the customers. The financial benefits from technologies such as changed delivery scheduling and shared service providers are seen as less certain, at best, and undoubtedly altering accepted practice.

Lack of information on the effects of current practices

Insufficient information is available to customers, suppliers and operators regarding the full external costs and environmental effects of the services provided or used. Current impacts are estimated from average emission factors, from large scale studies or using key assumptions and valuations. Companies that wish to address the issue to satisfy the needs

of their Corporate Social Responsibility (CSR) policy, “green” investor concerns or the aspects of their certified environmental management systems (ISO14001 or EMAS) cannot find validated data to reflect their own specific performance.

Uncertainty about the environmental and economic benefits of new technologies & fuels

Burdened with uncertainty about current practices, there is even less confidence in predictions of environmental improvements with new technologies. The availability of biofuel (biodiesel or bioethanol) is limited by crop growth and transformation as well as distribution. Moreover, the benefits of biofuels as regards their contribution to sustainability have recently been challenged, especially as the use of biofuels has proven to contribute to a sharp rise in food prices. Hydrogen as an energy carrier requires technological advances in fuel storage and distribution, as well as efficient fuel cells and motors. Economic gains are considered to vary from company to company, from market to market, and subject to unclear future policies and economic conditions. There is a tendency to wait until the “best” technology is evolved, with “reliable” impact and benefit measurement.

Lack of information about successful initiatives

Environmental performance is not seen by many companies as a potential focus for innovation. They may think that there have not been any relevant successful business initiatives, nor that any companies have set goals to improve their environmental performance. Any required changes are presumed to be radical and the benefits of smaller, incremental gains are neglected. The environmental aspects of innovations diffuse slowly through the sector.

Lack of partnership in the value chain

Freight movement requires the interconnection of many players: producer, customer, logistics provider, shipper, warehouse operators, transport provider, etc. Delivery time, reliability and, above all, price, structure the relationship. While some parties may individually have a corporate goal of sustainability, this is scarcely communicated along the supply value chain. Customers wait for the supplier to propose changes, but the suppliers, fearful of altering the cost base, wait for requests from the customer. While individual links may seek to optimise themselves, there is little consideration of the system in total, where superior gains may be achieved.

Infrastructural deficits

The existing transport infrastructure is oriented to the existing economy: petrol and diesel as fuels, passenger priority over rail freight, poorly compatible rail networks, etc. Biodiesel is relatively easy to integrate into existing diesel fuel and ethanol into gasoline as a low blend, but hydrogen would require a new distribution system.

The existing European rail network has bottlenecks that limit the capacity for transport by rail. Vehicle standards and network management systems (signalling, etc) are constructed to different national standards. In contrast, the road network is extensive and road transport flexibility is superior. In addition, few inter-modal hubs exist and beyond major centres, there is little interaction between rail, road and sea.

Lack of positive incentives from authorities

Just as suppliers and customers seem to wait for the other to take the initiative, they both in turn wait for authorities to demand and stimulate change. Measures such as the adoption of distance-based charging, urban congestion charging, access restrictions to urban areas, low emission zones, are seen as “negative”. “Positive” motivators, such as reduced charges for environmentally friendly vehicles, preferred access for city centres, are seen as lacking.

Customers demand for convenience and low cost rather than sustainability

Price and time are paramount to customers. “Next day” and “Just in Time” deliveries are demanded with little thought of the implications for choice of mode, vehicle capacity

utilisation, traffic movements and all the external impacts of air emissions, climate change, noise, etc. The real time sensitivity of the goods is not considered. Sustainability criteria are forgotten or ignored in the rush to receive.

2.3 Opportunities

Business is therefore driven in a sustainable direction by one set of motivators, but movement is counter-acted by another set of concerns, as illustrated in Figure 3.

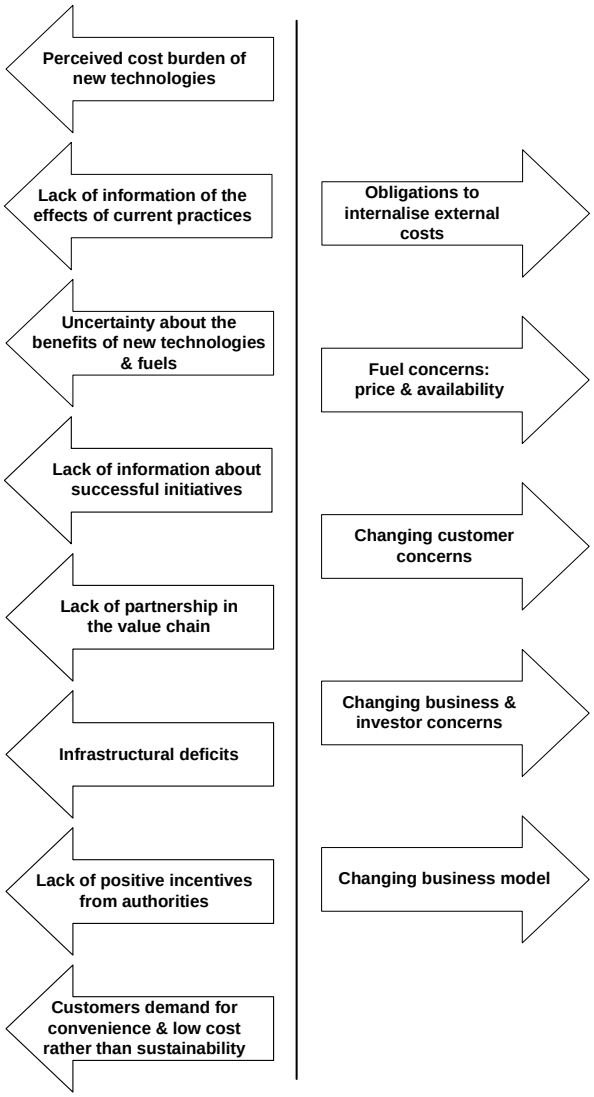

Figure 3 Force field analysis for the business case

For many companies, the consequence of this balance has been paralysis: wait and see. For some, now is the time to carry out trials, to explore the best way forward. A recent US report[16] identified the scope of improvements undertaken individually by companies. Many of these have been discussed in the previous ETTAR workshops in Gothenburg and Prague. These include:

- Use of biofuels: biodiesel & bioethanol
- Emission treatment and filters
- Aerodynamic vehicle bodies
- Fuel use monitoring
- Purchase of fuel efficient engines

More importantly, a system view needs to be taken, with logistics providers, transport companies, product designers, product suppliers, retailers and end consumers each playing their part – analogous to adopting an Integrated Product Policy. For example, the following measures are important:

- Delivery load utilisation must be maximised, with efficient use of return journeys. Better performance can be achieved if needs are pooled, rather than individually optimised. And modal shifts will be facilitated by increased visibility, standardization and consolidation
- Buyers must consider the environmental impacts of their delivery demands.
- Product packaging must be designed not only to protect and sell, but also to suit the logistics path. Superfluous volume of packaging reduces transport efficiency.

Innovation may be undertaken by a series of incremental improvements, each disseminated to a wider audience and building on success. Pilot exercises stimulate businesses into action as they can see tangible cause-effect relationships, can evaluate the experiences and benchmark against prior performance. Such outcomes are stronger motivators than theoretical argument.

[16] Eyefortransport, Green transportation and logistics survey, July 2007

Companies must undertake pilot exercises:

- **By forming partnerships between logistics providers and users, small scale pilot projects can share the risk and cost**
- **Pilot projects will provide the experience needed to identify and implement key improvements that are economically and environmentally effective**

3 Policy measures – the parallel with energy efficiency

Transport Policy

While analysing current transport policy and possible ways to reach a more sustainable transport system, a parallel can be made with the developments of energy policy. Transport policy can learn from the current energy policy. Both energy and transport policy have started with an emphasis on subsidy in order to promote economic growth and competitiveness. Both cheap energy and cheap transport were believed to be a public good to be supported.

Due to the need to tackle emerging and newly recognised environmental problems, the focus of energy and transport policy has been gradually changing. Energy policy has already since the early 1980s been aimed at more rational consumption. In the transport sector this is less the case with relevant policies having at least two decades delay in comparison with energy efficiency policies. The Commission's first White Paper on the future development of the common transport policy was published in 1992[17]. The guiding principle of the document was the opening-up of the transport market. In the following ten years or so, consumer prices dropped significantly, combined with a higher quality of service and a wider range of choices. The Commission's second White Paper "European Transport Policy for 2010 – Time to decide[18]" from 2001 recognised that road transport has adapted better to the needs of a modern economy than rail transport. It identified as main challenges the imbalance in the development of the different transport modes, congestion on routes and cities, as well as in airspace, and the impact on the environment. Therefore, the White Paper introduced 'sustainable development' as the new imperative and proposed policies to adjust the balance between the modes, stressed the need to do away with bottlenecks in the trans-European networks (TENs) and to reduce the number of road accidents.

Five years later, the White Paper Review "Keep Europe moving - Sustainable mobility for our continent[19]", which analyzed the experience since 2001, argues for a comprehensive, holistic approach to transport policy. The measures envisaged by the Commission in 2001 will not suffice by themselves if the objectives to restrain the negative environmental effects of transport growth while providing mobility, are to be achieved. Therefore, the enlarged EU needs a more broad and flexible transport policy toolbox, which could provide solutions ranging from economic and soft instruments, European regulations and their uniform applications, etc.

Arguably, transport has to a far greater extent been subsidised than energy supply to support economic growth. This subsidy has been provided indirectly, however, through the building of infrastructure (primarily road), paid out of the state budget of most countries, in addition to the external costs discussed earlier.

Historical parallels to energy efficiency policies

[17] European Commission, The future development of the common transport policy: a global approach to the construction of a community framework for sustainable mobility, Brussels, 1992

[18] European Commission, White paper: European transport policy for 2010 – Time to decide, Brussels, 2001

[19] European Commission, Keep Europe moving – sustainable mobility for our continent, Brussels, 2006

Our analysis shows that lessons can be learned from the energy policies for the transport sector and therefore we structure the analysis following this parallel: The table below gives an overview of the differences and similarities in transport and energy efficiency policies. Although some measures to raise efficiency of transport have been introduced, there is still a larger scope for introducing new instruments for increasing efficiency of transport. The listed instruments are illustrative, but not exhaustive, particularly for energy efficiency.

Table 1 Examples of policies for energy efficiency and transport

Policy instruments	Energy efficiency	Transport
Original approach	Cheap energy and transport subsidised as tool to support economic growth and competitiveness → transport and energy supply was considered as a "public good".	
Removing subsidies	Removal of subsidies to energy use (in Western Europe in the 1970s/1980s, in Central-Europe in the 1990s) Power plant construction in the past often subsidised (but not anymore since energy market liberalisation, end 1990s)	Subsidised construction of roads (and railways and waterways) has been moderated by the Eurovignette Directive that facilitates cost recovery via distance – based charging.
Adding tax / subsidies	CO_2 tax Subsidies for energy efficient technologies / appliances	Excise tax on motor fuels Congestion charges
Tradeable permits	CO_2 Emissions Trading Scheme White certificate trading scheme for energy efficiency	CO_2 Emissions Trading System for the different transport modes (current proposals for including air transport in the EU's emissions trading scheme)
Renewable energy	Renewable electricity targets and subsidies for capital and operating costs. Obligatory acceptance by the grid of distributed generation	Biofuels target and subsidies (tax exemptions)
Regulation - emissions	Emission limits for power plants (NOx & SO_2). No CO_2 standards so far.	EURO Norms 1 – 5: CO, NMHC, CH4, NOx, PM, standards,standards, no CO_2 standards so far Green driving in learner permit exams
Regulation - demand	Minimum energy efficiency standards for household and office appliances (Energy using Products Directive) or for buildings (Building Energy rating)	Circulation bans for certain vehicles featuring high emission levels in certain areas (for example Berlin, Köln or Bonn)
Voluntary instruments / cooperation	Voluntary agreements on energy efficiency in industry (introduced in some EU countries since 1990s)	Voluntary agreement between European Commission and car manufacturers on decrease of CO_2 emissions for new cars.
Information - general	Campaigns for energy efficiency in commercial, manufacturing and household sectors Networks of large energy users	Passenger traffic oriented campaigns (public transport promotion, car-pooling, etc)
Information - specific	Labelling of appliances Free advice centres Best practice advice, datasheets, etc	Labelling of vehicle emissions Some best practice advice (recent)
R&D promotion	Framework programmes, JOULE, THERMIE, SAVE, etc	Framework programmes, MARCO-POLO

As the table shows, more efforts have been put into reducing environmental impacts of the energy sector than has been done for the transport sector. More types of policy instruments have been introduced in the energy sector, promoting rational use of energy through all kinds of grant schemes, regulation and information instruments. The introduction of the EURO Norms for vehicle emissions has been the major initiative in the transport sector and has been very effective in reducing polluting emissions via improved engine technology and tailpipe treatment technologies such as filters and catalytic converters.

More recent policy efforts that were more or less successful have aimed to address CO_2 emissions:

- Promotion of alternative fuels, particularly biofuels, as well as low carbon fuels such as compressed natural gas (CNG) or liquefied petroleum gas (LPG).
- A voluntary agreement between the European, Japanese and Korean car manufacturers
- A suggested mandatory CO_2 target for car emissions

When energy efficiency was first promoted, it faced many of the same barriers as environmental technologies for the transport and logistics sector. Business did not initially recognise the benefits of changing, but effective measures to promote change were developed.

Two key measures, or rather combination of measures, were found to be most effective

- **Providing detailed economic and technical information, including demonstration projects, on technologies was needed, combined with technical advice and financial support via grants or subsidies to promote their uptake.**
- **Later, purely financial measures: application of tax, parallel rise in energy price and co-incident decreased technology costs as the market matured, led to the situation that investments in energy efficiency became cost-effective.**

The situation in the transport sector may be more complicated, however. There are more actors involved, and the relatively simple energy supply chain is replaced by a web or net of sellers, buyers, users, etc.

There are a number of other lessons learned from energy efficiency policies as not all forms of policy instruments in the field of energy have been successful:

- Information instruments have to be focused and specific to be successful. General campaigns like “save energy” set the context and are necessary to raise consumers’ awareness, but are not sufficient. Specific information like that provided through labelling of household appliances in needed. In a later stage this information may be combined with verified standards.
- Seeking energy efficiency, in itself, is not a sufficient target, but must be combined with gaining benefits, e.g. decrease in operational costs of a company, or increased comfort in the case of building insulation. The analogy for the transport sector is that reduction in fuel consumption or vehicle-km equates to a cost saving. Whether in the short or the long term, profitability is key to business.
- Financial instruments, such as taxes, are effective only when environmentally-preferable and lower-tax alternatives are available, but taxes are inappropriate if they are solely a revenue stream for general state funding.
- Mandatory regulation of minimum efficiency standards has been effective in pushing inefficient equipment out of the market but requires prolonged negotiation with

interested parties. In such cases a voluntary standard is easier to achieve, presuming the same outcome is reached and is not the lowest standard.

- Customers' awarness of the link between energy saving and environmental benefits (decrease of emissions) has been fostered by campaigns and motivated a part of customers to use energy saving equipment.

4 A model of a hypothetical pilot project

The following is an example of a hypothetical pilot project, serving to illustrate the type of small scale initiative businesses may undertake to explore potential benefits and difficulties.

Participants at ETTAR workshops conclude that not only better technologies must be applied, but also ways have to be found to engage freight transport buyers to get logistics operators to invest in them. ETTAR audience therefore supports the idea of small-scale pilot projects which show promise of economic payback, and make useful contributions to the expanding coverage of large companies' annual sustainability reports.

Amongst those companies who are participating in the ETTAR workshop series a core group would be willing to investigate into the most optimal transportation mix for a selected route.

In such a hypothetical case study, a buyer of transports and one of his major transport service providers should first establish together the degree of environmental impact. This means that an analysis should be made on the amount of emissions, above all CO2, which is put out by transporting the goods of this customer. After this analysis, it should become clear which transport means on which transport routes are causing the largest impacts. In a second step, both actors should evaluate all existing transport alternatives, including factors such as flexibility, quality, on-time arrival, utilization, driver behaviour, schedules, equipment, packaging, economic aspects etc. It is usually recommendable to start with the environmental optimization of only a few routes and not the total transport setup at once. Suboptimal choices will in this case not have such comprehensive consequences, and a learning curve can be established. In a third step, routes should be picked which can be changed the easiest, and different actions should once again be evaluated according to their costs and short, mid and long term gains. Finally, the measures which were decided upon should be implemented, monitored, adjusted and improved. All measures should regularly be followed up and reported upon in order to secure know-how and to be able to tell the good stories based on trustworthy data.

5 Policy recommendations

The following policy recommendations that the team regards as priorities can be given:

Standards

The employment of environmental technologies in general is favoured by a high environmental standard of vehicles either prescribed by law or agreed in a voluntary accord. Given the rather limited success of voluntary agreements, the gradual tightening of environmental vehicle standards is the most appropriate political measure to oblige car manufacturers and freight industry to replace traditional technologies with environmental technologies.

Such standards should be designed as command and control measures which should, however, not demand the use of specific technologies. Instead such legal standards should leave the industry the widest possible leeway to develop solutions to meet these standards. This would stimulate research and development and would facilitate the most economic solutions to come up.

A parallel of such a standard is the concept of "Best Available Techniques" in the IPPC Directive which lays down that the industrial installations covered by this Directive (e.g. cement mills, waste incineration plans, refineries, etc.) be run with the best available techniques in Europe. The Directive does not prescribe certain techniques but establishes, inter alia, a Europe-wide information exchange process aiming to produce Best Available Techniques Reference Documents (BREFs) that indicate technological solutions which can be regarded as Best Available Techniques.[20] The concept of BAT should leave enough flexibility to adopt creative solutions independent of one specific technology. Thus, BAT is not intended to cement certain technologies which are perceived as innovative at the moment for ever but should leave all the leeway to adapt to progress.

Promoting Drivers

The policy makers should exercise their options to impose the payment of the former "external costs" - **"obligation to internalise external costs"** - on the polluters themselves. This could be realised via an additional tax to be paid on fuel, as an automotive tax or as distance-based charging. The tax rates should be calculated in a manner that reflects external cost units. To gain "cost truth" (Kostenwahrheit?) it isvery important as the whole transport market is today built on false prices not reflecting external effects at all. This leads to ineffective and superfluous transportation, increasing environmental damage and societal costs. As costs are the strongest driver currently in the transportation industry, an effort should be made to change the system also via adapted costs.

As regards **fuel concerns - price and availability** – more environmentally friendly types of fuels should be promoted e.g. via subsidies. However, any subsidies have to be justified with real environmental benefits related to the use of the fuel in question. This calls for a continuous monitoring of the environmental benefits of such fuels. A current example is the subsidies of second-generation biofuels.

Another possibility to possibly promote more environmentally friendly fuels is to adapt the rates of any excise tax system in a manner that reflects the different levels of pollutions that are caused by the different kinds of fuels. Thus, the more polluting the fuels are the higher should be the tax rates. This would offset price differences between traditional fuels and more environmentally friendly fuels. Fuel taxes can, however, cause difficulties for smaller administrations. Firstly, the general public also use diesel and politically it may not be desired to affect voters (even though environmentally beneficial to reduce fuel use). Secondly, it can promote fuel tourism where countries are small. The capacity for fuel storage on a truck is enormous.

More generally, **customer behaviour** patterns can be influenced via conclusive labels that inform customers on the environmental impacts due to the transport of the product from the production site to the location of purchase or consumption. As regards the business sector, the enterprises could be induced legally to report on their transport performances, for example in their environmental declaration, which is necessary for the EMAS certificate.

Attenuating Barriers

The formulation of a legally binding environmental standard applying to freight vehicles, would also serve to diminish the tendency of industry to wait for the "best industry" and take actions "after all the others", The obligation to comply with such a standard, would give much publicity to new technologies and would enhance efforts to calculate their economic burden, their benefits and the environmental effects.

In a more general sense, the public authorities should always try to co-operate with industry in the pursuit of the best available technologies. Thereby, pilot projects shall be developed and spread to the notice of the stakeholders. The ETTAR project is one of these awareness raising projects.

[20] See the IPPC BREF outline and guide by the European IPPC Bureau http://eippcb.jrc.es (3 April 2008). .

While certain political actions are in the planning phase, as can be deduced from the principal EU policy documents on transport policy, others are, at the time being, not seriously considered. The following table sums up the principal gaps, which largely correspond to the initiatives suggested above.

Table 2 Policies to enhance the business drivers towards sustainability

Business drivers	Enhancing policy
Obligations to internalise external costs	Legal measures shifting the previously "external" costs to the polluter: e.g. additional tax to be paid on fuel or as an automotive tax based (initial purchase or annual) on external cost units, or distance based charging
Fuel concerns: price and availability	e.g. Tax system on fuels according to their potential for pollution promotion of less polluting fuels (e.g. second and third generation of biofuels) and more energy efficient vehicles and modes (e.g. via tax exemptions)
Changing customer concerns	• Extensive Labelling of products taking into account the transport that they involved • Legally binding green criteria for public procurement • Awareness raising
Changing business & investor concerns	• Duty to give account of the transport operations and their effects in EMAS, etc. • Public benchmarking studies • Public recognition of good logistics performance
Changing business model	• Promotion of logistics consolidation centres in regional planning by public authorities • Promotion of regional networks to optimise vehicle utilisation

Table 3 Policies to mitigate the business barriers against sustainability

Business barriers	Mitigating policy
Perceived cost burden of new technologies	• Introduction of binding environmental standards for freight vehicles, which would stimulate the search of most economic technologies (best available technologies); • Development and use of more flexible transport utilities, such as trailers that can be used by different transport modes
Lack of information of the effects of current practices	• Introducing benchmarks and labelling systems, starting with short sea or geographic region activities • Promotion of certification for logistics personnel that includes environmental considerations • Continued support for networks of logistics actors: educators, trainers, providers, major users
Uncertainty about the benefits of new	• Introduction of binding environmental standards, which would demonstrate the environmental and economic

technologies & fuels	benefits of different environmental technologies • Spreading emission monitoring technologies to enable customers to observe the environmental impacts of certain transport modes • Supporting also small and unconventional projects (like Flexiwaggon in Sweden), enabling also small and medium-sized companies to realize new ideas
Lack of information about successful initiatives	• The authorities should co-operate with industry, hold awareness raising events and spread good practice examples
Lack of partnership in the value chain	• Promotion of pilot projects to achieve environmental improvement via shared activities
Infrastructural deficits	• Promotion of a dedicated rail freight network • Promotion of inter-modal activities, building on the existing network of ShortSea Promotion Centres • Common European standards for inter-modal loading units • One-stop administrative "windows" where all customs (and other related) formalities are carried out in a co-ordinated way • In rail transport, telematic application for freight (TAF) and the European Railway Traffic Management System (ERTMS) should provide applications for integrated railway logistics
Lack of positive incentives from authorities	• Preferential procurement by public authorities of environmentally preferable logistics
Customers demand for convenience & low cost rather than sustainability	• Public awareness programmes to inform consumers • Development of a benchmark and associated labelling system to provide customer guidance • Attempts to resolve the currently felt contradiction between convenience, low cost and sustainability (meaning that it should the aim to realize both!)

6 Conclusions

The issue of making freight transport more environmentally friendly is of high public interest as freight transport is growing at a rapid rate and contributes significantly to environmental pollution. Transport external costs in 2000 accounted for €650 billion, being 7.3% of total GDP in EU 17. Congestion accounts for a further 0.7% of GDP. Freight transport is responsible for one half of these costs, though freight represents only one fifth of the traffic demand.

While many other policy fields, such as the emissions from energy production or from industrial facilities in general, have been subject to quite a tight-knit and sophisticated policy framework (see for example the IPPC Directive, the Emissions Trading Scheme or the EuP Directive), relatively few policy measures on freight transport have been enacted, such as progressively strict EURO-norms. A holistic framework of "environmental transport law" has not yet been developed by the European Union.

In a series of workshops, the experts attending have drawn the conclusion that a mix of progressively tighter environmental standards regarding the freight transport field and a

series of economic incentives to supplement command-and-control measures might be a promising way to improve the environmental performance of the freight transport sector.

While the public authorities are called upon to develop policies in this sense, they should also seek cooperative forms with industry, such as car producers and technology developers, to promote the development of environmentally sound and economic technologies and to spread good practice examples. This kind of public awareness raising should – in addition to the other measures outlined in this paper - contribute to public sensitivity to the issue and might facilitate the diffusion of environmental transport technologies.

Companies, on the other hand, must undertake pilot exercises by forming partnerships between logistics providers and users. Small scale pilot projects can reduce the risks and costs. Pilot projects will provide the experience needed to identify and implement key improvements that are economically and environmentally effective.