

Incentives in Action

Analysis of the role of incentives in road transport

Executive Summary



CE Delft

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Contents

Introduction	1
Incentives in road freight transport	3
Effects of incentives	7
Conclusions and Recommendations	11

Introduction

In 1996, the International Road Transport Union's (IRU) Member Associations adopted a 'Charter for Sustainable Development', with which the road transport industry committed itself to a proactive approach towards achieving sustainable development. One year later the IRU presented a strategy to this end, keyed to the 'three i's' of innovation, incentives and infrastructure.

The IRU asked CE to assist in improving its knowledge regarding the second prerequisite for sustainable development: incentives. These have been described as government policies that encourage faster introduction by transport operators of best available technologies and practices.

Incentives are one of the avenues open to governments seeking to promote best practices desirable from a governmental and/or societal point of view but not profitable from a business point of view. For hauliers, improving the environmental performance of their vehicle fleet generally means making investments. In some cases these investments will be financially justified by the benefits arising in the form of fuel savings, superior logistics or an improved corporate image, say. When the benefits accrue mainly to society as a whole, though, as with investments in trucks complying with a stricter 'Euro' emission class than legally required, hauliers are generally reluctant to implement best practices. Although the economy, the environment and society will all benefit from the reduced pollution, i.e. better air quality, resulting from these investments, haulage companies will see no tangible return on their investments.

Most European countries have therefore introduced incentives to encourage and help the road transport sector reduce its environmental impact, over and above such familiar regulations as the 'Euro' system of emission classes, night-time driving bans and so on. Examples include a lower road toll tariff for cleaner trucks and the exclusion of Euro 4 trucks in the Austrian 'ecopoints' system.

The aim of this study was to analyse the incentives currently in place and provide recommendations on possible improvements. It has been limited in scope to incentives to the road transport sector designed to promote technologies that reduce vehicle emissions of air pollutants and/or CO₂. We have focused primarily, furthermore, on incentives in the ECMT countries¹.

¹ The European Conference of Ministers of Transport (ECMT) is an intergovernmental organisation established in 1953. It is a forum in which Ministers responsible for transport can co-operate on policy. As of October 2003, there are 43 full Member countries, 7 Associate countries and 1 Observer country.



Incentives in road freight transport

Governments seeking to promote best practices in the road transport sector have three basic types of policy to choose from:

- 1 Monetary incentives, i.e. pricing policies.
- 2 Non-monetary, regulatory incentives.
- 3 Education and awareness-raising aimed at behavioural change.

Each of these may help encourage best practices in road transport and thus reduce the environmental impact of the sector.

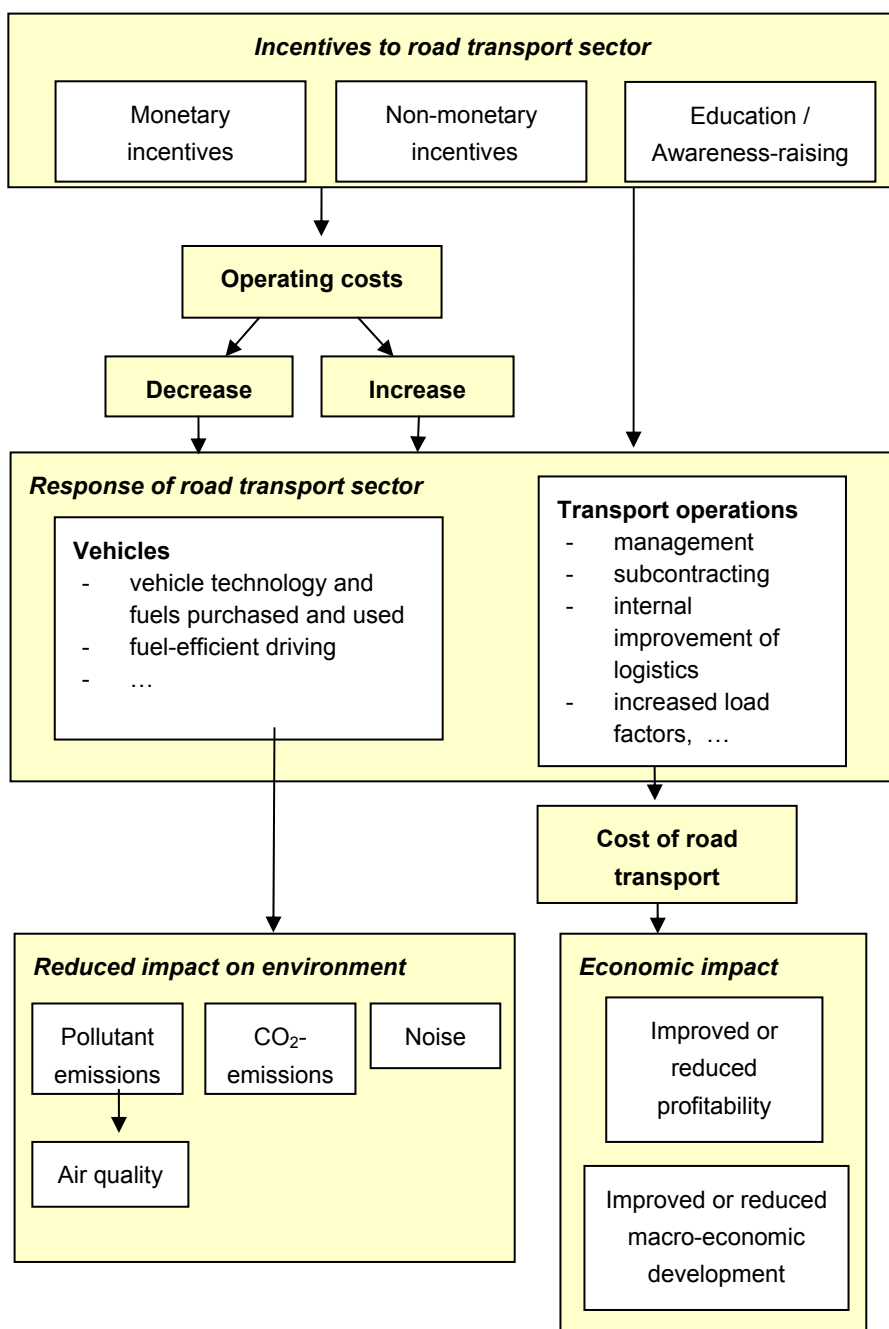
The diagram of figure 1 sketches the possible chain of effects of incentives in road freight transport.

In the first place, many incentives will alter the operating costs of the individual haulier, leading to either a decrease or an increase, depending on the design of the incentive and, in many cases, on the specifics of the individual haulage business. In some cases, however, costs will not be directly affected, as with incentives creating better business opportunities for hauliers operating cleaner trucks.

Hauliers may then respond to the incentive by opting for environmentally friendlier trucks, fuels or driving styles or by making operational changes. These responses will generally seek to minimise costs (or rather, maximise profits), with firms adapting operations to the new conditions.

The result is then twofold. First of all, if the incentive is effective the sectoral response will have positive environmental effects. Second, the cost of road transport will be affected. Individual hauliers will see their profitability either improved or damaged and there may also be macro-economic effects. Note that these cost changes are different from those resulting directly from the incentive, as overall sectoral response will itself also have an economic impact.

figure 1 Schematic summary of the effects of incentives to the road transport sector



The EU policy context

Even though most current incentives are national (in some cases local or regional) policies, they are often intimately linked to regulations and initiatives at the EU level. Some examples:

- Many incentives aimed at promoting cleaner vehicles are designed either to promote development and earlier market introduction of vehicles conforming to future Euro emission classes or discourage use of vehicles of older Euro class.
- Policies intended to encourage use of cleaner or alternative fuels (such as low-sulphur diesel or biofuels) are often linked to EU directives.



- Some incentives are put in place in order to comply with EU directives on air pollution (both total emissions and local air quality).
- Incentives that aim to reduce fuel consumption are often part of a broader national strategy to reduce greenhouse gas emissions under the Kyoto Protocol.
- Incentives introduced in EU member states must comply with a range of EU regulations, in particular the rules concerning the internal market and the directive on the charging of heavy goods vehicles for the use of infrastructure (the latter currently under revision).



Effects of incentives

In the report, the following incentives have been analysed:

Monetary:

- A road use charge differentiated according to emission class, based on:
 - Time (e.g. Eurovignette).
 - Distance (e.g. German or Swiss infrastructure charge).
- A sales or vehicle tax differentiated according to emission class.
- Financial incentives for clean vehicles or technologies, fleet renewal schemes.

Non-monetary:

- The multilateral ECMT quota system (differentiated according to Euro class).
- Ecopoints (differentiated according to Euro class).
- Exemptions from driving bans for cleaner or quieter vehicles.
- Promotion of 'eco-driving'.

Here, we summarise the effects of four of these incentives, two monetary and two non-monetary.

Differentiated road use charge based on distance

A road use charge based on distance is currently in force in Switzerland and in Austria, while Germany is now planning to start with its system in the beginning of 2005. Other countries are considering implementation on the longer term.

The road use charge does not in itself provide an incentive for the use of best practices, although it may encourage improved transport efficiency and reduce the kilometres driven, improving the overall environmental performance of the transport sector. However, its positive environmental impact can be improved by differentiating the charge, by indexing it to Euro class or noise emission, for example. A good example of this is the German 'Maut' system, in which tariffs are differentiated according to vehicle emission standard: the less polluting the vehicle, the less the owner has to pay. Investments in cleaner vehicles and perhaps higher operating costs can then be (part-)financed by the savings on road use toll. Furthermore, road hauliers with older, more polluting vehicles have a stronger incentive to reduce the kilometres driven than those with cleaner vehicles. Since foreign vehicles will pay the same toll as German trucks, the system will also provide an incentive to foreign road hauliers driving through or within Germany. The Austrian and Swiss charge systems do not differentiate between vehicles with environmental characteristics.

The environmental effectiveness and economic impact of a differentiated road use charge depend on the exact design of the system. Crucial factors are:

- The degree of differentiation (i.e. the financial reward accruing to less polluting or quieter vehicles), compared to the additional cost of the technology.
- The range of environmental classes included.

- The scope of the system (does it apply to all roads or to highways only, does it apply to all heavy-duty vehicles or only some?).

This incentive has the potential to be very effective, as it can be used to implement the 'polluter pays' principle. It can be targeted at those vehicles for which environmental investments yield the greatest benefit: the more kilometres a vehicle drives and the more polluting it is, the higher the incentive will be to invest in a cleaner truck.

Differentiation of a road use charge by Euro class (or other environmental characteristics) can be implemented in a manner that is revenue-neutral for governments, since the higher tariffs for dirtier vehicles can compensate for the lower tariffs for cleaner vehicles. In that case, the owners of more polluting trucks will effectively pay part of the additional cost of the environmentally friendlier technologies. However, revenues will then decrease over time, as the vehicle fleet will become cleaner owing to the Euro emission standards and normal fleet renewal. This loss of revenue can be avoided by regularly adapting the tariff system, as will be the case for the German Maut system.

The financial impact on individual transport businesses may be significant, however. Differentiation of a road use charge will mean a cost increase for hauliers with older vehicles, while those operating cleaner vehicles will gain financially (compared with a flat tariff). On the other hand, the latter category of hauliers is also likely to have higher expenses because of their investment in cleaner vehicles.

If the tariff is (sufficiently) differentiated according to existing and future Euro class, a differentiated road toll will promote faster penetration of new technologies. For example, it may encourage market demand for Euro 4 or 5 vehicles before they become mandatory, which will promote research, development and early market introduction of such vehicles. This technological development is also likely to have positive effects on other vehicle categories in which it can be applied, such as in light commercial vehicles.

Financial incentives for clean vehicles or technologies

Many ECMT countries use financial incentives to encourage investments in specific technologies that improve the environmental performance of their road vehicle fleet. These may be incentives for vehicles complying with future emission classes, for example, or for cleaner fuels.

These incentives may cover some or all of the costs incurred by the hauliers. In some cases they may involve a lump sum payment to hauliers who are eligible, while in others hauliers will be able to apply for a tax reduction. Frequently, financial incentives are temporary measures designed to promote a specific technology for a period of one or several years.



Financial incentives may be a very effective means of promoting purchase and implementation of a specific technology (such as particle filters), but they may also be used as a more general incentive, for example, for adopting future (rather than current) Euro standards. The second option is generally more cost-effective than the first, as it allows hauliers and vehicle manufacturers to choose the cheapest technological option to reduce emissions. As their use is voluntary, their effectiveness depends mainly on whether or not the financial incentive is sufficient to encourage hauliers to make the investments in question.

One general disadvantage of these incentives is that they are often valid for a limited period only. This may make manufacturers hesitant to invest in research and development in the new technologies promoted by the subsidy. If the technology is already available, however, an incentive targeted at creating demand ('market pull') may help get the new product out on the market and increase demand and production, eventually reducing its cost price.

Furthermore, these incentives cannot be aimed at those vehicles where the greatest benefits are to be achieved, as was the case with a differentiated road use charge.

Financial incentives are paid for by governments and their use is entirely voluntary. They therefore have no negative impact on individual transport firms. One potential drawback, however, is the so-called 'free-rider' effect, free riders being companies that would have invested in the best practice or technology even without the incentive. The environmental gains attributable to these companies will then not be due to the incentive, decreasing its cost-effectiveness from the government's (taxpayers') point of view.

Exemptions from driving bans

In various countries, driving bans for heavy-duty vehicles are used to reduce local noise or pollutant levels. These bans may be imposed during specific hours, as with night-time driving bans, or be limited to the transport of specific goods.

By providing exemptions for cleaner or quieter trucks, governments can use driving bans as a means of encouraging use of such vehicles. Indeed, this would be in line with the stated aim of most such bans: to cut noise and pollution. As yet, however, this form of incentive has not been introduced on any significant scale in Europe.

If cleaner or quieter trucks are exempted from driving bans, the following effects can be anticipated (compared with a driving ban without such exemptions):

- The share of trucks exempted from the ban will rise, with a corresponding decline in the number of trucks not exempted.
- If the ban is in force for a specific period of the day or week only, traffic will increase during that period, relative to the present situation, while at other times (mainly just before and just after the ban) it will decrease.

In addition, total traffic volume can be expected to increase slightly, as transport costs on the routes affected by such bans will decrease.

Hauliers with trucks exempted from the ban will have a competitive advantage on the route in question, while others will be encouraged to invest in cleaner or quieter vehicles. If the reward is not sufficient for this to be an interesting option, their business will be adversely affected. The larger the business advantage (which depends on the goods involved, the importance of the route and the extent of the ban), the more hauliers it will encourage to improve their environmental performance.

Two environmental effects will result, one positive and one negative. Firstly, the system will promote the use of environmentally friendlier technology. If the incentive is effective, the environmental performance of road transport will improve. However, even though the exempted trucks will be cleaner or quieter than average, their emissions will not be zero. Emissions during the time of the ban will therefore increase. A local analysis of the expected effects should therefore be carried out before this kind of policy measure is used, to determine whether or not the resulting net environmental impact is positive.

The government costs of issuing exemptions to driving bans will be limited to enforcement costs and, where necessary, the cost of additional noise abatement measures. The overall economic effect on the road transport industry will be positive, although some hauliers will benefit while others will be faced with negative financial consequences.

Promoting 'eco-driving'

Several countries currently promote 'eco-driving', a driving style that improves fuel efficiency and safety. Furthermore, eco-driving reduces operating costs by cutting expenditures on fuel and maintenance. Governments may provide a financial incentive for drivers attending a course or promote eco-driving by providing publicity. Nonetheless, operators will need to cover any remaining costs of employee attendance, lost vehicle availability and so on.

Reports of up to 15-20% improvement in fuel consumption are not uncommon, although the long-term effect is expected to be more modest, around 5%. Fuel costs decrease accordingly. Eco-driving has the greatest effect if hauliers maintain a focus on driving style and fuel consumption.

Incentives to promote eco-driving will yield environmental gains by reducing CO₂-emissions, as well as social benefits due to lower accident rates. In addition, more moderate driving habits can be expected to lead to reductions in noise.

The road transport sector benefits from eco-driving through reduced fuel costs, lower accident rates (and resultant costs) and decreased maintenance and insurance costs, but the cost of taking the course will cancel out (some of) this benefit. It has also been reported that drivers experience eco-driving as being less stressful than their usual driving style. The exact benefits will vary from company to company and cannot be precisely predicted.



Conclusions and Recommendations

Conclusions

As implementation of best environmental practices generally requires an investment on the part of hauliers, most will only consider doing so if they can expect a satisfactory return on their investment. This may be in any of several forms: financial compensation, a permit to drive through environmentally sensitive areas, an improved image (public relations), driver satisfaction and so on.

The same applies to vehicle manufactures. Research and development on cleaner vehicles and engines and their eventual market introduction involve very significant investments, which must be justified on economic grounds.

In the ECMT countries, various incentives are in place that encourage hauliers and vehicle and engine manufacturers to make these investments. Irrespective of the type of incentive, they will have the greatest effect if:

- a They provide sufficiently large business benefits (financial or otherwise) compared to the additional investments required.
- b They are stable, i.e. involve little of early termination, due to a change of government or budget cuts, for example.
- c They are established in a timely fashion.
- d They are valid for a large section of the transport market.

More specifically, we can conclude the following regarding **monetary incentives**:

- Differentiated road use charges based on distance have the greatest potential environmental benefits, provided they are sufficiently differentiated - in terms of both the degree of differentiation and the environmental categories distinguished. Their potential is large because: a) both national and international transport is affected, as well as old and new vehicles, and b) they provide the greatest incentive to those vehicles driven most, where the greatest environmental gains benefits are to be achieved.
- Sales tax differentiation and other financial incentives promoting the sales of cleaner vehicles or other environmental technologies may also be very effective policy instruments and relatively easy to implement. However, their potential environmental benefits are more limited as they are directed only at new vehicles in the national fleet and not linked to actual vehicle usage.
- Differentiation of vehicle tax affects the whole national vehicle fleet and therefore offers greater potential than differentiation of sales tax. In addition, it also provides an incentive to remove older (i.e. very polluting) vehicles from the fleet.
- Differentiation of taxes, tolls and other charges can be implemented in a revenue-neutral manner, i.e. without affecting government budgets or increasing the total financial burden on the sector. Nevertheless, hauliers with more polluting vehicles will be faced with an increase in costs.

- From an environmental perspective, many of the incentives currently in place could be improved. For example, differentiation is sometimes limited to emission classes up to Euro 2 or Euro 3 emission class, which provides no incentive for cleaner vehicles.
- To be effective over a longer period of time, monetary incentives need to be adapted regularly to developments in vehicle fleet, environmental technology and cost.

Regarding **non-monetary incentives**, we conclude the following:

- A permit or quota scheme differentiated according to Euro class can provide a clear advantage for haulage firms improving their environmental performance.
- Their effectiveness depends very much on the extent of (international) transport affected by the system and on the attractiveness of the rewards for vehicles with superior environmental performance. If both are large enough, these policies can provide very effective incentives to implement best environmental practices in road transport.
- However, these incentives often meet with considerable resistance from the industry, as they have a negative economic impact on the sector.
- As with the monetary incentives, these policy measures create a business opportunity for hauliers operating less polluting trucks but will have an adverse economic impact on others.
- Other non-monetary incentives appear to have a rather limited effect. Awareness-building campaigns can only have a significant impact if they promote technologies or other best practices that reduce costs or provide other benefits to hauliers. A case in point is eco-driving, which improves fuel efficiency.

Recommendations

Effectiveness of incentives

As we have seen, there are a variety of government incentives at hand to promote best environmental practices in the road transport sector. Some of them are potentially more effective than others, and some have positive, others negative economic effects on the sector.

Although the effectiveness of an incentive will always depend on its precise design, it is possible to draw a number of general conclusions on their *potential* effectiveness. In this study we have identified several options for improving existing schemes, most of them related to the generally limited degree of differentiation according to Euro emission class. Whether we are dealing with road use charges, vehicle tax, ecopoints or multilateral quota, differentiation according to as many Euro classes as there currently exist will always provide an additional incentive to use or purchase cleaner vehicles.



The key factor determining effectiveness is always whether the benefit accruing to a haulier investing in better environmental performance outweighs the associated cost. Whether the benefit is financial, for example a lower tax, or non-financial, such as a permit to drive through a given country or environmentally sensitive area, is not important in this respect.

Some incentives are potentially much more effective than others because of their wider, sometimes even international scope. For example, a differentiated vehicle tax affects national hauliers only, whereas a differentiated road use charge can improve the environmental performance of all the transport occurring in a country, including foreign vehicles. Increasing the scope of an incentive, or opting for incentives that affect a wide range of hauliers can therefore improve effectiveness.

We have also seen that there is a huge range of incentives in place in the various ECMT countries and within the EU. Harmonisation of taxes, including environmental incentives, would create a much more powerful operating environment: first by increasing pressure on vehicle manufacturers to develop and market cleaner trucks (which would reduce their cost) and second by creating a non-discriminatory and transparent situation for road hauliers.

However, harmonisation of incentives does not necessarily imply that all countries must adopt the same incentives. A combination of incentives all geared to the same environmental goals can also increase the benefit to hauliers and thus increase their overall effectiveness. For example, if purchase of a Euro 4 truck means the owner a) is exempted from the Austrian ecopoint system, b) pays lower road use charges in certain other European countries, and c) pays less vehicle tax in his home country, then more hauliers will opt for these cleaner trucks than if only one of these incentives were in place.

Level playing field

Apart from improved effectiveness, a harmonised and coordinated approach to transport prices and pricing will create a more level playing field. Purely fiscal, nationally based taxes impact more on competitiveness in the road haulage sector than territorial charges. Distortion of competition can thus be avoided by partially replacing vehicle charges with territorial charges.

Regional incentives for environmental bottlenecks

The various incentives discussed all have their own specific characteristics and impacts. Governments considering their introduction are therefore well-advised to first identify the specific, most pressing environmental problems attributable to road transport and then design and optimise the incentives best suited to alleviate them. This kind of analysis can also help generate political and public support for particular measures.

Other modes of transport

Many of the incentives examined in this report potentially increase the cost of road transport, possibly damaging its competitive position relative to other modes

(rail, shipping, air). However, various studies have shown that an increase in the cost of road transport leads to only a very limited modal shift, because the various modes serve quite separate markets. The effect of a modal shift on the environment depends on the specific route and type of goods being transported.

Any anticipated changes to a level playing field can be counteracted by designing incentives in such a way that governments pay for (part of) the additional costs, for example by lowering taxes or other road transport charges.

A second option would be to provide parallel incentives to other modes of transport. This could create a level playing field and at the same time improve the environmental performance of the overall transport sector. If this is done by applying the 'user pays' principle to all transport modes, the result would be a fair and efficient pricing system across the board.

Monitor effects and evaluate incentives

In the course of this study we discovered how difficult it was to find concrete data on the effects of the various incentives examined. In some cases anticipated effects had been estimated during the decision making process, but there were only very few (scientific) studies available in which the effects were actually monitored and evaluated once the policy had been put into practice.

Without proper knowledge and understanding of the costs and effects of the various incentives arising in actual practice, it is difficult to properly evaluate and compare them on these relevant aspects. More thorough monitoring of the policy measures in question would, moreover, help government justify decisions in this area and generate support within the road transport sector as well as among the public.

