International review of road funding and heavy vehicle charging mechanisms

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To: HCVI Board
From: Matthew Bereni, Manager Pricing Policy, National Transport Commission
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Abstract

This international review is essentially “desktop research”, intended to inform and update the HCVI Board of alternative models of road funding and expenditure and road user revenue collection and to provide consideration of alternative arrangements for heavy vehicle road funding and expenditure and direct pricing of heavy vehicles in Australia. By outlining the similarities between the different international models, this review attempts to identify some general trends in the way heavy vehicle road user charging is achieved in most countries. This review also contains references to a blue sky approach applied to Heavy Vehicle Charging in Australia.
Foreword

The *International review of road funding and heavy vehicle charging mechanisms* has been completed by the NTC for the Heavy Vehicle Charging and Investment Reform Project (HVCI), formerly known as the COAG Road Reform Plan (CRRP).

As detailed in the introduction, this work is essentially “desktop research”, intended to inform and update the HVCI Board of alternative models of road funding and expenditure, road user revenue collection and provide consideration of alternative arrangements for heavy vehicle road funding and expenditure and direct pricing of heavy vehicles in Australia.

As part of this research, the road charging and road funding policies of seven countries have been investigated and compared. These countries are New Zealand plus six European countries, namely Switzerland, Austria, Germany, the Czech Republic, the Slovak Republic and France.

The author of this review believes that there would be benefits in sharing this document with a larger audience. However, it should be noted that this document is essentially made up of extracts of other documents presented at conferences, or available on the internet. As this review was not drafted with the aim of being published, it has not been referenced to academic standards.

The executive summary provides an insight into the specificities of each reviewed model and investigates the similarities and dissimilarities between them. By outlining the similarities between the different international models, it also attempts to identify some general trends in the way heavy vehicle road user charging is achieved in most countries. Finally, the last section of the executive summary leans on the findings from this review to suggest the main features of a conceptual and hypothetical heavy vehicle charging scheme in Australia, as seen by the author of this review.

Sections 2 to 8 of the International Review are essentially compilations of published documents. In most sections the documents used as references were not initially published in English, thus producing some lingual inconsistencies.

This report has been prepared by Matthew Bereni, Manager Pricing Policy, National Transport Commission on behalf of HVCI.
Executive summary

1. Heavy vehicle charging policies

1.1. Objectives

This review of different heavy vehicle charging schemes shows that their implementation often results from politically motivated decisions pursuing objectives that do not vary significantly between countries. Most heavy vehicle charging schemes have the following objectives in common:

- enforcing the user (or ‘polluter’) pays principle to internalise the externalised costs of the freight transport industry
- recovering capital and maintenance expenditures on road infrastructure, or more generally, transportation infrastructure if the charge is aimed at financing intermodal infrastructure
- establishing more economic price relativities between road and rail transport
- encouraging the use of less-polluting heavy vehicles, such as through the use of Euro class emissions as charging parameters
- improving road safety (free flow charging systems)

Some pricing policies are crafted to meet more specific objectives such as the Swiss LSVA, which contributes to financing new railway tunnels in the Alpine regions or the Slovak Mýto which is supposed to improve the monitoring and management of dangerous goods. Also there appears to be no conclusive evidence demonstrating that a heavy vehicle fee (HVF) contributes to the shifting of freight from roads to railways.

1.2. Tolled vehicles

The review shows that in most cases, the HVF must be paid by all heavy commercial vehicles, or vehicle combinations with a gross vehicle mass of 3.5 tonnes or more, irrespective of national registry. In this review, Germany is the only country with a toll applicable to vehicles weighing more than 12 tonnes, which can contribute to “mass threshold” effects. For example, after the toll was announced in Germany, a number of marketing campaigns from truck manufacturers promoted heavy vehicles just under 12 tonnes. Consequently, sales of vehicles between 10 and 12 tonnes doubled when the LKW-Maut was introduced in 2005. However, the overall share of vehicles between 10 and 12 tonnes remained quite low in Germany (less than 3per cent of all trucks).

While it would be logical to enforce a HVF depending on the actual mass of the loaded vehicle, the total permissible mass of the heavy vehicle appears to be the most convenient charging parameter. The use of the continually changing operating mass would be impracticable. Moreover, toll operators often state that the total permissible mass is an effective charging parameter, as it is a good incentive to use heavy vehicles to the fullest and avoid empty trips.

Most of the reviewed heavy vehicle charging schemes share their list of toll-exempted vehicles. Not surprisingly, vehicles used by defence forces, civil protection authorities, fire services, emergency services, or governmental administrations are exempted from toll liability.
1.3. Tolled network

In most reviewed countries, the HVF is levied for use of motorway and expressway networks. Noticeably, the entire road network in Switzerland and New Zealand is tolled.

The risk of toll avoidance exists when only some sections of the road network are tolled. This may require the implementation of countermeasures. The risk of toll avoidance can occur on a local scale, for example use of the secondary network instead of the main network, or on a larger regional scale. The introduction of the LKW-Maut in Germany in 2005 resulted in a large volume of heavy vehicle traffic diverting from Western Germany to France where the main highways are not tolled yet. One aim of the French HVF is counteracting this negative outcome.

1.4. toll impact

All of the reviews examined share the same difficulty in quantifying or qualifying the impact due to the introduction of a HVF from a socio-economic or environmental perspective. Introduction of a HVF does not appear to be followed by the completion of a rigorous impact study in most cases. Unlike other countries, Switzerland commissioned an impact study further to the introduction of the Swiss LSVA. This study provides some valuable information regarding the impact of the LSVA on the environment, the labour market, consumer prices, transport demand, etc. It is possible that other countries commissioned similar impact studies, but they either are confidential documents, or were not published in English translated documents.

2. Pricing models

2.1. Internalising external costs

Enforcement of the user-pays principle essentially consists of internalising—or accounting for and including—the externalised costs of the freight transport industry. Although there appears to be consensus on a few essential costs to be recovered through a HVF, such as infrastructure, traffic-based noise pollution, traffic-based air pollution and road accidents, this review shows that situations vary between countries regarding externalities to be recovered.

In New Zealand, the RUC is intended to recover capital and maintenance expenditures on roads attributable to heavy vehicles. In the EU, the Eurovignette directive provides a framework for internalising and reducing the external costs related to environment, noise and health from all transport modes, including the legal basis and maximum values used.

At the other end of the economic spectrum, in addition to direct payments for the construction and maintenance of roads, the Swiss LSVA accounts for external environmental and health costs, as well as damages to buildings caused by air pollution, noise, accidents, landscape fragmentation, damages due to climate change and congestion.

2.2. Cost allocation models

One of the expected components of a literature review on heavy vehicle pricing mechanisms implemented in foreign countries is analysis of the process used to determine the toll amount in each country. However, it is often difficult to obtain comprehensive and relevant documents translated in English.

In this review, France and New Zealand were the two only countries for which detailed documentation regarding the determining of the toll amount was easily available. Switzerland, Germany and Austria also had documents outlining the broad principles against which their respective toll amounts were determined. This review noted that:
Switzerland, Germany and Austria implemented their HVF before the 2006 revision of the *Eurovignette directive on the charging of heavy goods vehicles for the use of certain infrastructures* (see Appendix B), which regulates the road user charges for heavy goods vehicles in the EU. For that reason, these three countries did not have to give the European Commission an account of the amount of their HVF or of the mechanism used to determine the fee.

The road administrations in Switzerland, Germany and Austria performed extensive analyses of their road cost bases and of the way these costs are allocated to different vehicle classes (light vehicles vs. heavy vehicles). However, there is often no direct relationship between the findings of their cost base reviews and the final toll amount. The Swiss example is the most extreme illustration of this as the Swiss toll amount resulted from political negotiations between Switzerland and the EU.

In most cases, a clear distinction was made between investment costs and maintenance costs. For the allocation of investment costs, each country used an asset depreciation approach, which led to the assessment of the financial depreciation of their road asset from a given point in time. The initial value of the road asset was calculated from financial data held in each country and no consideration was given to methodological consistency in the approach used by each country. Maintenance costs were allocated between light and heavy vehicles using traffic indicators such as Vehicle Kilometres Travelled (VKT) vehicle length x VKT, or number of standard axles x VKT but the methodology used for cost allocation differed from one country to another.

Therefore, while it appears that there is no simple way of allocating road costs to different vehicle classes, the use of an asset depreciation approach appears to be a convenient and straightforward methodology to allocate investment costs.

### 2.3. Charging parameters and a typical heavy vehicle fee

Charging parameters are fees calculated against the heavy vehicle and its usage. This review has shown four essential charging parameters:

- **type of road:** unless the tolled network is the whole road network, the HVF depends on the type of road travelled by heavy vehicles subject to the fee
- **distance:** the distance travelled by heavy vehicles on each type of road is the most straightforward way of relating road damage to road usage
- **number of axles:** the number of axles in a heavy vehicle combination is a simple way of reflecting road damage and is used as a charging parameter in most cases
- **emission class:** each vehicle is classified to a charge category, based on its toll emission class (e.g. euro emission classes). The graduation of toll-by-toll emission classes is an incentive for transport companies to invest in trucks with high environmental standards.

Other parameters such as the number of tyres per axle (NZ) or the time of the week (Czech Rep.) may be used but appear to be less widely adopted.

The review has demonstrated that the HVF usually ranges between AUD0.20 and 0.40 per km travelled for a 5-axle truck (2-axle prime mover, 3-axle trailer, GVM of 40 tonnes). With a fee of AUD0.92 per km, Switzerland is often seen as an exception. However, this comparison is not exhaustive as some countries such as France have additional taxes applied to heavy vehicles, such as the national axle tax.
3. Technology

3.1. The tolled network as a decisive parameter

A range of technologies may be used to enforce a HVF, from GPS on-board units (OBUs) to Dedicated Short Range modules (DSRC). When using a DSRC module, GPS or tachograph readings can also be used as back up for distance measurement. Devices relying on Global System for Mobile communications (GSM) are generally used for data transmission between the OBU or DSRC module and the computer centre of the toll operator.

The review has shown that the size of the tolled network has a decisive impact on the technology choice for toll enforcement. If the toll is enforced on only a few sections of the country’s road network, DSRC technology is usually the preferred option. If the entire road network is to be tolled, GPS-based OBUs offer a lot of flexibility at a competitive cost.

3.2. Interoperability

The use of different technologies as part of the tolling system is feasible and toll operators have developed expertise in this area. The road and motorway directorate of the Czech Republic has, for instance, decided to investigate extending the tolled network 800 km by including some arterial and local roads. This decision was a significant deviation from the original decision to only charge heavy vehicle use on motorways and expressways. This led the Czech Republic to opt for DSRC technology. In order to accommodate for a revised tolled network, which is very close to the entire road network, the toll operator in Czech Republic (Kapsch) has developed OBUs that are both DSRC and GPS compatible.

Particularly relevant to the European transport economy, the EU implemented guidelines calling for the introduction of an interoperable European charging system called European Electronic Tolling System (EETS) in 2004. According to this decision, from October 2012 it should be possible to pay all required fees across the entire EETS catchment area via a contract with a single supplier and by using a single recording device. The TOLL2GO is a good example of a device developed to meet the interoperability requirement. In September 2011, the German toll operator, Toll Collect released the TOLL2GO transnational, cross-system toll service for Austria and Germany. The advantage for toll system customers who use the new TOLL2GO service is that they only need one in-vehicle unit—the Toll Collect OBU—to pay toll charges in both countries. Unlike Germany, toll collection in Austria is based on DSRC technology and uses the Austrian GO-Box. The Toll Collect OBU used in Germany will continue to operate with satellite-based technology, but will also support the Austrian microwave system. Mixing technologies is possible but does not come without costs.
3.3. Undesired behaviours

Though illegal to use in the US, the UK and many other countries, GPS jamming devices or GPS jammers, can be bought on the internet for as little as NZ$30. Sellers claim they’re for protecting privacy, but since they can block devices that record a vehicle’s movements, they’re popular with some drivers who don’t want an electronic spy in their cabs. They can also block GPS-based road tolls that are levied via an on-board receiver.

However, technology exists that can deal with GPS jammers. In New Zealand, eRUC units used are incorporated with sensors that are easily capable of detecting GPS jamming devices. Vehicles attempting to block, or override a GPS signal generate a flashing light on the vehicle’s windscreen to indicate to authorities that an unauthorised unit is being used.

4. Institutional context

4.1. Introduction of a Heavy Vehicle Fee (HVF)

This international review has revealed some discrepancies in the way HVF are introduced in the sample of reviewed countries. On average, the implementation of a heavy vehicle charging scheme is a two-to-three year process from when the decision is taken to introduce a road toll to when the first toll is actually levied.

In Switzerland, it was decided to introduce the new regime stepwise in order to give the transport companies time to get used to the new situation. Thus, the HVF was introduced in 2001 at a rate of 1.60 Swiss cents and the heavy vehicle weight limit was increased from 28 to 34 tonnes. In 2005, the fee was increased to 2.44 Swiss cents while the weight limit was raised to 40 tonnes and in 2008, the fee was eventually increased to 2.70 Swiss Cents.

In France, a proposed experimental tax will be implemented in the Alsace region in March 2013. This network bears most of the avoidance traffic from Germany. The full-scale National Heavy Goods Vehicle Eco-tax (TPLN) will be implemented in June 2013. The Alsace experimental tax is designed with specific characteristics, which do not conflict with technical elements of the TPLN. The Alsace experimental tax will disappear once the TPLN comes into effect.

On the other hand, the Czech Republic implemented its heavy vehicle scheme in less than one year. The Czech Republic Government first discussed the introduction of the road toll shortly after the country joined the EU in 2004. On 1 January 2007 the Czech Republic’s nationwide electronic toll collection system MYTO CZ started commercial operation after being set up from scratch by Kapsch in a record time of only nine months. However, this rushed implementation has come with drawbacks since the Czech Republic opted for DSRC technology and is now exploring the opportunity of expanding its tolled network to most of its roads, making a GPS-based solution more relevant.

4.2. Institutional arrangements

Tolling system architecture is similar in most reviewed countries. Tolling systems usually involve three main stakeholders; a road administration or agency, a toll operator and a toll recipient. In Germany, France, Austria and the Czech Republic, the toll recipient can either be the State—which may be responsible for road administration through a national Ministry of Transport—or a publicly-owned corporation that collects toll revenues and operates infrastructure investments, such as Transfund in New Zealand, ASFINAG in Austria, VIFG in Germany or AFITF in France. The toll operator is classically delegated toll implementation and collection through a Public-Private Partnership.
5. A Blue-Sky approach to heavy vehicle charging in Australia

This international review offers an interesting insight into the heavy vehicle charging policies implemented in countries that differ from Australia, with respect to geography, nature and size of their transport industry, current charging regimes and institutional arrangements. However, some trends can be extracted from this review and used to build a hypothetical heavy vehicle charging framework that may be relevant to Australia. Opinions, or points of view expressed in this section are those of the author and do not necessarily reflect the official position or policies of HVCI. These opinions and points of view are summarised in the following table.
Table 1 Blue-sky approach applied to heavy vehicle charging in Australia

<table>
<thead>
<tr>
<th>1. Objectives</th>
<th><strong>Recovery of capital and maintenance expenditures on road infrastructure</strong></th>
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<td>State road authorities in Australia are mainly concerned with the recovery of capital and maintenance expenditures on road infrastructure, similarly to New Zealand. Unlike Europe, where significant levels of transit traffic are recorded, internalisation of the externalised costs of the road freight industry is not on the political agenda in Australia, where productivity benefits are usually put forward as the likely consequence of the introduction of a revised heavy vehicle charging scheme.</td>
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<th>2. Tolled vehicles</th>
<th><strong>Heavy vehicles with a total permissible laden mass over 3.5 tonnes</strong></th>
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<td>In general, the HVF applies to all vehicles used for the transport of goods (rigid vehicles, prime movers and their trailers) with a total permissible laden mass over 3.5 tonnes. Although unusual, the mass threshold may be set to a different tonnage in some countries (for example, 12 tonnes in Germany). Considering that vehicles with a gross vehicle mass of 3.5 tonnes or more as traditionally seen as heavy vehicles in Australia, it is recommended to apply the HVF to heavy vehicles with a total permissible laden mass of 3.5 tonnes or more.</td>
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<td>As in other countries, it is expected that some vehicles would be exempted from paying the tax in Australia, such as vehicles used by the defence forces, civil protection authorities, fire services, emergency services, etc.</td>
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<th>3. Tolled network</th>
<th><strong>Whole of the Australian road network, with HVF depending on the type of road circulated</strong></th>
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<td>Road usage comes with costs, regardless of the type of road considered. For this reason, it is recommended that a HVF is levied on the entire road network in Australia. However, it is acknowledged that different road types have different road maintenance expenditures (e.g. maintenance expenditures for dirt roads in central Australia would naturally be lower than maintenance costs for the Hume Highway). To accommodate different expenditure levels for each road type, it is suggested that a varied HVF is introduced according to the type of road circulated.</td>
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<tr>
<th>4. Charging parameters</th>
<th>Using the same set of four essential charging parameters found in most of the reviewed countries is advised. These charging parameters are:</th>
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|                        | - distance  
|                        | - number of axles  
|                        | - emission class  
|                        | - type of road |

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<th>5. Technology</th>
<th><strong>Use of GPS-based on-board units</strong></th>
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<td>Use of GPS-based OBUs seems consistent with the suggested tolled network. GPS-based OBUs could serve multiple purposes (tolling, tracking of PBS vehicles or vehicles carrying dangerous goods, geo-fencing, etc.). It would also allow for an improved understanding of freight movement, which would play a crucial role in revision of the HVF whenever needed. Another advantage of GPS-based technology is that large infrastructure investments would not be required if the tolled network was expanded.</td>
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<tr>
<td>6. Interoperability</td>
<td>Agreement on one single technology to be used in all states and territories</td>
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<td>Interoperability requirements play a central role in Europe where different countries rely on different technologies to toll heavy vehicle usage. To avoid interoperability issues, it is suggested that Transport Ministers from all states and territories agree on one technology to be used across Australia.</td>
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<th>7. Institutional arrangements</th>
<th>Public-private partnership is the preferred arrangement in most countries</th>
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<tr>
<td>As in many of the reviewed countries, it is recommended that the Australian Government delegates the tolling of the HVF to a private partner with experience in this area. The following allocation of roles is suggested:</td>
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<td>• The Australian Government or other relevant state bodies would be responsible for contracting (tendering process), regulating the system and setting the fee with the assistance of qualified government agencies (for example Infrastructure Australia and/or the NTC).</td>
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<td>• A publicly-owned corporation would collect toll revenues, advise on infrastructure investments and transfer toll revenue to states and territories (the National Heavy Vehicle Regulator).</td>
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<td>• A private company would be responsible for levying the HVF. As part of a public-private partnership, the toll operator would bear the costs associated with implementation of the HVF and would receive an agreed percentage of toll revenue to provide the corresponding service.</td>
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<th>8. Introduction and time-frame</th>
<th>A two-to-three year process that may start with a trial</th>
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<td>Considering the significant impact of introducing a HVF on the Australian economy, a rushed introduction must be excluded. A stepwise introduction including a possible trial would be preferable. A trial could allow testing of GPS-based OBUs with a sample of volunteer transport companies in exchange for a concession on their registration fee.</td>
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<td>If the concept of a public-private partnership was endorsed by transport ministers, the review has shown that the implementation of a heavy vehicle charging scheme is a two-to-three year process from the time the decision is taken to introduce a road toll to the toll being levied for the first time.</td>
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1. Introduction

1.1. The Heavy Vehicle Charging and Investment Reform

The Federal Highway Administration defines road pricing as ‘a fee related to the use of a roadway facility’ and comments that ‘revenue from these fees can be reinvested in capacity expansion, or used to pay for operations and maintenance’. Although simplistic, this definition has the virtue of establishing a clear connection between road charging or pricing and road funding.

Beyond the direct recovery of infrastructure costs due to heavy vehicle traffic, road pricing is usually seen as a way of internalising external costs related to the negative side effects associated with road freight transportation, such as emissions and noise. These are labelled ‘external effects’, whose associated costs are called “external costs”. Road pricing policies are supposedly designed to reduce these costs in an optimal way to achieve sustainable development in road transport.

In April 2007, COAG set up the COAG Road Reform Plan (CRRP) to conduct a review of current heavy vehicle user charges and to investigate the feasibility of alternative charging models for heavy vehicles.

The plan was the result of an inquiry by the Productivity Commission, which found that the current form of charging and the resulting financial flows did not promote the efficient usage and provision of road infrastructure for heavy vehicle purposes.

The inquiry identified three disconnects:

- network average charges under PAYGO do not provide signals to road users about the costs of using particular roads, or road providers about the demand of different roads
- road charges and future road spending can lead to inefficient decisions, including holding back efficient road projects, and encourage public sector road providers to preserve road assets
- Government provision of road infrastructure is unlikely to provide an incentive framework for providing road infrastructure services efficiently.

In summary, the inquiry found that the prices heavy vehicles pay were not efficient as they don’t reflect the distance travelled, their weight or the maintenance costs of different types of roads that they travel on.

CRRP then conducted a feasibility study into alternative charging arrangements for heavy vehicles. The preliminary findings of the study found that a more direct link between the costs of road use, road use charges and revenues to road providers would provide positive net benefits in the order of AUD$5 to AUD$7 billion (net present value).

In May 2012, the Standing Council of Transport Infrastructure (SCOTI) approved work to commence on the development of a heavy vehicle charging and road investment framework in anticipation of a COAG decision on the feasibility study.
The COAG Road Reform Plan has now been renamed the Heavy Vehicle Charging and Investment Reform (HVCI) to reflect its broadened scope. The HVCI Project Board will oversee the development of this framework and identify what processes are required to successfully implement the proposed reforms.

1.2. Objectives

Using desktop research and existing analysis, this project is intended to:

- contribute to informing and updating the HVCI Board of alternative models of road funding and expenditure and road user revenue collection and
- provide an input to consideration of alternative arrangements for heavy vehicle road funding and expenditure and direct pricing of heavy vehicles in Australia.

1.3. Scope

As detailed in the project brief, this project builds upon the work of the CRRP Feasibility Study and publicly available reports and research. As initially agreed, the main deliverable of this project is a report which:

- outlines six-to-ten international models and compares their main features
- outlines any key known benefits or issues that are associated with the reviewed models, for example if a system is under review or likely to change in the short term
- outlines any key issues that need to be considered in comparing the reviewed models with Australia. (country size and geographic characteristics)
- identifies any recent international developments in road user charging technology

1.4. Determining the toll amount

One of the expected contents of a literature review of the heavy vehicle pricing mechanisms implemented in foreign countries is an analysis of the process used to determine the toll amount in each country, although it is often difficult to obtain valuable documents translated in English and related to that matter.

France and New Zealand are noticeably the two only countries for which a detailed documentation regarding the determining of the toll amount was easily available. Switzerland, Germany and Austria also had documents outlining the broad principles against which their respective toll amounts were determined. However, it should be noticed that:

- Switzerland, Germany and Austria implemented their HVF before the revision in 2006 of the Eurovignette directive on the charging of heavy goods vehicles for the use of certain infrastructures which regulates the road user charges for heavy goods vehicles in the EU. For
that reason, these three countries did not have to give the European Commission an account of the amount of their HVF or of the mechanism used to determine the fee.

- The road administrations in Switzerland, Germany and Austria performed extensive analyses of their road cost bases and of the way these costs are allocated to different vehicle classes (light vehicles v. heavy vehicles). However, there is often no direct relationship between the findings of their cost base reviews and the final toll amount. The Swiss example is the most extreme illustration of this as the Swiss toll amount resulted from political negotiations between Switzerland and the EU.

- In most cases, a clear distinction was made between investment costs and maintenance costs. For the allocation of investment costs, each country used an asset depreciation approach, which led to the assessment of the financial depreciation of their road asset from a given point in time. The initial value of the road asset was calculated from financial data held in each country and no consideration was given to methodological consistency in the approach used by each country. Last, maintenance costs were allocated between light and heavy vehicles using traffic indicators such as Vehicle Kilometres Travelled (VKT), vehicle length x VKT, or number of standard axles x VKT but again, the methodology used for cost allocation differed from one country to another.

Therefore, it appears clearly that there is no simple way of allocating road costs to different vehicle classes. However, the use of an asset depreciation approach has proven to be a convenient and straightforward methodology to allocate investment costs.
2. The German LKW-Maut

2.1. Background

Germany, officially the Federal Republic of Germany (Bundesrepublik Deutschland) is a federal parliamentary republic in Europe. The country consists of 16 states (Länder) while the capital and largest city is Berlin. Germany covers an area of 357,021 km². With 81.8 million inhabitants, it is the most populous member state and the largest economy in the EU. It is one of the major political powers of the European continent and a technological leader in many fields. Germany was a founding member of the European Community in 1957, which became the EU in 1993. It is part of the Schengen Area and since 1999 a member of the Eurozone.

Germany has approximately 650,000 km of roads, of which 12,800 km are German Autobahnen (the nationally coordinated motorway system in Germany). In German, they are officially called Bundesautobahn, which translates to federal expressways. The national roads in Germany are called Bundesstraßen. Germany's bundesstraßen network has a total length of about 40,000 km. Bundesstraßen like Autobahnen are maintained by the federal agency of the Transport Ministry.

Figure 3 Map of Germany
2.2. Introduction of the German Heavy Vehicle Fee (HVF) or Lastkraftwagen-Maut (LKW-Maut)

German heavy goods vehicle tolling, introduced on January 1, 2005, is a satellite-based, electronic system covering the entire national motorway (Autobahn) network (12,500 km or 7,768 miles). Tolls are assessed to all heavy commercial vehicles over 12 tonnes gross vehicle weight, based on distance travelled, number of axles and emission class. A public-private partnership (PPP) was formed between the Ministry of Transport, Building and Housing, which was responsible for contracting and system regulation; the Federal Office for Goods Transport (Bundesamt für Guterverkehr or Federal Office for Good Transport (BAG)), responsible for enforcement; and Toll Collect, a private sector joint venture made up of Daimler-Chrysler Financial Services, Deutsche Telecom and Cofiroute. Specifics of the implementation contract between the Ministry of Transport and Toll Collect are not publicly available due to confidentiality agreements that protect sensitive details related to Toll Collect technology and business model.

The rationale for truck charges was based on several factors. First, recognition of the substantial infrastructure costs imposed by heavy trucks on federal motorways, estimated at 3.4 billion euros per year of internal costs per year ($4.4 billion), equivalent to 15 euro cents per vehicle.km. The cost-allocation method used to estimate the impact of trucks on infrastructure damage was done under the direction of the European Commission. Second, was the fact that 35 per cent of truck-kilometres on Germany’s motorways were made by foreign registered vehicles that impose infrastructure costs without contributing directly to system construction, maintenance and reconstruction. Third, many foreign trucks did not comply with EU emission standards and therefore had a competitive advantage over German registered trucks. The final factor was that fuel taxes had been raised eight times since 1991, resulting in a doubling of taxes on gasoline and diesel fuel. (Currently, fuel taxes are approximately half of the price per gallon of fuel).

The idea of a distance-based charge was conceived in 1989. Studies were conducted subsequently, and in 1995, based on the recommendations of the German High Commission (Paellman Commission) on Financing of Federal Transport Infrastructure, the Federal Government decided to introduce distance-based tolls. Initial opposition turned into acceptance because tolling of all heavy goods vehicles was considered fairer for German trucks vis-à-vis foreign trucks; tolling also served environmental interests, and more revenues would be available for transportation infrastructure improvements. The decision to implement tolls was strongly supported by a coalition of the ruling Christian Democratic Party and the Green Party (‘Red-Green’ Coalition). The imposition of tolls on domestic and foreign trucks by the German Government had to be authorised by the European Commission before implementation could occur. The Commission ensures that the scheme does not discriminate nor place foreign trucks at a competitive disadvantage. For example, an attempt to rebate fuel tax payments worth 600 million euros ($787 million) to the German trucking industry was rejected by the European Commission as being de facto discrimination.

Toll Collect was commissioned by the Federal Republic of Germany to develop the toll system, which Toll Collect also operates, under the direction of the Federal Ministry of Transport. The motorway freight tolling was authorised by the Motorway Toll Act for Heavy Commercial Trucks (in effect since April 12 2002) and the Toll Regulation (Toll Collect, 2007).

Specifically, the following are the legal terms and conditions for route-based toll collection in Germany:


• The Toll Extension Regulations, regulating the extension of the toll to specific segments of German non-motorway trunk roads [Bundesstrassen] (Mautstreckenausdehnungs-verordnung – MautStrAusdehnV) of 8 December 2006 (BGBl. I, p 2858).

2.3. Structure of the LKW-Maut

The level of the toll is based on the toll emissions class, the number of axles of the truck and the distance travelled. Each vehicle is classified to a charge category, based on its toll emissions class. The toll rates and the definition of toll emissions classes are laid down by legislation. The graduation of the toll-by-toll emissions classes is an incentive for transport companies to invest in trucks with high environmental standards.

2.3.1. Vehicles paying the fee

The toll is payable by all heavy commercial vehicles or vehicle combinations with a gross vehicle weight of 12 tonnes or more, irrespective of national registry and:

• intended exclusively for goods transport (first alternative)
• used for goods transport (second alternative)

The requirement to pay toll is established by one of these two alternatives being met. The toll obligation in accordance with the first alternative exists independently of whether:

• goods are actually being transported
• the transport of goods is for commercial or internal purposes (works traffic)
• the relevant vehicle is exempt from vehicle tax.

To the extent that motor vehicles or vehicle combinations are used for revenue-based or business transport of goods (commercial goods transport or works traffic), the toll obligation arises from the second alternative.

Details of how the permitted gross vehicle weight is calculated for vehicle combinations are set out in Section 34, subsection 7 of the German Road Traffic Licensing Regulations (StVZO).
All non-exempt toll road users, irrespective of their country of origin, are required to pay toll for the distance travelled on toll routes.

### 2.3.2. Toll exempted vehicles

Vehicles and vehicle combinations with a gross vehicle weight of less than 12 tonnes are exempt from the toll. Vehicles and vehicle combinations with a gross vehicle weight of 12 tonnes or more, which are neither intended nor used exclusively for goods transport, are toll-exempt.

In accordance with section 1 subsection 2 ABMG, the following vehicle and vehicle combinations with a gross vehicle weight of 12 tonnes or more are also exempted from the toll:
- motor buses and coaches
- vehicles belonging to the German armed forces, police, civil protection authorities, fire service and other emergency services, as well as government vehicles.

### 2.3.3. Toll road network

The toll requirement applies to all German motorways, including service and rest areas, which represents 12,500 km of road network. These motorways are represented as ‘Autobahn’ on Figure 5. Road tolls are payable as soon as the vehicle enters the motorway. By legal definition, German motorways are all national long distance roads formally designated as motorways.

In addition, from 1 January 2007, the truck toll has also applied on some sections of German non-motorway trunk roads (Bundesstrasse):
- B 75 between the A 253 motorway and the A 7 motorway (Hamburg)
- B 4 north of the A 23 motorway to Bad Bramstedt (Schleswig-Holstein and Hamburg)
- B 9 between the German/French border and the Kandel-Süd junction with the A 65 motorway (Rheinland-Pfalz).

In accordance with Section 1, sub-section 3, numbers 1 to 4 of the Motorway Toll Act (ABMG), the following sections of motorway are excluded from the toll requirement:
- section of the A6 motorway in both directions from the German-French border to the Saarbrücken-Fechingen junction
- section of the A5 motorway in both directions from the German-Swiss and German-French borders to the Müllheim/ Neuenburg junction
- motorway segments, on which a toll is levied in accordance with Section 2 of the Trunk Road Private Finance Act of 30 August 1994 (BGBl. I, page 2243) in the latest applicable version
- motorways segments with only one carriageway, which are not linked directly to the Federal German motorway network.
2.3.4. Toll amount

The toll amount is based on the truck’s emissions class and number of axles, as well as the length of the toll route. Each vehicle is assigned to one of four categories, A, B, C or D, on the basis of its emissions class. The user is responsible for correct entry of the emissions class and is required to accurately supply all toll relevant information (principle of self-declaration).

For vehicles registered in Germany, the emissions class can be obtained from the code number entered against number 1 on older vehicle registration documents. The key figures are the 5th and
6th positions of this code number. On the new harmonised EU vehicle registration certificates, the key information for German registered vehicles is in the plain text to number 14 or the 3rd and 4th positions of code number in 14.1. The 5th and 6th characters of this code number are the identifying elements.

For non-German registered vehicles, the following emission classes (as per section 9 subsection 2 LKW-MautV) can be assumed:

- Emissions class S 5 for first registration after 30 September 2009
- Emissions class S 4 for first registration after 30 September 2001 and before 01 October 2009
- Emissions class S 3 for first registration after 30 September 2001
- Emissions class S 2 for first registration after 30 September 1996 and before 01 October 2001
- Emissions class S 1 for first registration after 30 September 1993 and before 01 October 1996
- No emissions class for first registrations before 01 October 1993.

**Table 2 Fee per vehicle category in Germany**

<table>
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<tr>
<th>Category</th>
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<tr>
<td>Category A</td>
<td>S5, EEV class 1</td>
<td>up to 3 axles € 0,141</td>
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<tr>
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<td></td>
<td>4 axles or more € 0,155</td>
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<tr>
<td>Category B</td>
<td>S4, S3 with PMK 2, 3 or 4</td>
<td>up to 3 axles € 0,169</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 axles or more € 0,183</td>
</tr>
<tr>
<td>Category C</td>
<td>S3 without PMK, S2 with PMK 1, 2, 3 or 4</td>
<td>up to 3 axles € 0,190</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 axles or more € 0,204</td>
</tr>
<tr>
<td>Category D</td>
<td>S2 without PMK, S1 and vehicles not assigned to a pollutant emission category</td>
<td>up to 3 axles € 0,274</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 axles or more € 0,288</td>
</tr>
</tbody>
</table>

Trucks fitted with an air quality retrofit system have state-of-the-art, low-exhaust technology, and as a result pay significantly less than vehicles that generate high emissions. This means that when vehicles in pollutant emission categories S 2 or S 3 have been retrofitted with a particulate reduction system (Partikelminderungsklasse or PMK), they qualify for a more economical toll category (only when these conditions are met). For instance, vehicles in emissions class S2 in combination with PMK* 1, 2, 3 or 4 can take advantage of the lower toll rates of category C. Vehicles classified in emissions class S3 in combination with PMK* 2, 3 or 4 pay the category B toll rates.

**Table 3 Change of assignment to emissions classes by PMK in Germany**

<table>
<thead>
<tr>
<th>PMK</th>
<th>Without PMK</th>
<th>PMK 1</th>
<th>PMK 2</th>
<th>PMK 3</th>
<th>PMK 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>S3</td>
<td>Category C</td>
<td>Category C</td>
<td>Category B</td>
<td>Category B</td>
<td>Category B</td>
</tr>
<tr>
<td>S2</td>
<td>Category D</td>
<td>Category C</td>
<td>Category C</td>
<td>Category C</td>
<td>Category C</td>
</tr>
</tbody>
</table>

A tandem axle counts as two axles, while a tri-axle counts as three axles. Lift and suspended axles are always counted, regardless of whether a vehicle axle is in road contact or raised (i.e. without road contact) during transport. In accordance with Section 5 of the German Motorway Toll Act (Autobahnmautgesetz – ABMG) in conjunction with Section 7 of the Truck Toll Regulations (Lkw-MautV), toll road users are required by the Federal Office for Goods Transport (BAG) to provide appropriate documents to substantiate all information relevant for toll collection. For all trucks registered in Germany, Part I of the vehicle registration certificate (Fahrzeugschein) or the motor vehicle tax statement serves as sufficient proof of a vehicle’s emissions class (Lkw-MautV).
2.4. Charging objectives

The objectives of heavy goods vehicle tolling in Germany, implemented in 2005, were to:

- Introduce a national mileage-based infrastructure charging system for heavy trucks, applying the “user-pays” principle. This principle was intended to make a direct connection between road use and charging users for the impact their use caused, thus initiating a shift from traditional tax-financing of transportation infrastructure to user-financing.

- Secure funding for upgrade and maintenance of the transportation infrastructure. Unlike the US, where federal fuel taxes go into the Federal Highway Trust Fund, in Germany fuel taxes become part of the “general fund”, which is used to fund federal programs, including transportation infrastructure. However, the heavy goods vehicle toll revenues, are allocated (earmarked) exclusively to funding road, rail and waterway transportation infrastructure. This earmarking of heavy goods vehicle toll revenues was intended to complement the federal budget allocation to transportation, and help close the 2 billion euro annual funding gap for roads, 1.5 billion for rail and 0.25 billion for inland waterways (year 2000 estimates). Importantly, the expectation of closing or eliminating the road infrastructure funding gap was instrumental in securing support of the heavy goods vehicle tolling scheme by the trucking and logistics community.

- Provide incentives to shift freight truck traffic to rail and waterways. As part of the heavy goods vehicle tolling implementation, it was decided that 50 per cent of the toll revenues would go to finance the federal motorway infrastructure; the other 50 per cent would go to cross-subsidise other freight modes (38 per cent to rail and 12 per cent to waterways). This decision by the red-green coalition, which was intended to affect a better modal balance, was made despite violating the “user-pays” principle, and resulted in a reversal from initial stakeholder support to opposition for expansion of road tolling.

- Promote environmental interests and more efficient deployment of heavy goods vehicles. The decision to implement heavy goods vehicle tolls was strongly supported, and influenced, by a coalition of the ruling (at the time) Christian Democratic Party and the Green Party, who supported the provision of incentives through lower tolls for lower emission vehicles (euro class III to VI) and higher tolls for highest emission level vehicles (euro class I and II).

- Promote innovative tolling technologies. The heavy goods vehicle tolling system was envisioned to use electronic toll collection at free-flow speeds (no gates), automatically taking into account the type of road travelled, the distance travelled, number of axles and level of emissions.

2.5. Revenue generation and financing

2.5.1. Financing

Toll revenues are entitled to the Federal Government, revenues and expenses are accounted in the Federal budget and operated by a state-owned multi-modal transport infrastructure financing agency called VIFG (Verkehrsinfrastrukturfinanzierungsgesellschaft mbH). VIFG was established in 2003 as
an agency supporting transport infrastructure investments independent of the public accounting system.

Toll revenues raised by VIFG are earmarked for:

- enhancing transport infrastructure, mainly for federal road network
- operating the system.

VIFG collects the toll revenues from heavy vehicle tolling and the Parliament allocates fixed shares to the roads (50 per cent), to the railways (38 per cent) and to the inland waterways (12 per cent).

In 2006 Toll Collect collected EUR 3.08 billion. VIFG spent revenues from 2006 as follows: EUR 1.08 billion (50 per cent) for road building and maintenance, EUR 820 million for upgrading the federal railway network (38 per cent), and EUR 260 million for inland waterways (12 per cent).

Table 4 Expenditures funded by VIFG collected heavy vehicle toll revenues

<table>
<thead>
<tr>
<th>Year</th>
<th>Road</th>
<th>Rail</th>
<th>Waterway</th>
<th>Total expenditures</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>1114.70</td>
<td>246.70</td>
<td>271.10</td>
<td>1632.50</td>
</tr>
<tr>
<td>2005</td>
<td>1755.00</td>
<td>450.30</td>
<td>312.10</td>
<td>2517.40</td>
</tr>
<tr>
<td>2006</td>
<td>1297.70</td>
<td>682.50</td>
<td>227.20</td>
<td>2207.40</td>
</tr>
<tr>
<td>2007</td>
<td>1091.00</td>
<td>954.40</td>
<td>265.20</td>
<td>2310.60</td>
</tr>
<tr>
<td>2008</td>
<td>1311.90</td>
<td>1059.40</td>
<td>369.00</td>
<td>2740.30</td>
</tr>
<tr>
<td>2009</td>
<td>2099.90</td>
<td>1104.40</td>
<td>441.80</td>
<td>3646.10</td>
</tr>
<tr>
<td>2010</td>
<td>2041.40</td>
<td>1031.90</td>
<td>379.80</td>
<td>3453.10</td>
</tr>
<tr>
<td>2011</td>
<td>3311.50</td>
<td>-</td>
<td>-</td>
<td>3311.50</td>
</tr>
<tr>
<td>Total</td>
<td>14023.10</td>
<td>5529.60</td>
<td>2266.20</td>
<td>21818.90</td>
</tr>
</tbody>
</table>

Figure 6 Toll revenues vs. toll expenses
VIFG operate two kinds of infrastructure investments, known as A and F models which are two different PPP models for road and related infrastructure. Both have in common the transfer to a private partner of responsibility for the planning, construction, financing and operation of road stretches over a long period of the assets’ lifecycles, along with the transfer of the risks associated with these tasks. These models provide an interesting case study with regard to the potential impact of pricing policy, how a government might put in place legislation and tendering processes to create a PPP scheme, and institutional organisation within the government itself. These models differ only in the way in which the private partner is remunerated. Both are user-financed PPP models that transfer traffic-related revenue risks to the private partner. However, where the private partner is paid by the public authority (from income from the heavy goods vehicle toll on the same infrastructure) in the A-Model approach, in the F-Model, the private partner is remunerated by toll income from all vehicles and users on the stretch for which it is responsible. The A-Model is sometimes mistaken for a shadow toll, but this is not correct as it is funded by an actual charge levied for using the Autobahn. The toll is collected by the private company “Toll Collect” (a PPP project in its own right) on behalf of the government.

In 2003, a law for the establishment of the Transport Infrastructure Financing Company (VIFG) was passed, establishing the VIFG as a limited liability company under the ownership of the Federal Government. The act authorises the VIFG to finance the construction, extension, maintenance and operation of the federal trunk road and waterways networks, on behalf of the government. In addition, the company is also responsible for the financing of construction and extension works within the federal railways network operated by the Deutsche Bahn. The VIFG also took over certain tasks in relation to the preparation and realisation of projects based on the F-Model and corresponding privately financed projects within the transport sector. Thus, the VIFG can be regarded as a PPP Competence Centre for road infrastructure projects at the federal level. In order to fulfil these tasks, the VIFG receives income from the heavy goods vehicle toll and waterway charges.

**Caption for Figure 6**

- **EXPENDITURES**
  - Ausgaben für verkehrsträger = expenditures related to all transport modes, including user-financed construction and maintenance of federal trunk roads
  - Ausgaben für systemkosten = system costs including the costs encountered by Toll Collect to collect the heavy vehicle fee and the administrative costs of BAG and VIFG.
  - Ausgaben für harmonisiering = expenditures for “harmonisation” program (funding the compensation of motor vehicle tax revenues, innovation programs, the De-Minimis program, training and continuous education program).

- **REVENUES**
  - Geplante Mauteinnahmen = planned revenues
  - Verfügbare Mauteinnahmen = actual raised revenues
2.5.2. Revenue

VIFG receives the user charges from the LKW-Maut, distributes the proceeds from truck toll collections and also serves as a centre of transport expertise that helps the German Ministry of Transport plan and implement PPP and other projects involving the private sector. The VIFG supports the principle of a user-financed transport infrastructure.

The anticipated toll revenue, estimated at Euro 3 billion (approximately $3.9 billion in 2006 dollars) was exceeded during the second year of operations (2006), with revenue of Euro 3.08 billion ($4.8 billion). In 2007 revenue grew to Euro 3.4 billion ($5.3 billion). In 2010, total toll revenues were € 4.5 billion of which Euro 620 million was paid to Toll Collect for operating the toll system.

2.5.3. Collection costs

Current total collection costs are estimated at around 15-20 per cent of revenue.

2.6. Technology

Since 1 January 2005, Toll Collect has ensured successful operation of the truck toll system in Germany. The innovation in the system is the world’s first combination of GPS (Global Positioning System) for vehicle location with Global System for Mobile Communications (GSM mobile radio communications for data transmission—creating the basis for automatic toll collection. In addition, DSRC and ANPR technologies are used for enforcement.

2.6.1. The on-board unit

The heart of the automatic system is a clever microcomputer—the OBU—installed in the truck cab. The essential data for toll collection: the toll route network, the valid toll rate per kilometre, toll emissions class and number of axles of the truck, is stored on the OBU. The driver is responsible for checking the route data entered in the OBU (for example number of axles) and amending this information if necessary.

The OBU is provided to users free of charge by Toll Collect, but remains the property of Toll Collect even after installation. The cost of installation and any expense incurred by the user to facilitate this process is borne by the user. The OBU cost was initially 500 euros ($650) but has decreased since to 200 – 250 Euros.

The OBU receives satellite signals via GPS and, referencing this with a digitised road map, identifies whether the vehicle is on a toll route. The OBU then calculates the amount of toll due and transmits the securely encrypted data via mobile radio communications to the Toll Collect computer centre. Each revision of OBU operational data—for example, toll rates or new toll route segments—can be downloaded by GSM communications to the OBUs in the vehicles without impinging on normal driving.

In order to guarantee accurate toll collection and avoid faults with the OBUs, it is essential to ensure its proper use. A fundamental rule is that all installations and removals of OBUs and peripheral components, including antennae or Dedicated Short Range Communication (DSRC) modules), and maintenance work must be carried out exclusively by certified service partners.
2.6.2. Technological innovation

The German heavy goods vehicle tolling approach has successfully demonstrated that distance-based tolling can be implemented at a national level, using innovative technology: satellite-based (GPS), mobile communications (GSM), on-board computers (OBUs), Dedicated Short Range Communications (DSRC), license plate character recognition (OCR), as well as the internet and terminals. This national heavy goods vehicle toll system is able to accommodate 35 per cent of foreign through trucks and vehicle miles seamlessly.

Tolls have been successfully charged, with a reliability of 99.7 per cent, and enforcement-aided technology has been able to keep toll violations below 2 per cent.

The system is flexible and expandable: road segments can be added, time-of-day toll rates can be implemented, and differentiation by road type can be introduced, all without having to deploy any costly roadside infrastructure. Changes to the computer program and to the corresponding instructions to the OBUs are all that is needed.

2.6.3. Enforcement

To ensure compliance of users with their toll obligations, Toll Collect has made available a comprehensive enforcement system of automatic, stationary and mobile monitoring to the Federal Office for Goods Transport (Federal Office for Good Transport (BAG)). In the course of enforcement, the Toll Collect computer centre compares data for all monitored toll-liable vehicles, to check whether the monitored vehicles are logged-on to the toll. To enable this, the enforcement gantries and Federal Office for Good Transport (BAG) mobile patrols are equipped with the necessary enforcement technology so that the relevant data protection regulations are complied with.
The requirement is that 10 per cent of all truck trips are verified in order to achieve a violation rate of no more than 5 per cent. Substantial resources have been devoted to achieve this requirement: 300 gantries have been installed, each equipped with video cameras, license plate readers with infrared cameras, optical character recognition, and DSRC communications. At half of these gantry locations, there are stationary parking areas where enforcement personnel can check vehicles flagged by means of communications received from the gantries; there are about 280 mobile enforcement vehicles equipped with electronic equipment necessary to verify compliance. Finally, enforcement personnel have access to shippers’ premises where they can verify toll payments against manifests. It is important to note that the current violation rate is 1.7 per cent, which is substantially below the 5 per cent requirement.

2.6.4. Registration of road users and vehicles

The first step for convenient payment of tolls is the registration of the toll road user and their vehicles with Toll Collect. Registered users can select from three different log on options:

- automatic log on using an OBU,
- manual log on at a toll-station terminal
- manual log on via internet.

The automatic log on, using an OBU, is the easiest and most convenient way of paying the toll. The alternative options are the manual log on via internet, or at a toll station terminal. Registered users with a good credit rating can choose to use any of the various payment methods. Following registration, the company receives a vehicle card (chip card) for each truck. The vehicle card contains all the information necessary for toll collection, including vehicle registration, country of registration, emissions class, number of axles and gross vehicle weight. The user’s preferred method of payment can also be stored on the vehicle card. Even after issue to the user, the vehicle card remains the property of Toll Collect.

The easiest way to pay the toll is the automatic procedure using an OBU. However, the other log on options can also offer advantages. For instance, logging on manually at a toll station terminal is better suited for companies that seldom use German toll roads. You can log on via internet for up to three days before your journey.

2.6.5. Automatic log on using OBU

The mainstay of the satellite-based toll system is the automatic log on option with an OBU. Once users have registered, they can have an OBU installed in their vehicle. Using GPS satellite signals and other positioning sensors, the OBU automatically identifies when a vehicle is travelling on a toll road and calculates the road usage charges on the basis of the vehicle data filed on the OBU and the applicable toll rates. Toll information is encrypted and transmitted to the Toll Collect computer centre via wireless mobile communication. The Toll Collect computer centre generates the invoice (refer to Section 6: “Methods of payment”). Transparency is guaranteed: the toll statement or itemised journey
list (available to users as an option when registering) enables all registered users to track the toll amount payable and check that the charged amount is correct.

Figure 10 Automatic log on using the OBU

Using GPS signals, the automatic toll system continuously sends positioning data to the OBU. The OBU uses this data to track the truck position and continuously compares this position with the digital maps stored in the OBU memory. Additional sensors are used to support the mapping of the position in the OBU and thereby maximise the accuracy of the vehicle location finding. A system of linked positioning, using a gyroscope and speedometer signals, is used to check the vehicle movements and vehicle direction. Linked positioning is independent of GPS location finding. The results of satellite-based positioning and linked positioning are continuously compared.

The lengths of the toll route segments are stipulated by The Federal Highway Research Institute (Bundesanstalt für Straßenwesen (BAST)) and are stored on the OBU.

The OBU calculates the toll, on the basis of the specific route and toll rate data as well as the entered and stored vehicle data. This information is saved and transmitted to the Toll Collect computer centre via mobile communication signals. The information is sent each time a predetermined toll amount is reached or at predefined time intervals. If the OBU is not on, then the data is transmitted next time it is activated. When the driver switches off the vehicle ignition, the OBU is also switched off.

At the Toll Collect computer centre the toll charges are assigned to each user, on the basis of vehicle registration numbers. Then, at regular intervals—currently once a month—a toll statement is generated and sent to the company if any toll charges have accrued.

2.6.6. Manual log on at a toll station terminal

All registered and non-registered users can log on manually at a toll station terminal. These are identified by a Toll Collect sign and located near to access points, rest and service areas in Germany and in neighbouring countries near the border with Germany.

The log on process at a terminal is similar to purchasing a travel ticket from a vending machine. Drivers simply enter all relevant vehicle data along with the starting time, starting location and destination. The toll station terminal then calculates the shortest route within the toll road network.
Drivers can either accept the recommended route or modify it by inserting up to four interim locations, known as "waypoints", through which they want the journey to pass. Modifications can be made using the "Modify route" button and making a selection on the map. For this purpose, beginning at the starting location, the driver should select key points, such as the most important motorway junctions, as waypoints on the map.

When the driver is satisfied with the route, they confirm it and select the preferred means of payment. The system automatically calculates the estimated maximum route completion time. This is calculated from the starting time, the length of the route and a time buffer to allow for short breaks, traffic congestion and other delays. However, the time is calculated to prevent multiple use of a route with a single log on.

The driver is responsible for ensuring that there is sufficient time allowed for the statutory driving and rest periods. It is recommended that the journey commences as close to the start of the validity period of the log on as possible. Once the log on procedure is completed, the driver is issued a log on receipt containing the following information:

- vehicle data
- booked route
- length of route
- toll amount
- log on number
- period of validity

The user can log on up to three days before the starting time, for example the start of the period of validity of the log on receipt. All terminals are connected to the Toll Collect computer centre. Immediately after the user logs on, log on data is automatically transmitted to Toll Collect. This allows the system to determine whether vehicles travelling on a particular toll road are properly logged-on at all times.

Figure 11 Manual log on at a toll station terminal
2.6.7. Manual log on via the Internet

Manual log on via internet allows users to log on up to three days before starting their journey. In order to take advantage of this option, the company must be registered with Toll Collect. Users can request access to the Internet Reservation System when registering or subsequently by calling Toll Collect Customer Service.

Once logged into the system, all the user’s registered vehicles are displayed. The user can either select a vehicle already on the system, or enter the data for another vehicle, for example a rental truck. The user then specifies the starting point and destination for the route. The shortest possible route in the toll road network is then calculated automatically on the basis of this information. Users can either accept this recommended route or modify it according to their preferences by inserting up to four waypoints (i.e. motorway junctions through which the intended route is to pass). The toll system then calculates the period of validity and the amount of toll. If the user is satisfied with the recommended route, he/ she books it and receives a log on receipt with a log on number, which the driver can use as proof of correct toll payment during enforcement checks. The number is also required in the event of cancellations. The user can print the log on receipt directly or download it as an email attachment. This receipt includes a security code or “digital signature” that proves that the receipt is genuine.

2.6.8. Interoperability

In September 2011, Toll Collect released the TOLL2GO transnational, cross-system toll service for Austria and Germany. It is already being used by 30,000 vehicles. The advantage for toll system customers who use the new TOLL2GO service is that they only need one in-vehicle unit – the Toll Collect OBU – to pay toll charges in both countries. Some 2,000 transport and logistics companies, primarily in Germany, the Netherlands, Austria, the Czech Republic and Poland, have started using the TOLL2GO service since 1 September 2011. This confirms that the new toll service appeals to carriers who frequently operate vehicles weighing 12 tonnes or more in Germany and Austria. Registration for TOLL2GO is quick and easy and can be handled directly by ASFINAG via the fully electronic SelfCare portal (www.go-maut.at).
The new toll service was launched on 1 September 2011. A joint service provided by Austrian toll operator ASFINAG and Germany-based Toll Collect GmbH, TOLL2GO enables toll collection in both countries via the Toll Collect OBU. With TOLL2GO, the two companies are offering a toll collection service that is based on microwave technology and a satellite-supported toll system.

Unlike Germany, toll collection in Austria is based on microwave technology and uses the Austrian GO-Box. The Toll Collect OBU used in Germany will continue to operate with satellite-based technology, but will also support Austria microwave system. The Toll Collect OBU has been adapted for interoperability. When driving through a toll station on an Austrian motorway, the Toll Collect OBU triggers a toll transaction in exactly the same way as a GO-Box and transmits the billing data from the toll station to the ASFINAG computer centre. Although a single OBU is used, the customer still has a contract with each of the two toll operators. As in the past, toll invoicing by the two companies remains completely separate.

2.7. Institutional arrangements

2.7.1. The German Federal Government

The German Motorway Toll Act also authorises the German Federal Government to set toll rates by issuing statutory instruments (regulations).

2.7.2. The Transportation Infrastructure Financing Corporation (Verkehrsinfrastruktur-Finanzierungsgesellschaft or VIFG)

In 1999 a High Commission for Financing the Federal Transport Infrastructure was established to examine the funding problem and develop policy proposals. The Pällmann Commission, named for its chair Wilhelm Pällmann, developed a proposal to slowly convert Germany’s road financing system from solely tax-based funding to usage-based charging. Its 2000 report contained several policy proposals that were later adopted by the German Government. First, the commission recommended that a new highway financing company be created that could act independently from the state and have the ability to enter into PPPs. The Federal Government acted to create such an independent financing company, but for all transport infrastructure, not just roads. The Verkehrsinfrastruktur-Finanzierungsgesellschaft (VIFG), or Transportation Infrastructure Financing Corporation, was established in 2003. Its primary purpose is to mobilise private capital for infrastructure investment, but there are other advantages. As a corporation, it has greater financial management flexibility than the government to transfer financial resources between fiscal years. Also, the flow of toll revenues is more transparent for users, and the VIFG guarantees that revenues are dedicated to transportation system improvements. The Pällmann Commission also recommended a toll on heavy goods vehicles. On the issue of how to set the toll rate, the commission recommended a calculation based on infrastructure cost recovery, rather than meeting traffic management goals.

2.7.3. Toll Collect

The toll system was constructed and is administered by a company called Toll Collect. The legal provisions regarding the toll requirement determine the framework within Toll Collect acts as a contractor in terms of the public-private partnership.
Toll Collect is a consortium formed by Daimler-Chrysler (45 per cent, original controlling partner), Deutsche Telecom (45 per cent, current controlling partner) and Cofiroute (10 per cent). The system is a major undertaking that now affects over 1.5 million lorry drivers in Germany and the rest of Europe. The tolls collected, which amount to some €2.4bn per year, are being used by the government on road improvements and new road construction.

Toll Collect has developed and implemented the system for satellite-based toll collection and operates it as a reliable partner of the Federal Republic of Germany. In addition, the following duties have been transferred to Toll Collect as the government agent: establishing toll road usage, monitoring proper payment of the toll and retrospective collection of the toll in certain cases. As a private-sector company, Toll Collect has no influence on determining whether a vehicle is toll liable or toll exempt. The decision as to which vehicles are subject to the toll, which roads are subject to the toll requirement, the toll rates and the definition of emissions classes are matters for the German Parliament.

**Awarding of the contract**

The German Government officially awarded the contract for the system to Toll Collect in August 2002. This was contested by a rival consortium, AGES-MAUT (Shell, Vodafone and various financial institutions), but the case was lost and the contract stood. The government contract initially called for the system to be ready by August 2003, and severe financial penalties were incorporated for any delays.

Several delays occurred in the system development due to various technical problems, which led to an announcement of a cancellation of the contract in February 2004 (only one year to build such an extensive and complex system was not really realistic). A renegotiation of the contract followed in March 2004 with more realistic timelines and financial penalties agreed between the German Government and Toll Collect (who took a 5 per cent cut in fees).

The first phase of the system was up and running by January 2005 and a phase two modification was implemented by January 2006; hauliers had to install software version two into their OBU. A financial penalty of €780m was agreed if the January 2005 deadline was missed, but if the January 2006 deadline had been missed for version two the penalties were unlimited.

Thankfully the version two implementation went through on time. The German Government has lost €3bn because of the late introduction of the system and recovery of this has been pursued through legal arbitration.

To account for the renegotiations in the contract, Toll Collect carried out an extensive reorganisation of its resources to meet the new terms of the contract and gave Siemens a major role in the development of phase two of the project. The first phase was judged by independent observers as a success (it collected €665m in its first three months of operation).
2.7.4. The Federal Office for Goods Transport (Bundesamt fur Guterverkehr or BAG)

The scheme is administered and monitored by the Federal Office for Good Transport (BAG).

Federal Office for Good Transport (BAG) is also responsible for prosecuting toll infringements. If a toll-liable vehicle is found to have travelled a route, for which the toll has not been paid, the toll charge will be collected retrospectively. If it is not possible to accurately determine the actual distance travelled on toll routes, the toll is collected retrospectively as a fixed-rate charge for 500 km. During enforcement, Federal Office for Good Transport (BAG) records the necessary information, including the vehicle registration number and toll rates and subsequently institutes summary legal proceedings, which can lead to a fine of up to EUR 20,000. For minor infringements, fines between EUR 100 and EUR 400 can be imposed.

2.7.5. The Federal Highway Research Institute (Bundesanstalt für Straßenwesen or BASSt)

The Federal Highway Research Institute is under the responsibility of the Federal Ministry of Transport, Building and Urban Development (BMVBS).

Responsibility for the toll road network lies with BASSt. This was the body responsible for surveying the route segments that make up the toll road network. BASSt is also responsible for continuous updating of the road network (for example when new sections of road are completed). The up-to-date toll road network can always be checked on the Internet at www.mauttabelle.de.
2.8. Enforcement

The enforcement system monitors traffic to ensure that users pay the required road toll and adhere to the provisions of the German Motorway Toll Act (ABMG). These tasks are shared between the operator (Toll Collect) and the Federal Office for Goods Transport (BAG).

Initially predicted to be 5 per cent, the actual violation rate is less than 2 per cent. Fines are €400 for intentional violations and €200 for unintentional violations. The maximum fine is €20,000, and the responsibility for fines is split equally between the driver and shipper.

Toll Collect provides the necessary technical equipment, such as enforcement gantries and equipment for the Federal Office for Good Transport (BAG) patrol vehicles. The number and locations of the automatic enforcement gantries are regulated by the German Government. Toll Collect is also empowered to collect tolls retrospectively, where an enforcement gantry identifies vehicles that have not paid the correct toll. However, only Federal Office for Good Transport (BAG) is authorised to initiate summary legal proceedings in cases of infringements against the Motorway Toll Act, such as non-payment, incomplete payment or late payment of the toll, and to determine fines. Incomplete payment of the toll is a minor offence. Compliance with the toll requirement is enforced in the following ways:

- **Automatic enforcement:** 300 permanently installed enforcement gantries record approaching trucks and, in moving traffic, check whether trucks that are required to pay tolls are correctly logged onto the system. If an OBU is installed and switched on, the enforcement gantry checks whether the unit is correctly set up. The number plates of vehicles that have logged on manually and of all other vehicles required to pay toll are read out and compared with the data stored at the Toll Collect computer centre. If no log on is detected for a vehicle on the route being monitored, Toll Collect conducts the necessary investigations and, where appropriate, demands retrospective payment. Toll Collect is required to pass on all prosecution-related information to Federal Office for Good Transport (BAG), where it is assessed. If a vehicle is correctly logged on, the vehicle data is immediately deleted.

- **Stationary enforcement:** Data on potential toll violators can be transmitted to a Federal Office for Goods Transport (BAG) patrol stationed at a parking area near the enforcement gantry. Officials can then stop suspected vehicles for a more detailed inspection, allowing the Federal Office for Good Transport (BAG) patrols to immediately clarify the matter and impose on-the-spot fines, where justified.

- **Mobile enforcement:** Around 300 Federal Office for Good Transport (BAG) mobile teams monitor vehicles 24-hours per day to ensure that tolls are correctly paid. This ensures comprehensive and flexible toll enforcement throughout the toll road network. The mobile enforcement teams operate in a similar way to the automatic enforcement gantries, checking via the DSRC module whether the truck is participating in the automatic system and, if so, whether the number of axles has been entered correctly. If the monitoring shows that the truck is not participating in the automatic system, using an OBU, the enforcement team checks the vehicle registration against the manual log on data in the central database. Should the team have any doubts as to whether the toll has been paid correctly, the vehicle is stopped. If the initial suspicion is confirmed and the toll has not been paid correctly, the toll is charged immediately and summary legal proceedings may be initiated. Drivers of vehicles...
registered in a foreign country are required to pay a security deposit equivalent to the unpaid toll plus the anticipated fine and costs, before they are allowed to continue their journey.

- **Onsite enforcement:** Federal Office for Good Transport (BAG) officials also conduct spot checks at transport company sites throughout Germany. These checks are randomly conducted and partly based on genuine suspicion of a toll infringement. At transport companies, a check is made onsite to see whether the toll has been paid correctly in the past. For this purpose, transport documents, fuel receipts and tachograph discs, etc. are inspected. Toll enforcement takes place at all times of the day or night, seven days a week and on all segments of the toll road network. In cases where the proper payment of the toll cannot be established, the toll is always retrospectively charged for the actual distance travelled on the toll route. If the actual distance travelled cannot be established, a fixed-rate toll for a distance of 500 km is charged. In all cases, Federal Office for Good Transport (BAG) evaluates the information on the infringement and, where appropriate, institutes summary legal proceedings, which can lead to a fine of up to EUR 20,000.
2.9. The impact of the LKW-Maut

The introduction of the truck toll in Germany had immediate effects, some intended, others unintended; in some cases the consequences are not easy to determine. The leading topic of public debate was the question of avoidance traffic, or to what extent trucks avoid toll roads and use parallel routes. Several citizen groups formed and complained about increases of truck traffic on certain routes. The Federal Department of Transportation commissioned studies of these cases using traffic counts and traffic-model estimations to assess whether countermeasures were necessary. They found that traffic grew by more than 150 trucks per day on only 5 per cent of federal trunk roads (Bundesstrassen) and that night time traffic grew at twice the rate as daytime (15 per cent), amounting to about 15 trucks per night.

The impact of avoidance traffic was considered minimal, and the toll was extended to only three federal trunk roads starting January 2007. There are several explanations for the lack of significant avoidance traffic in Germany. Many potential alternate routes are closed to trucks via traffic regulations, and most roads about which citizens complained already had a high share of trucks. German trucking firms reported they could not afford the extra time consumed by alternative toll-free routes in urban areas at peak times. Avoidance traffic has been a more significant issue in neighbouring countries, in which trucks can use parallel high-speed motorways to avoid toll fees. For instance, more than 500 12-tonne vehicles per day were counted crossing the border from the Alsace region of France near Karlsruhe, Germany. France plans a new toll on such parallel routes to discourage spill over traffic.

Since introduction of the truck toll, there has been a clear shift in Germany toward trucks with better emission standards, partly the result of subsidies for the purchase of low-pollution vehicles. All vehicles in the EU have an emissions rating, starting from the threshold EURO 0 for the oldest and most polluting vehicles. Today, the cleanest trucks available are emissions class EURO 5 and 6. From 2005 to 2006, there were 2,700 new registrations of trucks above 12 tonnes in Germany, an increase of 24per cent. In that time frame, vehicle km driven by EURO 1 and 2 class vehicles in Germany declined by about 10per cent, while those by EURO 3 and above, grew at least that much. It is unclear to what extent this trend is attributable to the toll, to the subsidy, or to mandatory equipment replacement requirements, but the fleet change has contributed to lower vehicle emissions. Some vehicle purchases were spurred by an effort to avoid toll fees.

After the toll was announced, a number of marketing campaigns from truck manufacturers promoted HGVs just under 12 tonnes. Whereas in the years 1999–2002 about 4,000 vehicles between 10 and 12 tonnes were sold per year, the number nearly doubled to more than 7,000 vehicles in 2005, the first year of the toll. But the overall share of vehicles between 10 and 12 tonnes is still quite low, less than 3per cent of all trucks in Germany.

There has been a clear optimisation effect since introduction of the toll system. Trucking firms have been able to increase their efficiency and productivity. An indicator is the share of "empty trips" made, that is, cases in which trucks make return trips without a load. Trucking firms are increasingly making use of freight exchange marketplaces on the Internet to acquire loads. Before 2005, there was a general trend of fewer empty trips, but since the toll the percentage declined sharply to 20per cent of trips, nearly the lowest rate in the EU. It remains unclear whether the toll is leading to an increase in load weight per trip, because smaller loads taken for return trips are trending to lower average product weight. The toll has resulted in some increased costs to trucking firms. In most cases haulers are
unable to charge their customers for empty trips. That applies especially to the food, furniture, and construction industry. Federal Office for Good Transport (BAG) estimated an annual cost increase of 71,116 per truck used by trucking firms since the toll began.

Many supporters of the heavy goods vehicle toll hoped it would contribute to a modal shift of freight from road to more environmentally friendly railway transportation. This potential has not yet been realised, with rail capacity constraints one explanation. The share of road transport in the total transport task remained stable at 70 per cent while railways and waterways respectively carried 17 per cent and 10 per cent of the freight task.
## 2.10. Summary

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<td>Revenue distribution</td>
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3. The Swiss LSVA

3.1. Background

Switzerland, in its full name the Swiss Confederation, is a federal republic consisting of 26 cantons, with Bern as the seat of the federal authorities. The country is situated in western Europe, where it is bordered by Germany to the north, France to the west, Italy to the south, and Austria and Liechtenstein to the east.

Switzerland is a landlocked country geographically divided between the Alps, the Swiss Plateau and the Jura, spanning an area of 41,285 km². While the Alps occupy the greater part of the territory, the Swiss population of approximately 8 million people is concentrated mostly on the Plateau, where the largest cities are to be found. Among them are the two global cities and economic centres of Zurich and Geneva.

The Swiss autobahn/autoroute network has a total length (as of April 2012) of 1,763.6 km. The Swiss autobahn/autoroute network has not yet been completed; priority has been given to the most important routes, especially the north-south and the west-east axis. In addition, the Swiss road network is made up of 18,136 km of Cantonal roads and 51,446 km of municipal roads (2007 data).
3.2. Introduction of the Swiss Heavy Vehicle Fee (HVF) or Leistungsabhängige Schwerverkehrsabgabe (LSVA)

Although Switzerland lies at the centre of Europe, it is not a member of the EU. Because important transit routes—especially in the north-south direction—lead through Switzerland, Swiss (goods) transport policy always has an impact on its neighbours too. It is therefore no coincidence that transport issues have long been a key factor in the relationship between Switzerland and the EU. Transit traffic across the Alps has been, and is still, of central importance. The adoption of the constitutional article for the protection of the Alps in 1994 created a new dynamic in this relationship. Switzerland's intention of limiting the number of lorries led to impassioned reactions from the EU, which continued to demand unhindered free movement of goods. After negotiations that lasted for almost four years and were occasionally quite difficult, both partners agreed on joint solutions in the form of a land transport agreement. The solutions found allow both parties pursue their transport policy goals.

From a Swiss perspective, it was of particular importance that the EU explicitly recognised the main goal of Swiss transport policy, the transfer of traffic from road to rail. The most important instrument for the implementation of this goal is the HVF or Leistungsabhängige Schwerverkehrsabgabe (LSVA), which the EU also explicitly recognised. It is levied throughout the whole country, for example not only on transit routes. Domestic and foreign vehicles have to pay it. The charge thus corresponds to the principle of non-discrimination. In return, Switzerland committed itself to progressively increase its weight limit from the then 28 tonnes to the EU level of 40 tonnes. It also confirmed an earlier commitment to expand its rail network for transalpine traffic, in particular to construct two base tunnels at the Lötschberg and at the Gotthard crossings.

The result of the negotiations was recorded in the “Land Transport Agreement”. The Land Transport Agreement is one of seven individual agreements, the so-called bilateral agreements, which put Switzerland’s relationship with the EU on a new basis. Its central components are the establishment of an upper limit for the HVF rate and the increase of the weight limit to 40 tonnes. The permissible charging rate was set at a level that ensures that the resulting price for a transit journey on the route from Basel to Chiasso does not exceed 325 Swiss francs. A decision was also made to introduce the new regime of HVF and increased weight limit progressively. However, the land transport agreement not only regulates the questions of weight limits and the transit price. It also liberalises market access in road and rail transport. In road transport, the possibility for Swiss haulers to transport goods between two EU states, called Swiss home trade, was introduced in 2005. Swiss carriers, for example, can now load goods in Austria and transport them to Germany. In rail transport, Switzerland and the EU allow each other free access to the network. This enables cross-border competition between rail companies.

3.3. Structure of the Heavy Vehicle Fee

3.3.1. Vehicles paying the fee

The HVF applies to all domestic and foreign vehicles for the transport of goods (lorries, tractors and their trailers) with a total permissible laden weight over 3.5 tonnes, and applies to all distances and all roads driven within Switzerland.
3.3.2. Toll road network

Tolling all roads negated the need for the system to differentiate between road types as the German and Austrian system does.

3.3.3. Tonne kilometres as a basis

Calculation is based on a transit journey from Basel to Chiasso with an assumed average distance of 300 km. In their negotiations, Switzerland and the EU agreed a transit price for this journey of a maximum of 325 Swiss francs, for a 40 tonne vehicle. This gives a maximum rate of 2.70 centimes per tonne and kilometre (tkm). With the increase introduced on 1.1.2008, the maximum permissible rate has almost been reached. It is still possible to adjust the fee to take account of inflation.

The distance-related HVF applies to vehicles for passenger and freight transport with a total weight of more than 3.5 tonnes. The fee is calculated according to three criteria:

- km travelled on Swiss roads
- maximum authorised total weight
- pollutants emitted by the vehicle.

In the recording procedure, although not in the calculation of the fee, domestic and foreign vehicles are differentiated. Some vehicle classes are also subject to a special regulation independent of their origin.

3.3.4. The weight of the vehicle

To determine the fees, the distance travelled in Switzerland (in kilometres) is multiplied by the weight of the vehicle (in tonnes). The tonne-kilometres calculated are then multiplied by the rate of the fee. Here it is not the weight during operation that is important, but the maximum authorised weight according to vehicle licence. The use of the—continually changing—operating weight would have been impracticable. This solution also provides an additional incentive to use the vehicles to the fullest capacity and to avoid empty trips if possible.
3.3.5. The emission category

The rates of the fee are average values. They apply to the middle of three emission categories defined in the Ordinance on the HVF (Category 2). The Land Transport Agreement limits the maximum difference between one category and the next to 15 per cent.

- Fee category 1 (corresponds to Euro 0, I and II): 3.07 centimes per tonne-kilometre
- Fee category 2 (corresponds to Euro III): 2.66 centimes per tonne-kilometre
- Fee category 3 (corresponds to Euro IV–VI): 2.26 centimes per tonne-kilometre.

Table 5 Fee categories in Switzerland

<table>
<thead>
<tr>
<th>Emission standard</th>
<th>Fee category 1</th>
<th>Fee category 2</th>
<th>Fee category 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emission standard</td>
<td>Euro 0</td>
<td>Euro 1</td>
<td>Euro 2</td>
</tr>
<tr>
<td>Rate per tonne and per kilometre (tkm)</td>
<td>3.07 cents/tkm</td>
<td>2.66 cents/tkm</td>
<td>2.26 cents/tkm</td>
</tr>
</tbody>
</table>

3.3.6. Special regulations and exemptions

With a view to tourism, Switzerland has made exceptions for buses, mobile homes and caravans, which continue to pay a lower flat-rate fee. These vehicles do not require an OBU. Various types and categories of vehicle are completely exempt from the HVF (military, agricultural and public transport vehicles etc.).

3.3.7. Stepwise introduction

In order to give the transport companies time to get used to the new situation it was decided to introduce the new regime stepwise:

- 1.1.2001: – Introduction HVF at a rate of 1.6 Swiss cents and increase of the weight limit from 28 to 34 tonnes.
- 1.1.2005: – Increase of rate HVF to 2.44 Swiss cents, increase of weight limit to 40 tonnes
- 1.1.2008: – Increase of rate HVF to 2.70 Swiss cents.

3.4. Charging objectives

3.4.1. On the road to real costs

Over the past few years consensus has formed within Swiss transport policy (and increasingly within European transport policy), that transport should pay for all the costs it produces. If it does not, the state and the public face high expenditures, which are equivalent to an indirect subsidy. This leads to a disproportionate growth in transport, because it is too cheap. By internalising the full costs, this vicious circle, which is damaging to both the economy and the environment, can be stopped. In order
to realise real costs it is important to take external environmental and health costs into consideration, in addition to direct payments for the construction and maintenance of roads.

The majority of economists and political authorities support internalising the full costs according to the polluter-pays principle. The external costs must first be calculated. The Swiss Transport Department has carried out wide-ranging studies for the Federal Council. These had concentrated originally on the three areas of a significant size, and that could easily be given a monetary value: health costs and damage to buildings caused by air pollution, the costs of noise, and the costs of accidents. The external costs thus determined for goods transport by road came to almost exactly 1000 million Swiss francs. Taking into account the uncovered costs according to the road calculations and the necessary compensation for the HGV fixed fee, this sum was increased to 1150 million Swiss francs.

In recent years, these calculations have been updated. New areas have been included that had previously not been considered, such as landscape fragmentation and damage due to climate change. The areas that had already been quantified were recalculated on the basis of new scientific knowledge. It was found that heavy goods vehicle traffic currently causes external costs of 1,554 million Swiss francs. Taking into account the excess direct costs of 75 million Swiss francs, the shortfall to be covered by the HVF is reduced to 1,479 million Swiss francs.

In 2008, taking into account the increase in the fee, the net levy revenues amounted to 1,441 million Swiss francs. This left a shortfall of 38 million Swiss francs. The road transport industry lodged a successful appeal in the Federal Administrative Court against this method of calculation, in particular against the inclusion of congestion costs. However, the Swiss Federal Court annulled this decision on 19 April 2010 and confirmed that it was legal to include congestion costs and also confirmed the increase of the fee by the Federal Council on 1 January 2008.

The HVF forms part of a coordinated transport policy to reduce the impact of heavy vehicles, particularly in the sensitive alpine region, as well as to increase the model share to rail. It has arisen out of a need to curb the potential increase in heavy vehicle traffic through Switzerland resulting from the increase in weight limits: Its main objectives are to:

- internalise the external costs of the freight transport industry
- shift more freight transport from road to rail
- protect the environment of the Alpine Region
- finance new railway tunnels in the Alpine Region.

3.4.2. Adaptation of the Eurovignette directive

One step in the right direction was made with the revision of the directive on the charging of heavy goods vehicles for the use of certain infrastructures (Eurovignette directive), which regulates the road user charges for heavy goods vehicles in the EU. Key points of this revision, which came into force on 9 June 2006, include:

- application of road charges to vehicles from 3.5 tonnes (previously 12 tonnes)
- introduction of compulsory user charges not only on motorways, but also on other roads, and may include the whole network
- allowing user charges to be time-related
- the possibility of levying mark-ups in sensitive areas.
According to the law, the rate of the HVF may be at most three centimes per kilometre and tonne of total weight. In the Land Transport Agreement, Switzerland and the EU settled on a maximum transit price, which would permit an HVF of 2.70 centimes. This price scale is the result of the political agreement, but is also in line with one of the primary objectives of the HVF: internalising external costs, thus following the principle of real costs.

### 3.4.3. Calculation of the HVF rate

The principles and the broader framework for fee calculation are defined in the legal framework (Swiss constitution, HVF Act and HVF Ordinance): the fee burdens heavy vehicles according to the "polluter pays" principle (driving more leads to higher fees). To calculate the level of the HVF, the total transport performance in Switzerland was calculated for each weight category. These figures were then multiplied by the average weight in each category. For all classes combined, this gave the figure of 47 billion tonne-kilometres. Dividing the external costs figured out (1.15 billion Swiss francs, including the loss of the fixed fee) by this figure gives the value of 2.5 centimes per tkm; here the highest authorised tonnage is the deciding figure for calculating the HVF. The calculation uses 1993 as the base-line year; the data has recently been updated (see graph). Clean lorries can drive more cheaply. The HVF is environmentally efficient in two ways. It is related to transport performance and the weight category of each vehicle, and to the pollutant category. The toll is calculated using a division into three groups, corresponding to the EU pollutant categories. The maximum price difference between these groups is 15 per cent.

### Figure 16 HVF charge level

<table>
<thead>
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<th>Uncovered costs</th>
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<td>Summarise uncovered costs of heavy traffic:</td>
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<tr>
<td>• health care costs due to air pollution</td>
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<td>• noise</td>
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<tr>
<td>• accidents</td>
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<td>• congestion costs, etc.</td>
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<tr>
<th>Total transport performance</th>
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<tr>
<td>Calculate total transport performance (tonne.km). Unit: tonnes of revenue load carried one kilometre.</td>
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<th>Charge level</th>
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<tr>
<td>Calculating the rate: Divide uncovered costs by total transport performance. Unit: cents per tonne.kilometre</td>
</tr>
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</table>

### Figure 17 The external costs of heavy goods traffic in Switzerland in 2007

- **Total 1746 million Swiss francs**
  - Accidents 155
  - Noise 261
  - Health care costs due to air pollution 546
  - Climate costs 158
  - Damage to buildings due to air pollution 92
  - Nature and landscape 64
  - Congestion costs 269
  - Further domains 202
3.5. Revenue generation and financing

3.5.1. Financing large scale infrastructure projects

Any fiscal system generates expenditure as well as an income. The Swiss Parliament and the electorate decided to use the income from the HVF to increase the impact of transport policy even further.

Legislative approval was passed by the Swiss Federal Assembly and the member states comprising the Swiss confederation in 1994. However, it was not until 1998 that the legislation to implement the distance-based fee was accepted by a public referendum.

To gain public support for the referendum, the legislation to initiate a distance-based heavy vehicle fee included a provision requiring that two-thirds of the net income of the HVF be dedicated to the Confederation to finance large-scale infrastructure projects in the public transport sector (Finöv), which are essentially major rail infrastructure projects such as two new Alpine railway tunnels and the remaining third dedicated to the 26 Swiss cantons for road infrastructure projects. This includes the use of the money for building new bicycle paths if the existing route is not suitable for bicycles because of heavy vehicles.

Based on the outcome of the public referendum in 1998, the goals of the heavy vehicle distance-based fee were expanded to:

- pay for additional rail and road infrastructure
- pass some of the additional costs of road maintenance associated with heavy vehicle traffic back to the trucks
- encourage a shift in freight traffic from roadways to rail, particularly for through traffic.

The HVF will become the most important means of funding the new rail links through the Alps (NEAT), which will play a decisive role in transalpine transport of the 21st century. The HVF will remain important for the NEAT even after its construction. By strengthening the competitiveness of the railways, it ensures that the capacities of the rail infrastructure are used optimally and in a way that covers costs.

3.5.2. Revenue

The revenues generated by the HVF were approximately 800 million Swiss Francs (about $610 million) in 2002. For 2003, gross revenue was 843 million Swiss Francs. Cumulative program revenues are expected to reach 16 billion Swiss Francs (about $12 billion) by 2020. The collection costs associated with the fee are estimated to be about 5 to 7 per cent of the revenues collected.

In 2008, taking into account the increase in the fee, the gross levy revenues amounted to 1.441 million Swiss francs (equivalent to AUD$1.468 billion).

3.5.3. Collection costs

For 2003, the collection costs were 59 million Swiss Francs (7 per cent of gross revenue). Current total collection costs are estimated at around 5-7 per cent of revenue.
3.5.4. Public investment

Swiss Government investments in this initiative are €100 million in roadside equipment and background system, €60 million for the costs of OBU's (OBUs are distributed free of charge to domestic and foreign operators, the procurement cost of OBUs being €800 per unit) and €16 million incurred in annual operating costs. A team of 120 staff from the Swiss customs is employed to administer the system.

3.6. Technology

3.6.1. The OBU

The levying of the fee is only possible through the use of a well-functioning electronic system. The OBU plays a central role. Due to legal reasons, Switzerland could not declare the installation of an OBU mandatory for foreign vehicles. Therefore, domestic and foreign vehicles are treated differently. Two systems were developed, one for users equipped with an OBU and one for users without an OBU.

The procurement cost of OBUs is €800 per unit. Operators receive it free of charge, but they are responsible for its timely fitting and the associated cost. Installation costs are approximately €200 per unit.

The OBU must satisfy among others the following technical requirements:
- automatic recording of the kilometres travelled (through an electronic connection to the tachograph, which measures speed, distance travelled, stops, and time spent idling).
- automatic activation and deactivation at the national border through radio connections (DSRC)
- methods of monitoring vehicle performance (especially that the tachograph is functioning and has not been altered) and switching at the border using GPS and a movement sensor
- monitoring border crossing using GPS
- trailer recognition using a sensor

First generation OBUs are currently being replaced by new units (OBU 2). Both their design and their function largely correspond to that of the units originally installed. Since 2004, the Swiss OBU is compatible with the Austrian HVF system.
3.6.2. Vehicles covering small mileages

On request, vehicles covering only low mileage and not regularly crossing the border may be exempted from the installation of an OBU by the Directorate General of Customs. Such vehicles are equipped with an electronic tag, which is a simple means of identification. Kilometres subject to the fee are registered by means of a log book.

3.6.3. The procedure for domestic vehicles

For vehicles registered in Switzerland, the installation of an OBU is compulsory. The OBU is coupled with the tachograph and records the kilometres and tonnes-kilometres travelled. If the vehicle travels over the border, a DSRC beacon fitted above the road deactivates the registration. On returning to Swiss territory, the beacon reactivates the recording. The parameters for charging are either stored
directly into the OBU during the initialisation process (highest authorised weight and emission category of the vehicle), or can be entered by the driver (trailer weight upon coupling, or uncoupling of a trailer). The OBU records all the data to determine the fee tariff.

In principle, Cantonal Road Traffic Inspection Offices only grant registration to vehicles equipped with an OBU. Installation has to be carried out by an authorised workshop. Because the installation requires the replacement of seals, only workshops registered for the installation of tachographs can become authorised for OBU installation.

A microwave radio connection is needed to register changes in the status of the OBU (inland/abroad) and, to initiate the mileage registration device at border crossings. The same technology DSRC is used for control purposes on the Swiss road network. International standards are applied. A GPS antenna serves to control the status of the OBU (inland/abroad) and to register crossings of the border in case of piggyback transport. It can also be used to check the accuracy of the tachograph. The OBU displays information about its status to outside the vehicle (small lamps), and this allows, beside DSRC checks, visual checks on the proper functioning of the devices.

For the declaration of the trailers, the following alternatives are available:
- chip cards
- a selection menu in the OBU
- inserting information manually.

Inputs are only possible when the vehicle is at rest. Customs authorities investigate the plausibility of the details in their information system. The monitored, and if necessary corrected, data form the basis for calculating the fee and the appropriate monthly invoices.

**Figure 21 The procedure for domestic vehicles**

Data is read using a chip card and transmitted to Customs.

**The procedure for domestic vehicles**

- OBU
- Chipcard
- Lorry driver
- HVF information system at Customs
- Journey data
- Post
- Modem Internet
- 057/269
- 057/269 km
- LSVA
Microwave antenna (so-called DSRC beacons) are installed in some 80 border crossings, and HVF clearance terminals in some 100 customs offices. The units are linked to the central information (computing).

3.6.4. The procedure for foreign vehicles with OBU

The fitting of an OBU cannot be prescribed for foreign lorries. An operator may however fit it voluntarily. OBUs are distributed free of charge to domestic and foreign operators. The data will then be transmitted by radio to the central information system whenever the border is crossed, and forms the basis for regular invoices. The lorry driver must have an HVF account with Swiss Customs. In order to have OBUs installed in their vehicles, owners must commit to handling them properly and fulfilling the following conditions:

- opening a HVF account with the Directorate General of Customs
- depositing an adequate security
- installing the OBU at their own expense at an authorised workshop in Switzerland or in the Principality of Liechtenstein.

The declaration data is directly read out every time the vehicle leaves the country (beacon communication), and the fee is billed monthly.
3.6.5. The procedure for foreign vehicles without OBU

For vehicles without an OBU, an identification card, issued on the first entry into Switzerland, is used to record data. Upon entering Switzerland or the Principality of Liechtenstein for the first time, data relevant for the calculation of the HVF are registered in the central information (computing) system, and an ID card for the affected vehicle is handed to the driver. The appropriate data are also recorded in the central information system.

With each entry into the country, the driver inserts this card into the chip card reader at the clearance terminal and activates the data, which is stored in the system. This information is complemented by manually inserting mileage data from the tachograph and details about the trailer and mode of payment (fuel card, HVF account or cash). Customs randomly checks these declarations. The driver receives a receipt in two copies, which he or she completes with the new (actual) mileage and their signature when leaving the country. At the latest the fee must be paid in the customs office on leaving Switzerland, either in cash, or using a petrol or a credit card. An additional processing fee of CHF 10.00 is charged.

The data declared upon entering and leaving the country is randomly checked by the FCA. Clearance terminals are installed in almost all customs offices. Handling of the terminals is easy, as well for first-time users, and is based on a simple dialogue structure – available in many languages – on the terminal screen.

![The procedure for foreign vehicles](image)

**The procedure for foreign vehicles**

**Vehicle data**
- Account connection

**ID-card**

**Clearance Terminal**

**Receipt**

**Figure 24 Use of a toll station terminal in Switzerland**
3.6.6. The path to interoperability

Electronic technologies make it possible to record the data needed for charging without interrupting the flow of traffic. There are plans to standardise the systems at the European level, so that the OBUs can be used everywhere. This has already been partially achieved in the case of the HVF. Motorway tolls are levied in several European countries. Originally, this took place by stopping traffic at toll booths. Motorists and lorry drivers paid the tolls at the booths in cash, or at machines using credit cards. Over the past few years, electronic systems for levying charges have been introduced. They enable the payment to be carried out by radio, without the vehicle stopping, so that traffic jams do not form at toll booths. The information is transmitted from the device fitted in the OBU to the radio connection, which is mounted above the paying lane of traffic.

3.6.7. Uniform standards

It is desirable that one and the same OBU could be used to pay electronically throughout the whole of Europe, for example the way telephone calls can be made throughout Europe using one mobile phone. The jargon for this is interoperability. To produce interoperability requires uniform technical standards for the interfaces, uniform regulations on data formats and agreements between the toll companies on methods of payment. Switzerland helps to create uniform standards for charging systems by collaborating in the relevant international standards bodies, European Committee for Standardisation (CEN) and International Standards Organisation (ISO).

3.6.8. Interoperability guidelines of the EU

Not only was interoperability with electronic charging systems in Europe an important prerequisite for the Swiss HVF registration system from the outset, but it also conforms with EU policy for unobstructed movement of people and goods across borders. It was for this reason that the EU implemented guidelines calling for the introduction of an interoperable European charging system called EETS (European Electronic Tolling System) in 2004. With its decision of 8 October 2009, the EU Commission clearly defined this policy decision and determined a binding schedule. According to this decision, from October 2012 it should be possible to pay all the required fees across the entire EETS catchment area by means of a contract with a single supplier and by using a single recording device. Switzerland has already decided to join this initiative.

3.6.9. Swiss OBUs can be used abroad

A distance-related toll for lorries has been charged on motorways in Austria since the beginning of 2004. The Swiss OBU can be used for the Austrian electronic charging system because it uses the same technical standards and agreements have been reached with the Austrian toll company. A second generation of recording devices for the levying of the HVF is currently being developed. These could be used in a significantly higher number of countries, including in particular France and Italy. However, even if foreign OBUs are based on the same technical standards as Swiss ones, they cannot automatically be used for the HVF in return, because more functions are required for the HVF on account of the countrywide charging system. Records of the distance travelled from the tachograph have not been required in any other country up to the present. In the future, however, the collaboration of Switzerland in the introduction of the EETS will ensure that the recording devices envisaged for the EETS can also be used for the HVF.
3.7. Institutional arrangements

Implementation of the HVF was carried out by two government departments, separating the political and technical dimensions of delivery. The technical side involved developing a system for domestic and foreign vehicles and was found to be successful due to the team expertise on nation-wide project implementation, technology and project organisation. The political implementation was deemed successful due in part to the reinvestment of revenue in transport infrastructure and the link of the fee to the ‘polluters pay’ principle.

The maximum charge has been set as part of the Land Transport Agreement between Switzerland and the EU.

3.7.1. The Federal Council

In Switzerland, The Federal Council is the seven-member executive council, which constitutes the Federal Government of Switzerland and serves as the Swiss collective head of state.

The Federal Council is the governing authority of the country, responsible for coordinating policies and allocating resources to the State.

While the entire council is responsible for leading the federal administration of Switzerland, each Councillor heads one of the seven federal executive departments. For instance, one of these executive departments is the Federal Department of Environment, Transport, Energy and Communications (DETEC) made up of several offices, including the Federal Roads Authority (FEDRO), which is responsible for the construction, maintenance and operation of the national highway network.

The Federal Council decided that the levying of the HVF should not be privatised and delegated it to the Federal Customs Administration (FCA).

3.7.2. Federal Customs Administration

The procurement process in Switzerland was a classic ‘in house’ approach. The FCA was responsible for the development and implementation of the HVF collection system and its continued operation.

The FCA had a long-standing experience in implementing IT and automation projects. Throughout the project there was a good working relationship between the FCA, the consultants and the industrial suppliers based on clear specifications, fairness and trust. The back-office to support the scheme was developed by the in house IT team and is operated by customs staff. This approach has provided a very strong ownership of every element of the scheme. The on-board equipment was developed over a number of years with specialist suppliers of OBUs. The FCA was therefore, totally involved and specified every element of the system design. This approach was possible due to the very strong political support and legal framework for the scheme. Due to the tight time timeframe for implementation (four years), the system was limited to meeting the requirements of the FCA, being fee collection, and was based on existing principles for tax collection and known procedures.
Consequently, the FCA uses the most up-to-date equipment to collect the data for the HVF in the simplest and most reliable way. This required significant investments in technical infrastructure and equipment in the customs offices.

Customs plays an increasingly minor role in generating federal income; however, the FCA collects also fees and taxes of about 23 billion Swiss francs annually for the Confederation (including mineral oil, tobacco, vehicle and value added taxes).

3.7.3. The Swiss Cantons

The Cantons provide the Federal Customs Administration with substantial support. They collect the HVF of all vehicles, which have to be assessed on the basis of flat rates such as coaches. They record and update basic vehicle data from vehicles assessed on the basis of their performance, and transmit it to the FCA’s central information system. This information system is the core of HVF collection as it contains all information relevant for registration, control and billing.

The relevant period for fee collection is one calendar month. Owners of vehicles subject to the HVF have to read the data of the previous month from the OBU to a chip card at the beginning of each calendar month. The files are then transmitted to the FCA either by chip card (per mail) or electronically (per modem, internet). Fleet owners can also use the data for the management of their truck fleets. At the FCA, the data (declared by the vehicle owners) is fed into the information system where it becomes subject to plausibility tests. The checked and, if necessary, corrected data then forms the basis for the calculation of the fee and the billing. The fee is due 60 days after the end of the registration period and the bills have to be paid within 30 days.

![Figure 25: Billing process in Switzerland](image_url)
3.8. The impact of the HVF and its public acceptance

Introduction of the HVF involved high expectations and some fears. For this reason, the Confederation mandated an indepth study of the effects of the HVF in 2006. When assessing the results, some of which have since been expanded and updated, it should be noted that the HVF was not implemented in isolation, but that the weight limits were increased at the same time.

3.8.1. Gaining public support

By the rules of direct democracy, the electorate makes the final decision on many proposals. The government depended on a popular majority for the introduction of the HVF, and therefore the emphasis during stakeholder consultation was on benefits to the wider community. To make up for the disadvantages that resulted from not being a member of the EU, Switzerland wanted to conclude bilateral treaties with the EU. One of the EU conditions was raising the Swiss weight limit from 28 to 40 tonnes. Due to the fear of a significant increase in the number of 40 tonne foreign trucks entering the country, Switzerland had previously refused to increase the weight limit. In order to gain the acceptance of the trucking industry, the Swiss HVF included an increase in the allowable vehicle weight from 28 tonnes to 34 tonnes. The weight restriction was further increased from 34 tonnes to 40 tonnes in 2005 along with the introduction of another fee increase.

Swiss public are very environmentally conscious, especially of the threats to their sensitive alpine region. Support for an environmental charge for heavy vehicles through the Swiss alpine region was high, especially due to the high percentage of foreign transit traffic. It was accepted that the change from a flat fee with a low rate to a distance-related fee with a much higher rate was a suitable means to make up for raising of the weight limit and therefore would meet the needs of Switzerland and the EU. Other factors that proved essential in gaining acceptance of the fee included the wider transport policy and that the fee is an essential part of a transport policy, aimed at transferring goods from road to rail.

This policy has been accepted by Swiss people in several referendums on:

- use of the revenue: the revenue is reinvested in the transport sector, mainly for projects in public transport, thus supporting the policy of transferring goods from road to rail
- practical technical solution: the technical solution is simple, reliable and suited to meeting the objectives of the scheme
- polluter-pays principle: calculation of the fee takes the external costs of heavy goods road transport into account.

3.8.2. Increased efficiency

The new traffic regime with the HVF and an increased maximum permissible weight has resulted in a significant increase in efficiency. Between 2001 and 2005 the number of kilometres travelled by heavy goods traffic (kilometre performance) decreased by 6.4 per cent, whereas the goods transported (transport performance), measured in tkm, increased by 16.4 per cent. Since then, the numbers of kilometres travelled has increased again. However, as shown on Figure 26, this figure would have been much higher had the old regime continued. In specific terms, 19.4 per cent fewer kilometres have been covered (see graph). According to a separate study 28 per cent of the kilometres saved are due to the HVF, with 72 per cent being due to the increase in weight limit.
3.8.3. Positive effects on environment

The fact that the fee amount depends on the weight and emissions of the individual lorry resulted in a significant move towards renovation of the lorry fleet in the year before the HVF was introduced. Reduction in the emission of noxious substances per vehicle, combined with the reduction in kilometres travelled, has resulted in a substantial drop in the volume of pollutants attributable to heavy traffic. As it is difficult to measure the pollution attributable to heavy goods traffic in the field, the reduction of pollutants had to be calculated with the help of models. In order to obtain a comprehensive environmental balance, the reduction in road freight transport emissions due to the new regime also had to be compared with the increase in rail transport. The bottom line of the environmental balance is positive, particularly regarding air pollutants. They improved by 10 per cent (particle emissions) and 14 per cent (nitrogen oxides). The reduction of emissions was lower for CO2, which decreased by only 6 per cent. Overall, it has been possible to save 105,000 tonnes of CO2 or 325 GWh compared to the reference scenario (28 tonne limit, no HVF).

3.8.4. Effects on the labour market

With about 14,000 full-time equivalent employees, the number of people employed in road transport remained virtually stable. Because transport volumes have increased significantly, this lack of change confirms the identified gain in efficiency. According to computer modelling, retaining the old regime with a maximum permissible weight of 28 tonnes and without an HVF would have led to a significant increase in the number of people employed, bringing it to a total of 16,500. However, according to the same model, 900 people fewer would have been employed in the rail sector in 2005.
3.8.5. Negligible effect on consumer prices

The impact of the HVF on prices remained low for various reasons. Firstly, thanks to the increase in efficiency, a significant proportion of the costs of the HVF could be offset. Secondly, the remaining additional costs could not all be passed onto consumers (according to representatives of the transport sector, depending on the company, between 40 per cent and 100 per cent of the additional costs of domestic transport were passed on). Thirdly, transport costs represent a comparatively small proportion of the end costs of a product. Seen as an average of all statistically collected groups of goods, the new regime has resulted in a cost increase of only 0.11 per cent.

3.8.6. Different regional impacts

The effects of the new transport regime on mountain and peripheral areas have been studied in depth. It was shown that the new regime did have a greater impact on these regions than on the rest of Switzerland. The main reason is that it is more difficult to access these areas with 40 tonne vehicles. With a calculated additional annual burden of 40 Swiss francs per employee in mountain and peripheral regions, however, this difference is small. Thanks to the special consideration given to mountain and peripheral areas in the distribution of the HVF, these additional impacts are more than compensated for. It is interesting to note that the borderline between lower and higher impacts corresponds only partially to the borders between the mountain and peripheral regions and the other regions. The impact on some regions on the Central Plateau is significantly higher than it is in certain mountain and peripheral regions.

3.8.7. Unchanged modal split

Despite the rise in transport costs for road freight, no significant change was observed in the modal split (the proportion of freight transported by different modes). This is due to different trends that partly compensate each other. The new transport regime for rail, for example, has led to advantages for light goods. On the other hand, road transport achieved a productivity gain due to the increased weight limit. The reduction in transport subsidies in 2005 worsened the basic conditions for rail. Finally, it should be noted that the choice of transport mode—particularly in international transport—depends on different factors; with reliability and simplicity being at least as important as price.

3.8.8. Number of trips reduced

Development in the transalpine road haulage sector was uneven in the first few years after the introduction of the new transport regime with the HVF and the new weight limits. However, this was due not so much to the new transport regime but more to special circumstances. On the roads, the Gotthard tunnel remained closed for two months because of a fire in October 2000. This was followed by severe restrictions, and the Gotthard route was closed again in June 2006 following a rock fall. On the railways, the Monte Olimpino tunnel south of Chiasso was closed, first completely and then partially, which affected rail transport. Despite the aforementioned events, the previous trend was clearly broken (see Figure 27). Not only was the new regime able to stop the continual growth since the opening of the Gotthard road tunnel, but it also initiated a phase of significantly decreasing numbers of transalpine road freight vehicles. Between 2001 and 2006 the number of such vehicles decreased from 1,400,000 to 1,180,000. This corresponds to a decrease of 16 per cent. Since then, however, traffic has been on the increase. In 2010, 1,257,000 heavy goods vehicles crossed the Swiss Alps.
3.8.9. The effect of the new transport regime

The decrease in the number of transalpine road freight journeys observed until 2006 is due to the HFV and the higher weight limit. Because of the change from a flat-rate charge to a distance-related charge, foreign vehicles could no longer cross Switzerland for a token sum of 40 Swiss francs, but had to pay an amount about eight times higher. This significantly higher transit price is only worthwhile for efficient vehicles carrying full loads. This is reflected in changes to the composition of vehicle fleets. In the first years of the new regime, there was an extraordinary increase in the number of semi-trailers. This development was compensated by an even more pronounced drop in the number of lorries. The number of goods vehicles with trailers remained virtually constant. These shifts were clearly due to the higher weight limit. The traffic that was diverted out of Switzerland because of the lower weight limit, and which moved back when the weight limit was increased, is almost exclusively composed of semi-trailers. At the same time, journeys with lorries were replaced by journeys with semi-trailers, because the latter allow an optimum use of the higher weight limit. This second reason also explains the significant decrease of the number of lorries. Due to the shift from light lorries to heavier semi-trailers, the weight loaded per vehicle has increased considerably. This is why the modal proportion of road freight increased initially from 30 per cent to 37 per cent. Since then, the shift between vehicle categories has levelled off.

3.8.10. Outlook

Since 2007, traffic has been on the increase again. The decrease in 2009 is due to the economic slump. Although the opening of the Gotthard rail base tunnel, scheduled for 2016, is an important prerequisite for further steps to transfer traffic from road to rail, it will not have enough impact on its own. The Confederation therefore plans to introduce additional instruments. Priority is being given to the Alpine Crossing Exchange. This would regulate the right of transit for heavy goods traffic with the help of the market economy. The overall number of annual permissible journeys would be fixed in the form of auctionable Alpine crossing rights. In order to prevent traffic diverting via other routes, the introduction of this measure will have to be coordinated with neighbouring countries. The new Freight Traffic Transfer Act authorises the Federal Council to enter into the relevant negotiations with the EU. Scientific studies commissioned by Switzerland and other Alpine countries are currently underway. They aim to answer questions linked to the possible introduction of an Alpine Crossing Exchange (and other tools providing incentives).

Figure 27 Heavy Goods Vehicles through the Swiss Alps
### 3.9. Summary

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong></td>
<td>Date of introduction</td>
<td>Jan-01</td>
</tr>
<tr>
<td><strong>2</strong></td>
<td>Institutional operator (levying of the fee)</td>
<td>Federal Customs Administration (FCA)</td>
</tr>
<tr>
<td><strong>3</strong></td>
<td>Technical operator</td>
<td>Fela Management AG (Tripon OBU)</td>
</tr>
<tr>
<td><strong>4</strong></td>
<td>Type of vehicles charged</td>
<td>Heavy Vehicles (GCW&gt;3.5 tonnes)</td>
</tr>
<tr>
<td><strong>5</strong></td>
<td>Charging objectives</td>
<td>1. To internalise the external costs of the freight transport industry, 2. To shift more freight transport from road to rail, 3. To protect the environment of the Alpine Region and 4. To finance new railway tunnels in the Alpine Region</td>
</tr>
<tr>
<td><strong>6</strong></td>
<td>Factors which vary charge rate</td>
<td>Distance, weight and emissions. Weight limited have lifted from 28-40 tonnes</td>
</tr>
<tr>
<td><strong>7</strong></td>
<td>Typical fee for a prime mover + semi-trailer (in cents per tonne.km)</td>
<td>CHF 0.904 /km (AUD 0.92 per km for a 5 axle truck with 30 t payload)</td>
</tr>
<tr>
<td><strong>8</strong></td>
<td>Technology used (GPS, DSRC, Tachograph)</td>
<td>Tachograph to measure distance travelled + DSRC/Gantry for OBU activation + GPS to control the status of the OBU</td>
</tr>
<tr>
<td><strong>9</strong></td>
<td>On-board units in use</td>
<td>55500 (53000 for domestic vehicles and the rest for foreign vehicles)</td>
</tr>
<tr>
<td><strong>10</strong></td>
<td>OBU cost</td>
<td>€800 per unit</td>
</tr>
<tr>
<td><strong>11</strong></td>
<td>ID cards for foreign vehicles</td>
<td>300000</td>
</tr>
<tr>
<td><strong>12</strong></td>
<td>Coverage</td>
<td>Whole of the Swiss Road Network</td>
</tr>
<tr>
<td><strong>13</strong></td>
<td>Gantry numbers (where data was available)</td>
<td>215</td>
</tr>
<tr>
<td><strong>14</strong></td>
<td>Border crossings with appropriate equipment</td>
<td>87</td>
</tr>
<tr>
<td><strong>15</strong></td>
<td>Automatic control stations</td>
<td>24</td>
</tr>
<tr>
<td><strong>16</strong></td>
<td>Self-service machines</td>
<td>151</td>
</tr>
<tr>
<td><strong>17</strong></td>
<td>Daily entries/exits with OBU in each direction</td>
<td>Approx. 4000</td>
</tr>
<tr>
<td><strong>18</strong></td>
<td>Daily entries/exits without OBU in each direction</td>
<td>Approx. 7500</td>
</tr>
<tr>
<td><strong>19</strong></td>
<td>Use of cameras/ANPR</td>
<td>At fixed enforcement stations</td>
</tr>
<tr>
<td><strong>20</strong></td>
<td>Interoperability</td>
<td>Swiss OBU can be used in Austria.</td>
</tr>
<tr>
<td><strong>21</strong></td>
<td>Economic impact</td>
<td>In the 1st year of the tax, the volume of HV traffic fell by 7% whilst price hikes feared by economists have not materialised.</td>
</tr>
<tr>
<td><strong>22</strong></td>
<td>Per centage of foreign vehicles</td>
<td>Up to 75% road tonne.kms</td>
</tr>
<tr>
<td><strong>23</strong></td>
<td>Modal split</td>
<td>Rail - 72% (pre-toll when there was a ban on trucks over 28 tonnes)</td>
</tr>
<tr>
<td><strong>24</strong></td>
<td>Cost of road side equipment and background system</td>
<td>150 M CHF</td>
</tr>
<tr>
<td><strong>25</strong></td>
<td>Total investment</td>
<td>240 M CHF</td>
</tr>
<tr>
<td><strong>26</strong></td>
<td>Gross income per year</td>
<td>1441 million CHF in 2008 (AUD$1.468 billion)</td>
</tr>
<tr>
<td><strong>27</strong></td>
<td>Operating costs (in $ and as a % of toll revenue)</td>
<td>5-7%</td>
</tr>
<tr>
<td><strong>28</strong></td>
<td>Total staff dedicated to the HVF</td>
<td>120</td>
</tr>
<tr>
<td><strong>29</strong></td>
<td>Revenue distribution</td>
<td>2/3 of the net income dedicated to the Confederation to finance large-scale infrastructure projects in the public transport sector (Finöv) AND 1/3 dedicated to the 26 Swiss cantons for road infrastructure projects</td>
</tr>
</tbody>
</table>
4. The Austrian GO-Maut

4.1. Background

Austria, officially the Republic of Austria, is a landlocked country of roughly 8.47 million people in Central Europe. It is bordered by the Czech Republic and Germany to the north, Hungary and Slovakia to the east, Slovenia and Italy to the south, and Switzerland and Liechtenstein to the west. Its territory covers 83,855 sq km (32,377 sq mi) and its terrain is highly mountainous due to the Alps; only 32 per cent of the country is below 500 metres (1,640 ft), and its highest point is 3,798 metres (12,461 ft).

Austria is a parliamentary representative democracy comprising nine federal states. The capital and largest city, with a population exceeding 1.7 million, is Vienna. Austria joined the EU and signed the Schengen Agreement in 1995.

The Austrian motorway (Autobahnen) and expressway (Schnellstraßen) network has a total length (as of April 2012) of 2,175 km.

Figure 28 Map of Austria
4.2. Introduction of the Austrian GO-Maut

In Austria, the use of motorways and expressways is subject to payment of a toll. All motor vehicles with a maximum permissible gross weight of up to 3.5 tonnes – cars, motorbikes and campervans – are obliged to display the mandatory toll sticker. Depending on the type of toll sticker they have purchased, drivers may use the toll road network for a specific period of time.

Since 1 January 2001, all trucks, buses and large motorhomes with a maximum permissible gross vehicle weight of over 3.5 tonnes are subject to tolling on Austria’s motorways and expressways. Tolls are collected fully electronically without impacting the flow of traffic and using microwave technology.

All revenues gained through sales of toll stickers, the tolling system for vehicles over 3.5 tonnes gross weight (GO-Box) and special toll routes are exclusively reinvested in construction, operation and safety on the primary road network in Austria.

4.3. Structure of the GO-Maut

4.3.1. Vehicles paying the fee

All trucks, buses and large motorhomes with a maximum permissible gross vehicle weight of over 3.5 tonnes are subject to tolling on Austria’s motorways and expressways. Tolls are collected fully electronically without impacting the flow of traffic and using microwave technology (multilane free-flow system).

4.3.2. Toll road network

The Austrian toll road network is made up of Austria’s motorways and expressways. The total length of the tolled network is approximately equal to 2,175 km in 2011.
The Austrian highways (autobahnen in German) are controlled-access highways in Austria. They are officially called Bundesstraßen A according to the Austrian federal road act (Bundesstraßengesetz). The Austrian Autobahn network has a total length of 1,699 km (1,056 mi) as of 2007.

The Schnellstraßen (Bundesstraßen S) limited-access highway system has a total length of 462 km (287 mi). To use Schnellstraßen, a vignette or GO-Box is required as well. Schnellstraßen are very similar to the Autobahnen; the main difference is that they are more cheaply built with smaller curve radius and fewer bridges and tunnels. As they fit better with the mountainous topography of Austria, they often serve as an Autobahn substitute.

4.3.3. Toll amount

Depending on the number of axles and the EURO emission class, vehicles with a maximum permissible gross weight of more than 3.5 tonnes are classified into three categories and rate groups (A, B, C and D) to calculate the appropriate toll. The toll classes and toll rates are governed by the Austrian Tolling Regulations (which includes special toll sections) and can be found in the Federal Road Tolls Act.

Figure 30 Austrian toll amount according to Euro emission classes and number of axles

<table>
<thead>
<tr>
<th>Rate group</th>
<th>Category 2</th>
<th>Category 3</th>
<th>Category 4+</th>
</tr>
</thead>
<tbody>
<tr>
<td>A EURO emission class EURO VI</td>
<td>0,145</td>
<td>0,2030</td>
<td>0,3045</td>
</tr>
<tr>
<td>B EURO emission class EURO EEV</td>
<td>0,150</td>
<td>0,2100</td>
<td>0,3150</td>
</tr>
<tr>
<td>C EURO emission classes EURO IV &amp; V</td>
<td>0,165</td>
<td>0,2310</td>
<td>0,3465</td>
</tr>
<tr>
<td>D EURO emission classes EURO 0 to III</td>
<td>0,187</td>
<td>0,2618</td>
<td>0,3927</td>
</tr>
</tbody>
</table>

Ratios in EUR per kilometre driven (excl. 20 per cent VAT)

Toll rates were determined in 2004, in accordance with Directive 1999/62/EC of the European Parliament and the Council of 17 June 1999 on the collection of fees for the use of certain roads by heavy commercial vehicles. The following costs were taken into account to determine the rates of the toll collection system:

- capital costs
- investment costs
- construction costs
- operational costs
- maintenance costs
- administrative costs

The toll tariff system based on emission categories was implemented in accordance with the EU’s Eurovignette Directive. The truck toll was implemented nationally through the Bundesstraßen
4.4. Charging objectives

The objectives of the toll system are to:
- reduce pollutant emissions
- improve road safety
- improve and maintain Austria’s road infrastructure.

Constructing and maintaining motorways and expressways in Austria is a cost-intensive task. As ASFINAG is funded exclusively through toll revenues, a usage-based system was established ensuring costs are allocated fairly according to distance covered on the road network. Those who make greater use of the road network therefore have to pay a higher toll. The tolls collected are used for improving Austria’s road infrastructure.

4.5. Revenue generation and financing

As per Moody’s credit analysis of ASFINAG in 2011 (see Figure 31 below), the heavy vehicle toll is ASFINAG’s main source of revenues.

Following dramatic revenue growth in 2004 with the introduction of the truck-toll charge (distance-based), ASFINAG’s operating revenue continued to increase (with the exception of 2006) up to 2008, due to strong economic growth; the increase in traffic flows; and the indexation of toll prices implemented in 2008. However, revenue in 2009 was impacted by the economic crisis, dropping 7 per cent year-on-year to €1.4 billion (see figure below). Especially impacted was revenue from the truck-toll charge (13 per cent year-on-year), which had become ASFINAG’s main revenue source. Revenue has returned to 2008 levels in 2010 alongside the economic recovery (specifically a strong rise in revenue from the truck-toll charge).

![Figure 31 ASFINAG revenue composition (Moody’s credit analysis – June 2011)](image-url)
ASFINAG’s expenditure is typically dominated by expenses related to construction and maintenance, which accounted for 80 per cent of its total operating expenses (excluding depreciation) in 2010. This is in line with the company’s plans to keep structural maintenance costs at around €350 million per year. For 2011, structural maintenance costs are expected to rise temporarily to €410 million, linked to the central government’s economic stimulus program.

Until 2016, ASFINAG will make investments of 6.5 billion euro in Austria’s primary road network. By making these investments, ASFINAG will ensure the quality and safety of the entire motorway and expressway network in the future. At the same time, this needs-oriented construction program takes account of the uncertain income perspective (resulting from the general economic situation), the long-term goal of ASFINAG’s debt relief and the Federal Government’s clear mandate to cut costs.

Compared to the construction program presented in 2009, ASFINAG has thus reduced the amount to be invested by 2.5 billion euro down to 6.5 billion euro earmarked for investments until 2016. In the interests of ASFINAG’s customers, measures aimed at increasing road safety, maintaining the existing network and relating to the legally enshrined expansion of tunnel safety remained untouched by this reorientation of the construction program.

The preparation of this construction program was based on a forecasted increase in debt levels to approximately 4 billion euro by 2019. This is attributable to the economic crisis of the years 2008 and 2009, which resulted in a decline in mileage covered on the ASFINAG network and led to a decline in toll revenues. Against this background, ASFINAG made cutbacks in its construction program until 2016 in order to ensure a needs-based expansion of the network by re-dimensioning the program.

Figure 32 Planning of toll revenues before and after the decline in mileage in 2009 (mainly due to the GFC)

![Figure 32](image)
4.6. The technology

4.6.1. The toll system

The toll system, which does not require the vehicle to stop, or use a specific lane while the toll is being collected (multilane free flow system), has been in operation since 1 January 2004. The technology applied is based on a DSRC system that meets the European DSRC Standards requirements as specified under CEN TC 278.

The system is conceivably simple: it consists of two components visible to the driver: the toll gantries and the OBUs, called GO-Boxes, which drivers are obliged to install in their vehicle. The GO-Box is about the size of a cigarette box, it ensures proper toll collection from inside the vehicle.

The Austrian motorway and expressway network is subdivided into individual road sections with a special toll rate defined for each. Each of these road sections is fitted with automatic toll collection stations installed on gantries. As the toll collection gantries are located between the individual junctions (rather than at the access or exits ramps) the system used in Austria is known as an open or free flow toll collection system. When a vehicle passes through the toll gantry, its OBU (the GO-Box) communicates with the receiver installed on the gantry and the toll is automatically collected.

![Figure 33 Automatic toll collection stations installed on Austrian gantries](image)

The toll itself is collected in two ways: either the data processing centre of ASFINAG Maut Service GmbH saves the invoicing data and the customer pays the toll at a later date using the preferred payment method available—credit or fuel card—or the toll is directly debited from the prepaid credit on the GO-Box.

An acoustic signal from the OBU, the GO-Box, tells the driver if the toll has been properly collected based on the preset category. This convenient way of paying toll is warranted by gantries fitted with microwave antennas.

The antennas communicate with the OBU when the vehicle passes underneath the gantries. In the process, the toll is debited automatically—either from pre-paid credit (pre-pay method) or the data processing centre saves the invoicing data and the customer pays the toll at a later date of their choice—by GO Direct, credit or petrol card (post-pay). The signals between gantry and GO-Box are...
then exchanged in the high-frequency range with minimal power drain (substantially less than mobile phones). The process is completely safe and poses no health risks.

The toll system is an open system: There is no need to place the toll gantries at the beginning and end of each road section subject to tolling. Instead, they can be positioned between the junctions to the primary road network. The drivers of vehicles subject to tolling do not have to switch to a particular lane, nor do they have to slow down or stop, which explains why this advanced toll system is also called multilane free-flow system.

One toll gantry is required for each road section and direction of travel. Overall, some 400 toll gantries have been set up, most of them over both carriageways. As a result, there are approximately 800 toll collection points. Many of these gantries have been fitted to serve as enforcement stations. They are able to register the details of toll evaders and transmit them to the toll enforcement officers.

The safety of all road users was given special attention when implementing the toll gantries: every single gantry was set up according to the most stringent safety standards and equipped with impact absorbers.

4.6.2. The on-board unit

The OBU are owned by ASFINAG and rented out upon payment of a one-off processing fee of EUR 5.00 incl. 20 per cent VAT. Therefore, the customer is obliged to return the units to ASFINAG if they are no longer required. The GO-Boxes are sold mainly at the around 180 GO points-of-sale in Austria and in the border regions of neighbouring countries.

All vehicles with a maximum permissible gross vehicle weight of over 3.5 tonnes that are subject to mandatory tolling require an OBU when using the Austrian motorway and expressway network. The “GO-Box” is attached to the inside of the windscreen. The costs for OBUs or GO-Boxes are far lower than those for the equipment necessary for a GPS/GSM system, with GO-Boxes not requiring any workshop visit to boot. What is more, this state-of-the-art technology warrants high efficiency when it comes to identifying offences and the microwave system enjoys higher acceptance thanks to its greater user-friendliness.

ASFINAG has introduced the state-of-the-art GO-Box system to ensure that the tolling process is as user-friendly, simple and efficient as possible for its customers.

Whenever a vehicle passes through a toll gantry a microwave signal is transmitted enabling the GO-Box to charge the appropriate amount and thus ensuring correct handling of tolling.

Compared to other toll systems, the GO-Box and the underlying microwave present the following advantages. It is a:
4.6.3. Payment of the toll: pre-pay and post-pay procedures

Registered vehicle owners can choose whether they want to pay the toll by an authorised means of payment in arrears (post-pay), by acquiring toll credits in advance that are saved on the GO-Box (pre-pay) or directly to ASFINAG using GO Direkt.

Pre-pay procedure
This system is similar to mobile phone pre-pay card systems. The customer buys toll credits up to a certain maximum amount in advance and then “consumes them”. Means of payment accepted for this procedure are: cash, the electronic “Quick” payment system, debit cards (Maestro), fuel and credit cards.

Post-pay procedure
Registered vehicle owners who use the toll system frequently have the option of using the post-pay procedure. After having registered their vehicle, owners can use the tolled road network and the individual toll transactions will be charged in arrears to the card registered for their vehicle. Settlement based on such post-pay contracts is only possible with in the appendix 2 of the tolling regulation accepted fuel and credit cards, provided that the respective card company has given the relevant payment guarantees to ASFINAG for use of such cards.

GO Direkt
Registered vehicle owners also have the option of making their toll payments directly to ASFINAG.

4.6.4. Interoperability

In Austria, ASFINAG has already made the necessary preparations to ensure interoperability of OBU's. As early as mid-2008, an upgrade to enable compatibility with EN 15509 (application profile for DSRC interoperability) was made to the roadside toll equipment in Austria. When the Austrian toll system was first launched on 1 January 2004, ASFINAG in cooperation with the Swiss Directorate General of Customs (Eidgenössische Oberzolldirektion)—the operator of the Swiss toll system—had already succeeded in providing interoperability between its system and the Swiss OBU's TRIPON and (since 1 November 2010) EMOTACH. Austria and Switzerland were, therefore, the first two nations worldwide to actually provide interoperability between their national tolling systems. Together with other toll operators such as Toll Collect in Germany or the Scandinavian toll syndicate EasyGo (involving toll operators from Denmark, Norway and Sweden), ASFINAG is currently investigating opportunities for interoperability in order to gather and share experience ahead of the introduction of the EETS.

As of September 1, 2011, the implementation of TOLL2GO is another step leading to an inter-system and inter-country toll service. The German toll operator Toll Collect GmbH and ASFINAG have implemented a toll system based on interoperability between a microwave-based toll system and a
satellite-aided toll system. After registration for this service, drivers can pay the toll in Germany and in Austria through Toll Collect's on-board unit (or briefly Toll Collect. Currently, ASFINAG and the Scandinavian toll syndicate EasyGO (consisting of Danish, Norwegian and Swedish toll operators) cooperate on the implementation of an interoperable toll service pursuant to the EETS-model in order to gather and share experience already before the introduction of EETS. Table below

### The European Electronic Toll Service – EETS

In order to ensure interoperability with other tolling systems, ASFINAG was actively involved in a number of European research projects aiming to lay the technical and contractual foundations for the interoperability of tolling systems and the introduction of the European Electronic Toll Service (EETS).

With the exception of Germany, Italy, Switzerland and Slovakia, all European countries that already have introduced electronic tolling systems that are based on the same underlying technology as the Austrian system (5.8 GHz DSRC microwave in line with the CEN Standard).

Technically, it would therefore be possible to use just one OBU to pay the tolls in all of these countries, provided that data transfer is synchronised at the OBUs microwave interface and appropriate commercial and technical arrangements are in place.

The reason for introducing the EETS, which is called for in the Directive on the Interoperability of Electronic Road Toll Systems 2004/52/EC, is to enable customers to pay the tolls due in ALL EU Member States using just one on-board unit with one single contract. This means that such a single on-board unit would not only need to be compatible with the above-mentioned CEN DSRC interface but also for example with the DSRC system used in Italy and the satellite-based tolling systems used in Germany.

The underlying concept of the European Electronic Toll Service was prepared under the CESARE III project. Starting in 2007, the follow-up project, CESARE IV, focused on the correct design of the EETS. The findings achieved under CESARE IV (concluded at the end of 2009) were integrated in the EETS Decision, which went into force as of 8th of October 2009.

### 4.7. Enforcement

Monitoring the proper payment of toll and penalising any infringements is important in any toll system. ASFINAG's Service and Monitoring unit plays the key role in this task. Toll enforcement officers are public order officers.

*Figure 35 Toll enforcement by ASFINAG's Service and Monitoring Unit*
4.7.1. The ASFINAG Service and Monitoring Unit

Monitoring the payment of toll and penalising any infringements is important in any toll system.

ASFINAG's Service and Monitoring unit plays a key role in this task. Toll enforcement officers are public order officers. They are employed with ASFINAG, trained at the official training centres for Austrian law enforcement officers, and sworn in by the district administration authorities. When on duty, service and monitoring staff carry an official ID card, which they have to show on request. In other words, service and monitoring staff are ASFINAG employees acting on behalf of the district administration authorities.

Enforcement, in the Austrian open toll system for motor vehicles with a maximum permissible gross weight of more than 3.5 tonnes, involves a combination of manual and automatic checks.

In Austria, the powers of toll enforcement officers are regulated by law (Federal Road Tolls Act, 2002). Toll enforcement officers are entitled to:

• stop drivers using clearly visible and audible signals (such as blue flashing lights, handheld stop signs, neon signage displayed in the rear of the inspection vehicle)

• ask to see an identity card

• inspect the vehicle, especially the OBU for electronic toll collection, the (correct) attachment of the toll sticker, the tachograph, the odometer and the EC control device, order and accept payment of substitute tolls and fines

• if necessary, take the appropriate measures to prevent vehicles from continuing their trip (using, for example, wheel clamps or by confiscating the vehicle documents)

• take the appropriate measures to initiate administrative penal proceedings and/or accept a provisional security deposit on behalf of the authorities

• during the course of their inspection trips, advise, consult and assist all users of Austria’s primary road network (providing first aid, securing the scene of an accident or providing assistance in the event of traffic jams

In the event that the mileage-dependent toll for trucks, buses and large motorhomes has not been paid correctly, the ASFINAG toll enforcement officers will levy an on-the-spot substitute toll. The toll dodger is given the opportunity to immediately pay the substitute toll.

If incorrect payment of the toll is detected in the course of an automatic check, the registered vehicle owner will be sent a request for payment of the substitute toll. The toll dodger is also given the opportunity to pay the substitute toll immediately on the spot. The substitute toll for non-payment currently amounts to EUR 220 (for trucks, buses, large motorhomes) and for setting the wrong vehicle category (for example the number of axles set in the GO-Box is too low) there is a charge of EUR 110. If the substitute toll is not paid, administrative penalties (between EUR 300 and EUR 3,000) are owed.

4.7.2. Manual checks

In addition to the automatic checks at various toll gantries, manual checks are also carried out on motorways and expressways to verify whether the toll has been paid. These checks are performed by toll enforcement officers in free flowing traffic, at traffic inspection points and in carparks.
4.7.3. Automatic checks

Alongside the manual checks conducted by the toll enforcement officers, automatic checks are carried out by surveillance cameras at the enforcement stations. Without impairing traffic flow, these cameras check whether the toll has been correctly paid. They do this by categorising all passing vehicles (determining their axle number) and checking whether the correct toll has been paid.

Portable monitoring devices also used for this purpose can be set up in the different road sections subject to toll. If the automatic check gives rise to grounds for suspicion, a picture of the vehicle in question is sent to the control centre or headquarters for further verification. Depending on the outcome of verification, either the relevant information is sent to the toll enforcement officers, or a written request for payment of a substitute toll is sent to the vehicle's owner.

4.8. Institutional arrangements

4.8.1. The Austrian Federal Government

The Austrian Federal Government (German: Österreichische Bundesregierung) is a collective body of the highest-ranking officers of the Austrian executive branch. It consists of the Chancellor, the Vice-Chancellor and the other federal cabinet ministers. Together with the President, the government forms the supreme federal authority.

Each federal minister is also responsible for own ministry and may be supported by one or more state secretaries, who also participate in cabinet meetings.
ASFINAG can propose new toll charges, but central government makes the final decision and sets the fees.

4.8.2. ASFINAG

The ASFINAG (short for "Autobahnen- und Schnellstraßen-Finanzierungs-Aktiengesellschaft" which is German for "Autobahn and high way financing stock corporation") is an Austrian publicly-owned corporation that plans, finances, builds, maintains and collects tolls for the Austrian autobahns.

ASFINAG plans, finances, maintains and tolls the entire Austrian motorway and expressway network covering 2,175 km. This figure includes 340 km per direction in tunnels and 340 km per direction over bridges.

ASFINAG was established in 1982 and is wholly owned by the Austrian Federal Government. A contract signed in 1997 between the Federal Government and ASFINAG gave the company additional powers and responsibilities. By virtue of this contract, ASFINAG holds usufruct rights related to land and facilities belonging to the primary federal road network and owned by the Federal Government, and has the right to collect tolls and charges from those who use such land and facilities.

ASFINAG has the right to collect tolls, or road use charges, for example the right to charge for the use of roads, but does not owe them (as per the usufruct contract). ASFINAG can propose new toll charges but the central government makes the final decision and sets the fees.

As a user-funded company, ASFINAG has committed itself to utmost efficiency in managing its financial resources. ASFINAG does not receive any money from the federal budget.

4.8.3. Europpass

Since 1 January 2004, the operator company Europpass, a subsidiary of Autostrade, is responsible for operating the toll system. ASFINAG, the organisation responsible for financing highways in Austria determined Autostrade, the largest private operator of toll systems in Europe, to be the best bid for the ten-year operation of the kilometre-based truck toll. In order to levy the truck toll, Autostrade established an Austrian subsidiary called Europpass.

4.8.4. Kapsch Group

Responsible for setting up the LKW-Mautsystem in Australia is the internationally renowned and experienced Kapsch TrafficCom AG, a member of the Kapsch Group.

Roadside equipment is from Kapsch and is connected to Kapsch TrafficCom’s computer centre, which also processes the acquisition and consolidation of incoming toll data and its transfer to the operator, Europpass.

The GO-Box is manufactured by Q-Free of Norway. It uses the European standard CEN-TC278 5.8GHz passive backscatter transponders.
4.9. The impact of the GO-Maut

4.9.1. Environment

With regard to the environment, the “ecologisation” of the GO-Maut will reduce nitrogen oxide and particulate emissions by up to 60 per cent by 2015. It is also expected that a significant proportion of the freight task will transfer from road to rail following the introduction of the GO-Maut.

4.9.2. Consumers

The ecologisation of the GO-Maut will have no effect on consumers. The tariffs will be designed in a way that, all in all, they will neither raise nor lower the cost of transportation. The effects on the transport companies depend on the vehicles in their fleets, what EURO emission categories they are assigned to and how old they are.

4.9.3. Increased efficiency of road freight transport

The introduction of the truck toll has reduced the proportion of empty runs for trans-Alpine freight traffic in Austria in 1999 from 21.1 per cent to 15.7 per cent in 2004. In the same period, the average charge per loaded trucks rose by 0.6 tonnes to 14.7 tonnes. Better utilisation of existing capacity and decreasing empty runs benefits the environment and improves the situation for neighbouring communities.

4.9.4. Road safety

The object of the EU Eurovignette Directive is to create incentives for the transport industry to change over to more environmentally friendly vehicles. This transition to low-emission vehicles has the positive side effect of automatically raising road safety by modernising the fleets.
### 4.10. Summary

<table>
<thead>
<tr>
<th></th>
<th>Date of introduction</th>
<th>1 January 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Institutional operator (levying of the fee)</td>
<td>The Autobahn and Highway financing stock corporation “ASFINAG”</td>
</tr>
<tr>
<td>3</td>
<td>Technical operator</td>
<td>Europass (subsidiary of Autostrade)</td>
</tr>
<tr>
<td>4</td>
<td>Type of vehicles charged</td>
<td>Heavy Vehicles (GCW&gt;3.5 tonnes)</td>
</tr>
</tbody>
</table>
| 5 | Charging objectives | 1. Reduce pollutant emissions  
2. Improve road safety  
3. Improve and maintain Austria’s road infrastructure |
| 6 | Factors which vary charge rate | Distance, number of axles, Euro emission classes, type of road |
| 7 | Typical fee for a prime mover + semi-trailer (in cents per tonne.km) | 0.35 euro/ km (AUD 0.43/km) |
| 8 | Technology used (GPS, DSRC, Tachograph) | DSRC |
| 9 | On-board units in use | N/A |
| 10 | OBU cost | Provided for free by ASFINAG (5 euros one-off processing fee) |
| 11 | ID cards for foreign vehicles | N/A |
| 12 | Coverage | 2175 km of Austrian motorways (1700 km) and expressways (465 km) |
| 13 | Gantry numbers (where data was available) | 400 |
| 14 | Border crossings with appropriate equipment | N/A |
| 15 | Automatic control stations | At most gantries |
| 16 | Self-service machines | No but online payment possible with Go-Direkt |
| 17 | Daily entries/exits with OBU in each direction | N/A |
| 18 | Daily entries/exits without OBU in each direction | N/A |
| 19 | Use of cameras/ANPR | Surveillance cameras on enforcement stations |
| 20 | Interoperability | Interoperability with Swiss and German systems |
| 21 | Economic impact | Proportion of empty runs reduced (from 21.1% to 15.7%) and increased average charge per loaded truck |
| 22 | Percentage of foreign vehicles | N/A |
| 23 | Modal split | N/A |
| 24 | Cost of road side equipment and background system | N/A |
| 25 | Total investment | N/A |
| 26 | Gross income per year | Euro 1.031 billion (AUD 1.262 billion) in 2010 |
| 27 | Operating costs (in $ and as a % of toll revenue) | N/A |
| 28 | Total staff dedicated to the HVF | N/A |
| 29 | Revenue distribution | 80% of ASFINAG expenses are related to road construction and maintenance |
5. The Slovak Mýto

5.1. Background

The Slovak Republic is a landlocked state in central Europe. It has a population of over five million and an area of about 49,000 square km (19,000 sq mi). Slovakia is bordered by the Czech Republic and Austria to the west, Poland to the north, Ukraine to the east and Hungary to the south. The largest city is the capital, Bratislava, and the second largest is Košice.

The Slovak landscape is noted primarily for its mountainous nature, with the Carpathian Mountains extending across most of the northern half of the country. Amongst these mountain ranges are the high peaks of the Tatra Mountains.

Slovakia has a well-developed rail network (3,662 km) and a somewhat underdeveloped highway system (225.25 km). As of December 2007, there were 368 km of highways, 135 km of expressways and 3,341 km of first-class roads in Slovakia.
Previously, Slovakia operated a vignette system for highways and for vehicles with a GVMI above 3.5 tonnes for first class roads. On January 2009, the Slovakian Road Traffic Authority signed a contract for the installation and operation of a satellite-based toll system for all trucks and buses weighing 3.5 tonnes or more on some 2,400 km of road. This ‘pay as you drive’ system entered into operation on 1 January 2010.

Slovakia operates one of the most state-of-art electronic toll systems, which puts the country among the leaders in the area of electronic toll collection worldwide. The system covers almost 2,400 kilometres of specified sections of motorways, expressways and selected first class roads. The satellite GPS-GSM technology used provides for maximum flexibility of the system while coping with a future increase of the volume of freight traffic and expansion of the road network in the Slovak Republic.

Legal aspects of the Slovak HVF

Legal Regulations of the Slovak Republic covering electronic toll collection include:

- Act No. 25/2007 Coll. on Electronic Toll Collection for the Use of Specified Sections of Ground Roads and on amendments and supplements to some laws in its valid wording
- Decree No. 388/2009 Coll. (Toll Order) of the Ministry of Transport, Post and Telecommunications of the Slovak Republic governing details of Toll collection according to the empowering provision of the Act No. 25/2007 Coll. in its valid wording
- Regulation of the Government of the Slovak Republic No. 350/2007 Coll. stipulating the toll rate amount for the use of specified sections of ground roads
- Decree No. 441/2011 Coll. of the Ministry of Transport, Post and Telecommunications of the Slovak Republic specifying the sections of highways, expressways and the first class roads with Electronic Toll Collection
- Act No. 725/2004 Coll. on the Conditions of Vehicles Operation in Traffic on Ground Roads and on Amendments and Supplements to Some Laws as amended
- Act No. 639/2004 Coll. on Národná diaľničná spoločnosť in is valid wording.

List of legal acts of the European Communities and European Union taken over:

5.3. Structure of the Heavy Vehicle Fee

5.3.1. Vehicles paying the fee

Toll-liable vehicles are motor vehicles with the total weight exceeding 3.5 tonnes or vehicle combinations designed for transporting goods, or motor vehicles enabling the transport of more than nine persons including a driver, with a gross vehicle weight exceeding 3.5 tonnes, regardless of their country of origin.

5.3.2. Toll road network

The toll road infrastructure comprises specified road sections in accordance with the Decree No. 529/2009 Coll. of the Ministry of Transport, Posts and Telecommunications of the Slovak Republic as amended. These include specified sections of motorways (Diaľnica), expressways (Rýchlostná komunikácia) and certain first class roads (Cesta I. triedy). On the following map, the tolled sections are represented in red (motorways), green (expressways) and orange (first class roads).

The toll system covers almost 2,400 km of specified sections of motorways, expressways and selected first class roads.

As of December 2007, there were 368 km of highways, 135 km of expressways and 3,341 km of first-class roads in Slovakia.

5.3.3. Toll amount

In Slovakia, toll rate is defined by the regulation of the government of the Slovak Republic No. 350/2007 Coll. as amended laying down the toll rate for the use of specified sections of the ground roads. In addition, toll rate is governed by Section 5 of Act No. 25/2007 Coll. on Electronic Toll Collection for the Use of Specified Road Sections as amended.
The toll rate per 1 km of a specified road section (highways, expressways and certain first class roads) is determined for the following categories of vehicles: vehicles with a total weight from 3.5 tonnes to 12 tonnes; vehicles with a total weight of 12 tonnes and more; vehicles able to accommodate the transport of more than nine persons including the driver.

The toll rate for applicable toll roads also reflects the EURO emission class and the number of the vehicle’s axles. More details are contained in Slovak Government Decree No. 350/2007 Coll. stipulating the tolls for the use of specified road sections.

### Table 6 Toll rates for the use of specified sections of highways and expressways in Slovakia

<table>
<thead>
<tr>
<th>Vehicle category</th>
<th>Emission class</th>
<th>EURO 0 – II</th>
<th>EURO III</th>
<th>EURO IV, V, EEV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trucks</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.5 t – to 12 t</td>
<td></td>
<td>0.093 €</td>
<td>0.086 €</td>
<td>0.083 €</td>
</tr>
<tr>
<td>2 axles</td>
<td></td>
<td>0.193 €</td>
<td>0.183 €</td>
<td>0.179 €</td>
</tr>
<tr>
<td>3 axles</td>
<td></td>
<td>0.202 €</td>
<td>0.193 €</td>
<td>0.189 €</td>
</tr>
<tr>
<td>4 axles</td>
<td></td>
<td>0.209 €</td>
<td>0.199 €</td>
<td>0.196 €</td>
</tr>
<tr>
<td>5 axles and more</td>
<td></td>
<td>0.206 €</td>
<td>0.193 €</td>
<td>0.189 €</td>
</tr>
<tr>
<td>12 t and more</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buses</td>
<td></td>
<td>0.060 €</td>
<td>0.050 €</td>
<td>0.030 €</td>
</tr>
<tr>
<td>12 t and more</td>
<td></td>
<td>0.110 €</td>
<td>0.100 €</td>
<td>0.060 €</td>
</tr>
</tbody>
</table>

### Table 7 Toll rates for the use of specified sections of the first class roads in Slovakia

<table>
<thead>
<tr>
<th>Vehicle category</th>
<th>Emission class</th>
<th>EURO 0 – II</th>
<th>EURO III</th>
<th>EURO IV, V, EEV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trucks</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.5 t – to 12 t</td>
<td></td>
<td>0.070 €</td>
<td>0.063 €</td>
<td>0.063 €</td>
</tr>
<tr>
<td>2 axles</td>
<td></td>
<td>0.146 €</td>
<td>0.136 €</td>
<td>0.136 €</td>
</tr>
<tr>
<td>3 axles</td>
<td></td>
<td>0.153 €</td>
<td>0.146 €</td>
<td>0.143 €</td>
</tr>
<tr>
<td>4 axles</td>
<td></td>
<td>0.156 €</td>
<td>0.149 €</td>
<td>0.146 €</td>
</tr>
<tr>
<td>5 axles and more</td>
<td></td>
<td>0.153 €</td>
<td>0.146 €</td>
<td>0.143 €</td>
</tr>
<tr>
<td>12 t and more</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buses</td>
<td></td>
<td>0.040 €</td>
<td>0.030 €</td>
<td>0.020 €</td>
</tr>
<tr>
<td>12 t and more</td>
<td></td>
<td>0.080 €</td>
<td>0.070 €</td>
<td>0.040 €</td>
</tr>
</tbody>
</table>

#### 5.3.4. Electronic toll collection

The electronic toll collection system enables the vehicle operator to choose between two payment regimes. In the prepaid toll regime, the vehicle operator may use specified road sections only after the toll defrayment. In the post-paid toll regime the vehicle operator may use specified road sections prior to the toll defrayment, while providing the details required to secure the payment in advance. The calculated toll is then paid at the end of the appropriate monthly clearing period.
5.3.5. Toll exempted vehicles

Vehicles exempted from toll liability are defined under the Section 4, Subsection 1 of the Act No. 25/2007 Coll. on Electronic Toll Collection as vehicles used by the:

- Ministry of Interior of the Slovak Republic designated according to a special regulation
- Ministry of Defence of the Slovak Republic
- armed forces or civil corps of the commissioning state for the purpose of service duties fulfilment
- armed forces of the Slovak Republic and NATO
- rescue forces of the integrated rescue system according to a special regulation
- Toll Collection Administrator
- organisations undertaking maintenance of specified road sections
- person authorised by the Toll Collection Administrator for the electronic toll collection and control of the electronic toll collection
- Slovak Intelligence Service
- Railway Police
- Corps of Prison and Judicial Guard
- Customs administration.

The Toll Order specifies in more detail conditions of the registration of vehicles exempt from toll liability into the electronic tolling system. Vehicles exempt from toll with registration liability are vehicles of the:

- armed forces or civil corps of the commissioning state for the purpose of service duties fulfilment
- rescue forces of the integrated rescue system according to the Act No. 129/2002 Coll. on Integrated Rescue System as amended
- Toll Collection Administrator used for the maintenance of specified road sections
- System operator used for the electronic toll collection and control of the electronic toll collection
- Customs administration.

5.4. Charging objectives

The income collected through the HVF is used to fund future investments including planning and construction of highways and their maintenance, as approved by the government of the Slovak Republic.

The main reasons for the pricing of road infrastructure are:
- collecting funds for road infrastructure funding
- improving traffic safety
- managing traffic levels through the fee. The aim is to slow down the rapid increase in road freight traffic
- improving monitoring and management of dangerous goods, etc.
- supporting other transport modes.
5.5. Revenue generation and financing

Electronic toll collection operator SkyToll earned the state 154 million Euros in 2011, of which 110 million Euros was paid to SkyToll for providing the toll service.

The total amount charged for trucks using specified road sections of motorways and expressways in 2011 was 98.7 million Euros while 55.2 million Euros was collected for truck use on first class roads.

Compared to 2010, the collection on motorways and expressways grew by 7 million Euros while on the specified sections of first class roads it increased by 5.4 million Euros.

The terms of the contract signed in 2009 by the Slovak Road Traffic Authority with the operators of the tolling system stipulated that for the first four years, most of the collected toll revenue would be transferred to the operators of the system to fund operating costs and to repay the investment costs. From 2014, most of the revenue will be transferred to the Road Traffic Authority.

Of the total annual sum of the collected tolls, foreign vehicle operators paid 43 per cent. Besides the Slovak hauliers, who paid 57 per cent of collected tolls per cent, the highest share of tolls in 2011 was paid by vehicles from Poland (17 per cent), the Czech Republic (9 per cent) and Hungary (5 per cent).

Almost 70 per cent of revenues in 2011 were collected under the prepaid toll regime 70 per cent. Of the total number of registered vehicles, almost 85 per cent chose the prepaid toll regime. In case of the Slovak vehicle operators, 67 per cent chose the prepaid toll regime, same as the year before.

The greatest share of the collected tolls in 2011 was achieved by hauliers using vehicles in the weight category of over 12 tonnes with two axles, who paid 108.7 million Euros.

In terms of emission classes, the greatest share of the total toll collection in 2011 was earned by EURO III class vehicles with almost 47 per cent followed by the most environmentally friendly vehicles of EURO IV+ emission class with over 36 per cent.

As at 31 December 2011, there were over 199,200 active OBUs registered in the electronic toll collection system, of which over 67 per cent were used by foreign vehicles.

In 2011 the specified road sections were daily used by 27,921 vehicles over 3.5 tonnes on average. Compared to 2010 their number grew by 2.5 per cent.

In 2010, almost 2.3 million vehicles were checked by the mobile enforcement units on the specified sections. The supplementary toll revenue collected by enforcement teams was almost 187,100 Euros.

5.6. Technology

The Slovak electronic toll collection system is unique in the world because apart from motorways and expressways it also covers a vast range of first-class roads using modern GPS based toll collection technology. The Slovak system is based on GPS–GSM technology which provides maximum flexibility while maintaining the growth of volume of freight transport and extension of the road network of the Slovak Republic.
Tolled specified road sections are divided into tolled sections. The electronic tolling system uses the GPS technology to determine the toll fee while the vehicle is driving in any lane without the need to slow down or limit the drive in any way.

Motor vehicles subject to the toll liability must be registered in the electronic tolling system and equipped with a functioning electronic device, an OBU.

In contrast to conventional microwave systems, satellite-based tolling systems detect the position of the vehicles via the OBU's using GPS satellite signals. This information is encrypted and transferred by GSM mobile telephony to the control centre (Central Information System) for further processing. This technology is particularly suitable for extensive road networks beyond the scope of the freeways. Toll gantries are not required for data capture.

The Central Information System processes this information together with the data held on the vehicle operator and generates the relevant toll transactions statement. The vehicle operator or driver is responsible for the correct use and setting of the OBU. The Central Information System is also used for enforcement.

5.6.1. The on-board unit

The OBU is an electronic technical device providing for clear identification and position of the vehicle by the electronic tolling system. The OBU is not transferable and from 1 January 2010, the vehicle operator is obliged to use it when driving on the toll road network. The vehicle operator must exclusively use the OBU requested by the Toll Collection Administrator. The OBU is supplied with basic accessories.

If the vehicle operator enters into the contract on the use of specified road sections under the post-paid toll regime, the operator is obliged to pay the costs of installing the OBU by an authorised service centre.

The vehicle driver subject to toll payment liability is required to check the correctness and functionality of the OBU settings prior to, during and after the journey on the specified road sections.

If a vehicle combination with a total weight over 3.5 tonnes becomes a vehicle that is not liable to pay the toll after disconnecting its trailer, the driver must contact the customer service line to avoid double charging. Alternatively, if the vehicle is driving without a trailer it is possible to uninstall the OBU.

Siemens Mobility developed and delivered the satellite-based toll collection solution and the OBUs which capture the data necessary for calculating the toll fee. Thanks to the use of satellite technology, the toll system in Slovakia enables easy acquisition of data not only on freeways and highways, but also on a large part of the road network.
5.6.2. Registration into the electronic tolling system

When vehicle operators register into the tolling system, they must decide on the payment regime. The vehicle operator can decide to pay the toll in advance, for example a prepaid toll regime, or the toll payment by invoice via a post-paid toll regime. The vehicle operator may file the application for registration either in person, or via an authorised representative. The vehicle driver can file the application for vehicle registration on behalf of the vehicle operator.

5.6.3. Interoperability

The satellite toll system used in the Slovak Republic is already technologically prepared for interoperability with the surrounding countries, in accordance with the requirements of the future european electronic toll service. This technology can be quickly and flexibly used to implement future changes and new rules of the EU in the area of pan-European traffic policy.

5.7. Institutional arrangements

The Toll Collection Administrator is Národná diaľničná spoločnosť, a.s. which is the Slovakian Road Traffic Authority (the National Highway Company).

The electronic tolling system operator is SkyToll, a.s.

Despite some political opposition, on 13 January 2009 the Slovakian Road Traffic Authority (NDS) signed an €863 million agreement with SkyToll, for the installation and operation of the satellite-based toll system.

In turn, Siemens has received Euro 81 million contract from SkyToll to supply the OBUs and roadside detectors to be used in Slovakia’s new truck toll system.

5.7.1. The Slovakian Road Traffic Authority (Národná diaľničná spoločnosť or NDS)

The Slovakian Road Traffic Authority, Inc. (NDS) was established on 1 February 2005. It was founded by the State Act. On behalf of the State, the sole shareholder of the company is the Ministry of Transport, Construction and Regional Development.

The NDS provides some very important and state-regulated activities, which include: the planning and construction of highways and their maintenance, as approved by the government of the Slovak Republic.

The Slovak Republic has charged for use of its road network since 1996. This measure was to achieve a pan-European development of road infrastructure. NDS has provided this service since 2005.

The income collected through the HVF is used to fund future investments and form a major source of funding for the NDS.
5.7.2. SkyToll

On 13 January 2009, SkyToll, as signed a contract with the NDS for the delivery and operation of a comprehensive electronic tolling system in the Slovak Republic. The project for Slovakia’s electronic tolling system is unique by international standards as the state-of-the-art satellite tolling technology covers, in addition to highways and expressways, also large sections of first-class routes.

The SkyToll electronic tolling solution, based on the GPS–GSM technology, offers maximum flexibility to secure future increases in the volume of freight transport and road-network extensions across Slovakia.

This project is implemented with renowned international companies, as well as Slovak experts and local companies specialising in IT technologies and intelligent transport systems. The joint-stock company of SkyToll was established by members of the Ibertax-SanToll consortium, the winner of a tender for implementation of a comprehensive tolling system in the Slovak Republic.

SanToll s.r.o. is owned by Sanef, a French-based corporation that operates one of the longest toll-road networks in Europe (more than 1,700 km). Sanef annually collects over one billion euro worth of toll through cash, credit-card and electronic-toll transactions.

5.8. Enforcement

Enforcement agents control compliance with the electronic toll collection toll liability in cooperation with toll police.

Control is ensured on the whole Slovak Republic territory by mobile enforcement units working on a non-stop basis, 7 days per week and 365 days per year.

If it is not possible to confirm the distance driven by the vehicle on specified road sections the toll is calculated using a distance of 650 km and the appropriate toll rate.

At the control, toll policemen are entitled to:

▪ guide vehicles to control points determined by the Toll Collection Administrator or authorised person
▪ stop or redirect vehicles
▪ forbid further driving if violation of any liability stipulated under the Section 3 of the Act No. 25/2007 Coll. as amended on Electronic Toll Collection for the Use of Specified Sections of Ground Roads is found; it is possible to forbid driving until the vehicle operator or vehicle driver fulfils the liabilities according to this provision of the law.

During 2010, almost 2.3 million vehicles were checked by the mobile enforcement units on the specified sections. The supplementary tolls collected by enforcement teams were almost 187,100 Euros.
### 5.9. Summary

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Date of introduction</td>
<td>1 January 2010</td>
</tr>
<tr>
<td>2</td>
<td>Institutional operator (levying of the fee)</td>
<td>National Highway Company (Národná diaľničná spoločnosť or NDS)</td>
</tr>
<tr>
<td>3</td>
<td>Technical operator</td>
<td>SkyToll</td>
</tr>
<tr>
<td>4</td>
<td>Type of vehicles charged</td>
<td>Heavy Vehicles (GCW&gt;3.5 tonnes) from any country</td>
</tr>
<tr>
<td>5</td>
<td>Charging objectives</td>
<td>1. Collect funds for road infrastructure funding, 2. Improve traffic safety, 3. Manage traffic levels through the fee, 4. Improve the monitoring and management of dangerous goods and 5. Support other transport modes</td>
</tr>
<tr>
<td>6</td>
<td>Factors which vary charge rate</td>
<td>Distance, weight, number of axles, Euro emission class and category of road.</td>
</tr>
<tr>
<td>7</td>
<td>Typical fee for a prime mover + semi-trailer (in euros per km)</td>
<td>EUR 0.189 per km (AUD0.23/km) for a 5 axle truck with 30 t payload</td>
</tr>
<tr>
<td>8</td>
<td>Technology used (GPS, DSCR, Tachograph)</td>
<td>GPS distance based charging. GSM mobile technology used to transfer the vehicle details to the control centre.</td>
</tr>
<tr>
<td>9</td>
<td>On-board units in use</td>
<td>199,200 OBUs as of 31/12/2011. 67% used by foreign vehicles.</td>
</tr>
<tr>
<td>10</td>
<td>OBU cost</td>
<td>N/A</td>
</tr>
<tr>
<td>11</td>
<td>ID cards for foreign vehicles</td>
<td>N/A</td>
</tr>
<tr>
<td>12</td>
<td>Coverage</td>
<td>2400 km of specified motorways, expressways and selected first class roads.</td>
</tr>
<tr>
<td>13</td>
<td>Gantry numbers (where data was available)</td>
<td>None</td>
</tr>
<tr>
<td>14</td>
<td>Border crossings with appropriate equipment</td>
<td>None</td>
</tr>
<tr>
<td>15</td>
<td>Automatic control stations</td>
<td>46</td>
</tr>
<tr>
<td>16</td>
<td>Self-service machines</td>
<td>N/A</td>
</tr>
<tr>
<td>17</td>
<td>Daily entries/exits with OBU in each direction</td>
<td>N/A</td>
</tr>
<tr>
<td>18</td>
<td>Daily entries/exits without OBU in each direction</td>
<td>N/A</td>
</tr>
<tr>
<td>19</td>
<td>Use of cameras/ANPR</td>
<td>N/A</td>
</tr>
<tr>
<td>20</td>
<td>Interoperability</td>
<td>Interoperable with systems implemented in surrounding countries.</td>
</tr>
<tr>
<td>21</td>
<td>Economic impact</td>
<td>N/A</td>
</tr>
<tr>
<td>22</td>
<td>Percentage of foreign vehicles</td>
<td>N/A</td>
</tr>
<tr>
<td>23</td>
<td>Modal split</td>
<td>N/A</td>
</tr>
<tr>
<td>24</td>
<td>Cost of road side equipment and background system</td>
<td>N/A</td>
</tr>
<tr>
<td>25</td>
<td>Total investment</td>
<td>At least €863 million</td>
</tr>
<tr>
<td>26</td>
<td>Net income per year</td>
<td>2011: Revenue 154 million Euros (AUD 188.5 million) – 110 million Euros paid to SkyToll = 44 million Euros</td>
</tr>
<tr>
<td>27</td>
<td>Operating costs (in $ and as a % of toll revenue)</td>
<td>44 million Euros, 30% of revenue.</td>
</tr>
<tr>
<td>28</td>
<td>Total staff dedicated to the HVF</td>
<td>N/A</td>
</tr>
<tr>
<td>29</td>
<td>Revenue distribution</td>
<td>N/A</td>
</tr>
</tbody>
</table>
6. The Czech Republic Mýto CZ

6.1. Background

The Czech Republic is a landlocked country in Central Europe. The country is bordered by Poland to the north, Germany to the west, Austria to the south and Slovakia to the east. Its capital and largest city, with 1.3 million inhabitants, is Prague.

The Czech landscape is exceedingly varied. Bohemia, to the west, consists of a basin drained by the Elbe and the Vltava rivers, surrounded by mostly low mountains, such as the Krkonoše range of the Sudetes. The highest point in the country, Sněžka at 1,602 m (5,256 ft), is located here. Moravia, the eastern part of the country, is also quite hilly. It is drained mainly by the Morava River, but it also contains the source of the Oder River.

The Czech Republic has, in total, 55,751 km of roads. It has 734 km of motorways and 422 km of expressways and 5,832 km of Class I roads in 2011.

Figure 41 Map of the Czech Republic
6.2. Introduction of the Mýto CZ

Situated at the centre of the EU, 40 per cent of the trucks using the Czech highway system are foreign-based. Thus, the primary goal of the Czech Truck Tolling program is to generate revenue from foreign trucks that were perceived to not be paying their fair share of system costs. The electronic distance-based fee system (“MÝTO CZ”) was launched in the Czech Republic on 1 January 2007 and uses DSRC-based tolling points on highways with automated number plate readers for enforcement. At the outset, the toll applied only to trucks weighing more than 12 tonnes. As of January 2010, tolls are collected from freight vehicles weighing more than 3.5 tonnes on more than 1,300 kilometres of motorways, expressways and selected sections of class I roads (ca. 180km).

6.3. Structure of the Heavy Vehicle Fee

6.3.1. Vehicles paying the fee

As of January 2010, tolls are collected for all freight vehicles weighing more than 3.5 tonnes regardless of their country of origin.

Figure 42 Map of the toll-road network in Czech Republic in 2012

6.3.2. Toll-exempted vehicles

Vehicles and vehicle combinations with a gross vehicle weight of less than 3.5 tonnes are exempt from the toll.
In accordance with Act No. 13/1997 Coll. § 20a, Article 1, certain types of vehicles, including first responders and law enforcement, are exempt from the toll, but are still required to register and install an OBU. The following vehicle categories are exempted from paying the toll:
- motor buses used for the transport of disabled persons
- trucks used to remove crash debris on call of state bodies
- vehicles belonging to the Czech Republic Police, Fire brigade and other institutions as well as government vehicles.

6.3.3. Toll road network

As of January 2010, tolls are collected from freight vehicles weighing more than 3.5 tonnes on more than 1,300 km of road network, including 734 km of motorways, 422 km of expressways and 180 km of selected sections of class I roads.

Implementing truck tolling on freeways and expressways is considered to be the first phase of a more comprehensive road pricing system. Future plans (phase 2) could see tolling extended to 800 km of additional roadways by 2017 by including some arterial and local roads.

6.3.4. Toll amount

Toll rates are stipulated by Czech Government Regulation Nr. 26/2010 Coll. The toll for using a particular section of a tolled road depends on the length of the section and the category of the respective vehicle, depending on the number of axles and the emissions class of the vehicle.

Domestic and foreign road users are charged the same amount.

**Figure 43 Toll rates for truck [CZK/km] on weekdays in Czech Republic**

<table>
<thead>
<tr>
<th>Emission class</th>
<th>Number of axles</th>
<th>Emission class EURO 0-II</th>
<th>Emission class EURO III-IV</th>
<th>Emission class EURO V+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highways</td>
<td>2</td>
<td>3.34</td>
<td>5.67</td>
<td>8.24</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>2.61</td>
<td>4.45</td>
<td>6.44</td>
</tr>
<tr>
<td></td>
<td>4+</td>
<td>1.67</td>
<td>2.85</td>
<td>4.12</td>
</tr>
<tr>
<td>Roads</td>
<td>1.58</td>
<td>2.74</td>
<td>3.92</td>
<td>1.23</td>
</tr>
<tr>
<td></td>
<td>2.74</td>
<td>2.14</td>
<td>3.06</td>
<td>0.79</td>
</tr>
<tr>
<td></td>
<td>3.92</td>
<td>1.37</td>
<td>1.96</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 44 Toll rates for truck [CZK/km] on weekends in Czech Republic**

<table>
<thead>
<tr>
<th>Emission class</th>
<th>Number of axles</th>
<th>Emission class EURO 0-II</th>
<th>Emission class EURO III-IV</th>
<th>Emission class EURO V+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highways</td>
<td>2</td>
<td>4.24</td>
<td>8.10</td>
<td>11.76</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>3.31</td>
<td>6.35</td>
<td>9.19</td>
</tr>
<tr>
<td></td>
<td>4+</td>
<td>2.12</td>
<td>4.06</td>
<td>5.88</td>
</tr>
<tr>
<td>Roads</td>
<td>2.00</td>
<td>3.92</td>
<td>5.60</td>
<td>1.56</td>
</tr>
<tr>
<td></td>
<td>3.92</td>
<td>3.06</td>
<td>4.38</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>5.60</td>
<td>1.96</td>
<td>2.80</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 45 Toll rates for buses [CZK/km] in Czech Republic**

<table>
<thead>
<tr>
<th>Emission class</th>
<th>Emission class EURO 0-II</th>
<th>Emission class EURO III-IV</th>
<th>Emission class EURO V+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highways</td>
<td>1.38</td>
<td>1.00</td>
<td>0.80</td>
</tr>
<tr>
<td>Roads</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6.3.5. Rushed introduction

The Czech Government discussed the introduction of the road toll shortly after the country joined EU in 2004.

In 2005, a consortium led by Kapsch won the tender to be the operator of the Heavy Vehicle Fee in Czech Republic, using microwave (DSRC) technology.

On 1 January 2007 the Czech Republic’s nationwide electronic toll collection system “MYTO CZ” started commercial operation after being set up from scratch by Kapsch in a record time of only nine months. Since then Kapsch operates and continues to develop the system. The contract was signed for 10 years.

6.4. Charging objectives

The Czech Government discussed the introduction of the road toll shortly after the country joined EU in 2004. The primary reasons were to:

- change the time-based taxation to a more just performance-based one where a user pays for the number of km actually driven
- increase the volume of funds flowing into road management
- introduce telematic services (safety and free flow).

6.5. Revenue generation and financing

6.5.1. Revenue

In the four years since implementation, transporters have paid tolls amounting to 925 million euros (23.8 billion crowns). Of this, 58 per cent came from domestic trucks, and more than 388 million euros (ten billion crowns) was paid by transiting drivers. The greatest international revenue came from Slovakia (12 per cent), followed by Polish (9 per cent), Hungarian (6 per cent) and German (5 per cent) vehicles. Freight vehicles weighing between 3.5 and 12 tonnes, for which tolls became mandatory at the beginning of 2010, pay roughly one tenth of all tolls.

In 2008, revenues from the program generated about 233 million euros (billion crowns) with an average toll rate of Eur 0.16 per km (CZK 4.05 per km) for motorways and highways and Eur 0.08 per km (CZK 1.90 per kilometre) for first class (i.e. principal arterials) roadways.

In 2010, the toll system brought in 255 million euros (6.57 billion crowns) – 18.5 per cent more than in 2009.

6.5.2. Collection costs

No data available.
6.5.3. Public investment

The capital costs for the initial implementation (phase 1) and future expansion (phase 2) of the system is estimated at approximately 700 million Euros (CZK 18 billion).

Only after seven months of operation, the total amount of toll income reached the total capital expenditure (EUR 112 millions).

This excellent indicator is amplified by the fact that the system was built using the contractor method, which means that the general contractor bears the initial costs related to the construction and the risks like in a PPP project. The state reimburses the general contractor for such costs gradually within a horizon of 30 months after the launch of the system. Thus, in the first year of system operation, the state has only paid 25 per cent of the total acquisition cost.

6.5.4. Financing

When the HVF was introduced in 2007, the Czech Ministry of Transport announced that one of the charging objectives was to increase the volume of funds flowing into road management. Revenues from the HVF were used to secure road infrastructure development until 2009. However, it appears that the GFC has significantly contributed to diverting these revenues into the general budget since then.

6.6. Technology

6.6.1. The on-board unit – Premid

To be able to pay toll, each vehicle over 3.5 tonnes must be equipped with an OBU called Premid, which is not transferable to other vehicles.

The toll amount for each segment of highway is deducted when the vehicle passes under the toll gantry. Toll rates of any segment depend on roadway class, section length, day of the week, number of vehicle axles and vehicle emission category.

The compulsory use of a cost-effective Premid unit gives frequent and occasional users the same access to the system, avoiding any systematic discrimination. As the toll varies with the number of axles and emissions class of a vehicle, the vehicle class declaration has to ensure the fees are correct. Evidence of anomalies is recorded accurately in a secure and legally admissible form, deterring systematic fraud.

The Czech Government also needed to
safeguard and maximize return on its investment by ensuring that the system could be adapted to support future developments in transport policy without compromising existing functionality. This might include, for example, extending the road network, adding vehicle classes, and supporting road safety and other telematic functions. Already the system has been augmented to extend its role as a traffic management and traffic planning tool, demonstrating the soundness of an approach based on investing in a solid, revenue-generating system.

There are currently 540,000 OBUs registered in the toll system.

The prepaid version of the OBU can be obtained and registered at any distribution point. Toll pre-payment can be made in cash, or with credit cards or fleet cards. The premid OBU is issued to the authorised user immediately after the vehicle has been registered in the electronic tolling system and after paying the deposit set by the statutory instruments, and they have agreed to the general business terms and conditions of the tolling system operator. Premid point distribution centres are located along tolled roads, or within their proximity, and at selected border crossings. They primarily provides services to drivers who are on the road.

### 6.6.2. Architecture of the tolling system

![Architecture of the Czech Republic truck tolling system](image)

The Myto CZ uses DSRC-based tolling points on the highway with automated number plate readers for enforcement.

The Czech toll network is an open system, which enables tolling of moving vehicles in unimpeded driving conditions. This multilane, free-flow system uses microwave antennas mounted on gantries above the highway that communicate with OBUs installed on the windscreens of passing trucks. Changing lanes while passing beneath the gantries does not influence the tolling transaction. The
tolling process is fully automatic and requires no intervention on the part of the driver. Behind the scenes, a major IT facility deals with transactional, financial and billing data. It is supported by an extensive communications infrastructure.

### 6.6.3. Payment of the toll: pre-pay and post-pay procedures

Toll payment is very simple:

- **pre-paid system** - before you enter a tolled road
- **post-paid system** - after you have used a tolled road, if you have signed a post-paid contract.

#### Pre-pay procedure

In the prepaid system, tolls are paid by charging a Premid OBU with credit before driving onto a tolled road. This can be done in cash, or by using permitted payment cards (permitted bank and fleet cards). When the toll credit falls below CZK 600 (23 euros), the unit emits an acoustic signal to the driver when travelling through a toll gate, indicating that the Premid should be recharged with credit. Upon request, users can receive a statement of their toll transactions.

#### Post-pay procedure

In addition to other advantages, the post-paid system does not require Premids to be recharged with toll credit constantly before or during a journey.

The post-paid method, however, requires the signing of a contract between the vehicle operator and the electronic tolling system operator. This contract can only be closed at Premid point contact centres. The vehicle operator is charged for toll transactions retroactively, and a pre-agreed and admissible means of payment, which is specified in the contract, is used.

Upon request, the vehicle operator will receive a regular statement of their toll transactions or other services as agreed upon in the contract.

The post-paid method is the most suitable means of paying tolls. The driver of a vehicle that is subject to tolling does not have to monitor how much toll credit remains in their OBU and the vehicle operator does not have to worry about providing their drivers with enough cash, or other means of payment, to ensure that there is enough credit in their Premids.

Compared with the pre-paid method, the post-paid method offers multiple benefits and a great deal of convenience to vehicle operators.

#### 6.6.4. Interoperability

The Czech Republic’s nationwide system was implemented using DSRC as standardised by CEN TC278 to support interoperability in Europe.
6.6.5. Hybrid technology to support the expansion of the tolled road network

The Czech government has decided to expand the tolled-road network in 2017 (Phase 2). This expansion of the existing system will seek to employ microwave technology and GPS based OBUs, because the cost associated with installing additional gantries on arterials and local roads is seen as excessive.

The pilot project for the hybrid system is part of the delivery of Phase 2 and will work as a full area system with the possibility of tolling lower class roads with limited capacity for roadside infrastructure anywhere in the Czech Republic. The hybrid system developed by Kapsch System Concept could be implemented for all roads and all vehicles:

- DSRC for motorways and other main roads (current solution)
- GPS/GPRS for rural roads (trial)
- DSRC/Video charging for urban areas or specific charging zones (parking)

Kapsch Area Hybrid OBU is a sophisticated but user-friendly device designed for microwave and satellite-based charging. It is designed for windscreen mounting and is self-installable within a few minutes. The system is being tested by up to 10,000 users and the matching results are higher than 99 per cent.

Due to their simplicity the OBUs can be distributed via a broad spectrum of point-of-sale locations like petrol stations and kiosks.

6.7. Institutional arrangements

6.7.1. The Czech Ministry of Transport

The Czech Ministry of Transport (Ministerstvo dopravy České republiky or MD ČR) is a central government authority, in charge of transport and responsible for the formation of State policy in transport, its scope and its implementation.

The Czech Ministry of Transport is the contracting authority for the Myto CZ.
6.7.2. The Road and Motorway Directorate of the Czech Republic

The electronic toll system is operated by the Road and Motorway Directorate of the Czech Republic (ŘSD ČR), which currently has 1700 employees.

The Road and Motorway Directorate of the Czech Republic (RSD CR) is a national contributory organisation, founded by the Ministry of Transport and Communications on 1 January 1997. The organisation fulfils the following main tasks in the framework:

- management, maintenance and repairs of motorways and first class roads
- processing groundwork, proposals and reasoning for acquiring and optimal allocation of funds for roads and motorways
- guarantee the information system of the road management including the road database and the winter information service concerning trafficability of roads and motorways.

Management, maintenance and repairs of motorways are performed by 16 Centres of Administration and Maintenance of motorways. RMD CR also uses Centres of Road Maintenance in order to guarantee first class road maintenance on contractual basis.

6.7.3. The General Directorate of Customs of the Czech Republic

Mobile enforcement is realised by the General Directorate of Customs of the Czech Republic (Generální ředitelství cel ČR).

Mobile groups are an operative part of direct performance of the control activities of the customs service. Their task is to carry out controls over goods subject to customs, or tax supervision and to perform other competences of the customs administration. The mobile groups also control vehicles on roadways and their freight spaces, personal documents and documents related to the transported goods, including documents proving compliance with the specified route. They control compliance with the obligation to pay fees for the use of certain sections of superhighways and throughways. An important competence of the mobile groups lies in control of the weighing and measuring of trailer truck units. The groups also pay considerable attention to control the transport of dual-use goods in the framework of the community. In this area, they cooperate closely with the other state administrative bodies, the Licence Administration of the Ministry of Industry and Trade of the Czech Republic.
6.7.4. Consortium Kapsch

The general contractor and operator of services of ETC is Kapsch.

Over almost 20 years, Kapsch has compiled significant experience in the specialised sector of road traffic telematics in the areas of tolling solutions (electronic and manual), urban traffic solutions, ITS and telematics solutions, operations and components sales. In 41 countries on five continents, and with about 64 million delivered OBUs, Kapsch TrafficCom has positioned itself among the leading suppliers of ETC systems worldwide.

In Czech Republic Kapsch has designed, developed, manufactured, installed, integrated and implemented this complex, multilane free-flow electronic toll collection system in only nine months. This included setting up a nationwide distribution network for OBUs with pre-pay and post-pay capabilities, and establishing multilingual support services. Kapsch has provided the complete operation services for the Czech Republic since January 2007. The total length of the contract is 10 years.

For traffic management and traffic planning purposes, accurate real-time, as well as historical traffic data are generated by the electronic toll system. The Kapsch Telematics Platform allows the Czech road authority (ŘSD ČR) to capture travel times, level-of-service, traffic statistics and traffic flow analysis data for the entire tolled road network in a cost efficient manner, and feed that data via open XML interfaces to the Czech National Traffic Management Centre. The data are then used for controlling traffic and to plan traffic infrastructure in line with demand.

6.7.5. The National Traffic Information Centre (NTIC)

The National Traffic Information Centre (NTIC) is the main office for supervising traffic on surface roads. The NTIC collects, processes, shares, publishes and distributes traffic information and traffic data regarding the situation on the road network throughout the Czech Republic. The NTIC takes part in managing traffic and in cooperating with other traffic management centres as needed.

The NTIC processes information from the Czech Police, the Czech fire and emergency services, road administrations, road administrative offices, and other organisations or institutions throughout the Czech Republic.

It also has access to automatic data from intelligent transportation systems such as surveillance cameras, highway weather stations, traffic counting systems and traffic jam detectors, dynamic scales, traffic information signs, changeable road signs, etc. The NTIC keeps track of and assesses incidents that constrain traffic—such as accidents, closures, and driving conditions—provides generally available information about such incidents, participates in traffic management, and works to improve processes and to permanently remove the causes of repeated incidents.
6.8. Enforcement

6.8.1. Enforcement stations on toll gantries

Tolling stations are built on the tolled road network and they are equipped with antennas that enable communication between a tolling station and a Premid OBU.

When passing through a toll gantry, an acoustic signal from the Premid alerts the driver that the toll has been registered properly. The tolling process is automatic.

Enforcement stations are equipped with technology to check whether vehicles have Premid units installed, whether they are installed properly, and to check toll payments.

In the event of any discrepancies, the information is forwarded to the enforcement centre of the electronic tolling system, including an automatically acquired image of the vehicle in question. Enforcement centre staff will verify this information. If a tolling offence is confirmed, the information will be forwarded to mobile enforcement units, who stop the vehicle and impose a penalty. The vehicle can be even impounded.
6.8.2. Portable enforcement devices

In addition to the stationary gantries, there are also portable devices that can be deployed to various sections of a road. For instance, 200 handheld control devices (OBU mobile readers) with GSM connection to central system have been distributed to authorised personnel (Custom Administration, Police of CR) for checking on parking lots and fuel stations.

6.8.3. Mobile enforcement

Mobile enforcement complements the functions of stationary and portable enforcement devices. They are performed by the General Directorate of Customs of the Czech Republic (Generální ředitelství cel ČR), which the central office of the electronic tolling system notifies about all offences immediately.
6.9. The impact of the HVF

The tolling system is proving to be an effective traffic management tool for transit traffic, with traffic continuing to grow in line with, but not substantially beyond, national economic growth.
## 6.10. Summary

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Date of introduction</td>
<td>Jan-07</td>
</tr>
<tr>
<td>2</td>
<td>Institutional operator (levying of the fee)</td>
<td>The Road and Motorway Directorate of the Czech Rep</td>
</tr>
<tr>
<td>3</td>
<td>Technical operator</td>
<td>Kapsch</td>
</tr>
<tr>
<td>4</td>
<td>Type of vehicles charged</td>
<td>Heavy Vehicles (GCW&gt;3.5 tonnes)</td>
</tr>
</tbody>
</table>
| 5 | Charging objectives                                                                          | 1. User-pays principle (Change the time-based taxation to a more performance-based and fair one)  
                                                2. Secure funds for road infrastructure funding  
                                                3. Introduce telematics services (safety and free flow) |
| 6 | Factors which vary charge rate                                                                | Distance, type of road, number of axles, Euro emission class, time of the week |
| 7 | Typical fee for a prime mover + semi-trailer (in cents per tonne.km)                         | EUR 0.25 per km (AUD 0.31) for a 5 axle Euro 4 truck on a motorways     |
| 8 | Technology used (GPS, DSRC, Tachograph)                                                      | DSRC/Gantry + ANPR for enforcement. GPS used in a trial prior to Phase 2 that will cover the secondary network. |
| 9 | On-board units in use                                                                         | 540,000                                                                |
| 10| OBU cost                                                                                      | N/A                                                                    |
| 11| ID cards for foreign vehicles                                                                 | No                                                                     |
| 12| Coverage                                                                                      | 1,300 kilometres of road network, including motorways, expressways and  
                                                180km of class I roads. Phase 2 will add an extra 800 km of additional roadways by 2017, by including some arterial and local roads. |
| 13| Gantry numbers (where data was available)                                                     | N/A                                                                    |
| 14| Border crossings with appropriate equipment                                                   | N/A                                                                    |
| 15| Automatic control stations                                                                    | N/A                                                                    |
| 16| Self-service machines                                                                         | N/A                                                                    |
| 17| Daily entries/exits with OBU in each direction                                               | N/A                                                                    |
| 18| Daily entries/exits without OBU in each direction                                             | N/A                                                                    |
| 19| Use of cameras/ANPR                                                                          | Yes, at fixed enforcement stations                                     |
| 20| Interoperability                                                                              | Yes                                                                    |
| 21| Economic impact                                                                               | N/A                                                                    |
| 22| Per centage of foreign vehicles                                                               | 40% of the trucks using the Czech highway system are foreign based    |
| 23| Modal split                                                                                  | N/A                                                                    |
| 24| Cost of road side equipment and background system                                              | Total capital expenditures for Phase 1 were EUR 112 millions)          |
| 25| Total investment                                                                              | The capital costs for the initial implementation (phase 1) and future expansion (phase 2) of the system is estimated at approximately 700 million Euros. |
| 26| Gross income per year                                                                         | 255 million euros (AUD 312 millions) in 2010                           |
| 27| Operating costs (in $ and as a % of toll revenue)                                             | N/A                                                                    |
| 28| Total staff dedicated to the HVF                                                              | N/A                                                                    |
| 29| Revenue distribution                                                                          | N/A                                                                    |
7. The French Heavy Goods Vehicle eco-tax

7.1. Background

The European territory of France covers 547,030 sq km. The country is bordered by Belgium and Luxembourg to the north, Germany, Switzerland and Italy to the east and Spain to the south-west. France is also connected with the UK through the Channel Tunnel. Its capital and largest city is Paris with 11 million inhabitants (its total population is 65.8 million people). France has a wide variety of landscapes, from coastal plains in the north and west to mountain ranges of the Alps in the south-east, the Massif Central in the south-central and Pyrenees in the south-west.

There are approximately 1,000,960 km of roads in France ranking it the most extensive network of the European continent. The French motorway network or “autoroute” system consists largely of toll roads, except around large cities and in parts of the north. It is a network totalling 11,000 km of motorways of which 8,200 km are operated by private companies. France also counts 9,000 km of major trunk roads or “routes nationales” and state-owned motorways. The secondary network is made up of the “routes départementales” which cover a total distance of 378,000 km. The “routes départementales” are maintained by the French departments (third level of government in the administrative division of France, below the national level and the regions).

![Map of France](image)
7.2. Introduction of the Heavy Vehicle Fee (HVF)

The concept of a HVF was introduced in 2007 during a public consultation process called the “Grenelle de l’Environnement” (“Environment Round Table”). The original aim of the Environment Round Table was to define the key points of government policy on ecological and sustainable development issues for the coming five years.

For the first time, the Environment Round Table brought all the civilian and public service representatives together, forming five colleges: the state, unions, employers, NGOs and local authorities. For three months, workgroups met to propose concrete action to be implemented at national, European and international level. In October 2007, these proposals were opened up to debate by a range of public groups. On 25 October, 2007, the French President presented the conclusions of these discussions.

The following paragraph is an extract from President Sarkozy’s speech on 25 October 2007. The speech is available here:

“I propose to tax trucks travelling through France and using our road network. José Manuel (Barroso), there is no reason why France should welcome all the trucks that are avoiding the roads of our neighbours. This tax will be used to finance public transport. The Grenelle proposes an annual ecology tax on the highest-polluting new vehicles. I call for this tax to finance the withdrawal of old high-polluting vehicles by making a progressive and long-term vehicle scrapping bonus available to support the purchase of a clean vehicle.”

In compliance with the conclusions of the “Grenelle de l’environnement”, the Government is currently establishing the national eco-tax on heavy goods vehicles (“Taxe poids lourds nationale” or TPLN). The TPLN is planned to enter into operation in June 2013. Before the TPLN comes into effect, a proposed experimental tax will be implemented in the Alsace region in March 2013 for three months.

7.3. Structure of the National Heavy Goods Vehicle Eco-tax (TPLN)

7.3.1. Vehicles paying the fee

The TPLN will be applied to all French and foreign freight transport vehicles, alone or towing a trailer, of which the total permissible laden weight, or the total permissible weight including tow, if it is a jointed unit, is more than 3.5 tonnes, in compliance with the “Eurovignette” directive. To be consistent with the toll system set up on the German highways, the Alsace experimental tax is applied from 12 tonnes.

The number of vehicles subjected to the TPLN is estimated, for the first year of operation, at about 800,000 vehicles, of which 600,000 vehicles registered in France and 200,000 vehicles registered abroad. The yearly total traffic volume on the taxable network is estimated at 10 billion heavy goods vehicle km over the same period.

The vehicles subject to the TPLN will require on-board electronic equipment. This obligation will be imposed on all vehicles registered in France and subject to TPLN, from the moment it comes into
effect. For vehicles registered abroad, this obligation will be effective only when they drive on the taxable network.

Concerning the vehicles subject to the Alsace experimental tax, the obligation to have on-board equipment will be applied only when they drive on the taxable network. This applies to all vehicles liable for tax; national as well as foreign.

7.3.2. An eco-tax established in accordance with the Eurovignette directive

The “Eurovignette” directive establishes rules for the collection by the member States of tolls or charges for the use of trans-European transport road networks (TEN-T). In particular, it determines the calculation modes of the maximum rates and the modulation parameters of these rates. It recalls the rules of non-discrimination and defines the Commission information procedures.

The directive states that on roads subject to tolls or to charges for use outside the RTE-T, the charging should have neither, discriminatory behaviour towards international traffic, nor cause distortion between transport operators. The directive prohibits any addition to existing toll or charges for use except in very specific cases (tunnels, bridges or mountain cols).

7.3.3. Toll exempted vehicles

The following vehicle categories are exempted from the payment of the eco-tax:

- freight transport vehicles and combinations with a total permissible weight less than 3.5 tonnes
- vehicles providing key public-interest services
- vehicles carrying agricultural supplies (as defined by regulatory authority)
- public transport vehicles
- military vehicles.

7.3.4. Toll road network

The TPLN concerns all motorways and highways of the state road network located in mainland France (toll trunk roads), except the motorway (already tolled and operated by private companies) and road sections that should be tolled but on the heavy goods vehicle traffic level is particularly low. The list of routes to be excluded from the taxable network will be fixed by a decree in the Council of State.

The territorial authorities’ roads expected to be affected by a high traffic shift coming from the toll motorways, or from roads subject to the TPLN, or to identical charges in force in the neighbouring countries can also be subject to these charges. These roads, which will make up most of the tolled secondary network, will be defined by a decree in the council of state after advice from the deliberative assemblies of the managing local authorities.

Overall, the taxable network will comprise 10,000 km of main national roads and non-concessionary motorways and 5000 km of smaller, departmental roads, which are currently not charged at all. The taxable network will evolve over time to take into account the establishment of temporary deviations, and the setting of new routes and changes in observed traffic different from the forecasts.
Figure 57 The French Toll Road Network

- Red: Talled "Routes Nationales" - Talled trunk roads
- Pink: Toll-exempted "Routes Nationales"
- Yellow: Talled Secondary Network
- Turquoise: Talled "Autoroutes" - toll high ways operated by private companies
7.3.5. Toll amount (distance, number of axles, permissible weight and emission class)

The toll rates per kilometre are not known yet. However, it is already known that the toll amount will be based on the following charging parameters:

- distance travelled
- type of road travelled
- number of axles
- total permissible weight
- Euro emission class.

It is expected that the HVF will range from EUR 0.08 to EUR 0.14 per km.

The kilometric rate of tax and the adjustments which are applied to it will be defined each year by a joint order of the ministers in charge of transport and finance.

In case of the lack of justification by the person liable for tax of the Euro emission class or of the number of vehicle axles, the kilometric rate is defined by the class or the category corresponding to the highest kilometric rate.

The kilometric rate is decreased by 25 per cent for the most remote parts of the country according to their peripheral location within the European area and their distance from large European urban areas of more than one million inhabitants. The principle of a 25 per cent reduction for journeys made in three regions (Brittany, Aquitaine, Midi-Pyrenees) was included in decree 2011-233 of 2 March 2011.

7.3.6. Stepwise introduction

Before the TPLN comes into effect in June 2013, a proposed experimental tax will be implemented in the Alsace region (“Alsace heavy goods vehicle tax” or TPLA) in March 2013. This has been designed to not conflict with the technical elements of the TPLN. The Alsace experimental tax will disappear once the TPLN comes into effect.

The Alsace experimental tax will be applied to the network that bears most of the avoidance traffic from Germany (drivers use the French road network to avoid to pay the German LKW-Maut): the A35 motorway between Lauterbourg and Mulhouse, which is 135 km of national road network. Territorial authorities have also decided to include the district roads RD 1083 and RD 83 in the taxable network. These roads are parallel to the A35 highway and will likely bear any traffic shift. This district road network represents an additional 45 km.

Overall, about 180 km of the road network will be subjected, temporarily and experimentally, to the Alsace experimental tax. This tax will disappear from the moment the TPLN comes into effect.
7.4. Charging objectives

7.4.1. Reducing the environmental impact of freight transport while financing new infrastructures

The objectives of the French HVF are to:

- reduce the environmental impacts of the road freight transport, by influencing the choices made by shippers via a charge covering external costs associated with using road freight transport

- rationalise road transport over medium and short distances by, for example reducing the number of empty trips and increasing the transported load, improving the distribution of traffic between conceded and non-conceded networks, optimising the production processes of goods in order to generate a decrease in transport

- obtain resources to finance the new infrastructures required for implementing the sustainable transport policy, in a multimodal perspective.
7.4.2. Recovering infrastructure costs

The “Eurovignette” directive requires that the level of the TPLN and the Alsace experimental tax be based on the principle of recovering infrastructure costs. This means that the revenue collected from these taxes will have as a ceiling the total cost of construction, operation, servicing and development of the taxable network.

7.4.3. Distance travelled, number of axles, total permissible weight and Euro emission class as charging parameters

The TPLN and the Alsace experimental tax will be calculated based on the distance covered. For the same trip leading to the same result, whatever is the precision authorised by the locating technologies, this distance will be calculated by adding up the length of predetermined elementary sections.

For this reason, the taxable network is cut up into charging sections. A charging point is associated with each charging section. Passage by the charging point is the generating act of the TPLN and the Alsace experimental tax.

These elementary sections, called charging sections, are defined for the TPLN as sections of taxed road between two successive intersections with other public roads. In the cases where the intersections with public roads are close to one another, leading to very short sections, several adjacent charging sections can be joined at the state’s initiative. This ensures that the collection cost of the TPLN will not be disproportionate to its product.

The resulting charging sections and the charging points associated with it will be established by a joint order of the ministers in charge of transport and budget.

In application of these principles, the average length of these sections will be—as far as the TPLN is concerned—about 4 to 5 km. In the case of the Alsace experimental tax, as an exception and taking into account the transitional and experimental nature of the measure, the charging sections will be 10 to 15 km long.

The kilometric rate applied to the TPLN and to the Alsace experimental tax will also depend on the number of axles of the vehicle liable for tax. In addition, the TPLN will also be based on the vehicle’s total permissible laden weight (Poids Total en Charge Autorisé PTAC) or its total permissible weight including tow (Poids Total Roulant Autorisé PTRA). This rate will be adjusted depending on its EURO emission class, in order to encourage the use of less polluting vehicles. In the long term, the TPLN kilometric rate can be adjusted according to the overall congestion of each pricing section, which can be set to a pre-established schedule. Other than these variances, the idea at this stage is that there will be a uniform basic scale for the whole taxable network.
These scales will be established each year by a joint order of the Ministers in charge of transport and budget. The law provides for a reduction of 25 per cent in the TPLN rate in those districts considered as the most outlying within the European area. The list of these districts will be established by decree in the Council of State.

Reductions in the amounts of the TPLN can also be proposed to the subscribers liable for tax, within the limit of the management savings generated for subscribers compared to non-subscribers. These reductions will be less than the ceiling of 13 per cent indicated by the “Eurovignette” directive. These reduction rules will be fixed each year by a joint order of the Ministers in charge of transport and budget.

### 7.5. Allocation of road infrastructure costs to heavy goods vehicles

According to the Eurovignette directive, the toll levels for heavy goods vehicles (over 3.5 tonnes) on the trans-European network should be calculated on the basis of allocating infrastructure costs to different road users.

#### 7.5.1. Allocation method for road infrastructure charges

The method proposed for charging road infrastructure costs to the various road users is to examine investment and maintenance costs separately.

Investment expenditure allocation is based on a comparison between the cost of building a virtual road in an imaginary context with no heavy goods vehicles on the road and those of an “average” road in the French national road network. In both cases, the French technical doctrine is applied directly, or its theoretical basis (especially for roads structures and bridges) is used to highlight the impact of including heavy goods vehicles in the investment. Thus, all the “functional components” of a road are examined to highlight the extra costs associated with the presence of heavy goods vehicle and where possible, the relative responsibility of one type of heavy goods vehicle over another to establish rules for allocating costs for each functional component. Dividing the road into functional components allows the use of balance sheets produced by state-nominated project engineers and provides data on the relative weight of each component in the total investment costs.

For maintenance costs, each item of expenditure is looked at directly in order to quantify and differentiate between types of heavy goods vehicle based on an objective criterion representing marginal use of the infrastructure.

#### 7.5.2. Allocation of investment costs

Various scenarios in which the flow of different types of heavy goods vehicle are authorised or prohibited are considered to allocate investment costs:

- **scenario 0 or the reference scenario** corresponds to a fictitious road without heavy goods vehicle except for a few small heavy vehicles of less than 12 tonnes to facilitate maintenance work and emergencies.
- **scenario 1**, only HGV with 2 axles less than 12 tonnes are permitted; these HGV belong to the so-called “Class 1”.
- **scenario 2**, 2- or 3-axle heavy goods vehicle are considered; heavy goods vehicle of Class 1 and Class 2 are found here.
• scenario 3, all types of heavy goods vehicle can travel on the roadway; the new heavy goods vehicle introduced in this scenario belongs to class 3.

In all four scenarios, the overall volume of heavy goods vehicle is constant and represents 12 per cent of all vehicle.km. This percentage represents heavy goods vehicle actually observed in the National Road Network outside motorway concessions in the 2004-2005 traffic survey. The difference between scenarios 1, 2 and 3 does not stem from the total heavy goods vehicle considered but the type that is allowed.

To represent the diversity of the different types of heavy goods vehicle in each scenario, data from a network of traffic stations can be used to establish the relative share of each type of heavy goods vehicle in global use.

**Figure 59 Heavy Vehicle classification and scenarios**

Initially, only the allocation of road structures was studied and this was helpful in order to define heavy goods vehicle classes based on the damage caused by each type of heavy goods vehicle loaded to its maximum authorised total weight (MATW) or gross combination weight (GCW) on French roads. A pavement loading analysis using the Standard Axle Repetition (SAR) approach was used to measure the relative damage on pavements due to each heavy vehicle category. The classes obtained were slightly different from those presented above: Class 1 was identical, but some of the heavy goods vehicle of Class 3 moved to Class 2 (heavy goods vehicle of 40 tonnes: semi-trailers with 5 axles with 3 axles on the tractor and a tandem at the rear; articulated vehicles with 5 axles or more – these heavy goods vehicle represent about 6 per cent of vehicle.km travelled by heavy goods vehicle in France).

Other road components were then examined. For bridges, the decisive factor is the MATW or GCW, defining classes in the same type as those finally selected. This raised doubts about the classes defined for the road. Finally, for the sake of simplicity, it was decided to retain the three classes
according to criteria for MATW or GCW and the number of axles. It was established that this did not significantly change the results on the road structures. Once these classes were defined, the corresponding scenarios were constructed for each functional road component, construction costs were assessed on the basis of data from construction cost monitoring by the French Scientific and Technical Equipment Network in the road domain, then allocated to the different users.

Investment costs are allocated based on the cost of each scenario. The next step distributed the extra costs of one scenario to the next to new users introduced and considered responsible for these costs. This allocation operation is a problem with no unique solution and is sensitive to the order in which scenarios are defined. It proceeds as follows:

- Extra costs between scenario 3 and scenario 2 are charged to heavy goods vehicle Class 3.
- Extra costs between scenario 2 and scenario 1 are allocated to Class 2 and 3 heavy goods vehicle in proportion to the relative shares of Class 2 and 3 in the observed traffic.
- Extra costs between scenario 1 and scenario 0 are charged to all heavy goods vehicle in proportion to the shares of each class of HGV in the observed traffic.
- Fixed costs calculated in scenario 0 are distributed among all users, heavy goods vehicle and LV in proportion to the relative share of each user in the traffic observed (heavy goods vehicle account for 12 per cent of all vehicular traffic). An HGV/LV equivalence coefficient of 2.5 is used to apportion these costs to reflect the relative size of both types of vehicle. The value of this equivalence coefficient is used in the timeflow curves. For parking, the coefficient is changed from 2.5 to 4, which represents the space occupied by an heavy goods vehicle compared with an LV.

The various investment cost items are examined to calculate the overall cost of each scenario. However, some of the road investment components are not subject to extra costs associated with heavy goods vehicle. Ultimately, only the following items were discussed in detail in order to determine equivalence coefficients for HGV/LV:

- Standard section: equivalence coefficients are determined for the road structure, earthworks and drainage items making up this element.
- Exchange and road reinstatement: equivalence coefficients are determined for the road structure and bridges items.
- Specific current section: only viaducts are studied.
- Rest areas: the coefficients are defined by the impact of heavy goods vehicle on the road structure and the relative use of the area by HGV/LV.

Global coefficients for the investment are finally established from the coefficients obtained for the items listed above by taking into account the relative share of each item in the investment observed via the French road investment cost observatory. As these items are likely to evolve over time (changes in prices, the structure of road investments, etc.), regular reassessment of the proposed equivalence coefficients is advisable.

| Table 9 Equivalence coefficients for road investment in France |
|----------------|----------------|---------------|---------------|---------------|
| Users          | Light vehicles | Class 1 HGVs  | Class 2 HGVs  | Class 3 HGVs  |
| Equivalence coefficient | 1            | 3.8           | 4.4           | 5.5           |
7.5.3. Allocation of maintenance charges

Among the expenses examined, only the expenditure for structural maintenance is subject to a differential allocation between heavy goods vehicle and LV according to criterion that is different from the dimensions of the vehicle. Indeed, these costs only relate to the presence of heavy goods vehicle and the relative liability of heavy goods vehicle for these expenses can be "measured" by calculating the aggressiveness of different silhouettes. Ultimately, two sets of coefficients have been calculated to reflect the different techniques for road structures built under the National Road Network (38 per cent asphalt, 41 per cent semi-rigid), reported in the following table.

Table 10 Equivalence coefficients for road structural maintenance in France

<table>
<thead>
<tr>
<th>Users</th>
<th>Light Vehicles</th>
<th>Class 1 HGVs</th>
<th>Class 2 HGVs</th>
<th>Class 3 HGVs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt roadways</td>
<td>0</td>
<td>1</td>
<td>16</td>
<td>48</td>
</tr>
<tr>
<td>Semi-rigid roadways</td>
<td>0</td>
<td>1</td>
<td>259</td>
<td>728</td>
</tr>
</tbody>
</table>

Other items of expenditure may be charged by default with a HGV/LV coefficient of 2.5 to reflect the relative use of the infrastructure by the different vehicles or with a coefficient of 1 if it is considered that some of this expenditure is not to be linked to the use of the infrastructure (for example, government expenditure).

Applying the principles outlined in the Eurovignette directive, the French Ministry of Transport has calculated that heavy vehicle road usage can be associated with the following costs for each vehicle class:
- Class HV1 (2 axles, less than 12 tonnes): EUR 0.08/vehicle.kilometre
- Class HV2 (2 axles, more than 12 tonnes + 3 axles): EUR 0.10/vehicle.kilometre
- Class HV3 (4 axles and more): EUR 0.14/vehicle.kilometre

7.6. Revenue generation and financing

7.6.1. Financing large-scale infrastructure projects

The revenues collected on the national road network will be assigned to the Financing Agency for Infrastructure of France (AFITF), whereas those collected from the local networks, after deduction of the costs relevant to the collection, will be paid out by the French state to the territorial authorities managing the taxed roads.

Part of the proceeds of the tax will be invested in infrastructure development and projects developed under the Grenelle de l’Environnement agreement, to protect the environment and promote sustainable development. In particular, a significant proportion of the eco-tax revenue will be used to finance the building of high speed railways.

7.6.2. Revenue

The gross total annual eco-tax revenue to be collected is estimated at 1.20 billion euros per year when the TPLN comes into effect. Roughly two-thirds (Eur 760 million) is likely to be hypothecated for
the government infrastructure agency AFITF and Euro 160 million for the territorial authorities managing the future tolled secondary network. The remaining Euro 230 million will be transferred to the eco-tax contractor.

It is planned that this revenue will come from 600,000 domestic heavy vehicles and 200,000 foreign heavy vehicles every year.

7.6.3. Collection costs

Total collection costs are estimated at around 15-20 per cent of revenue.

7.7. Technology

7.7.1. Main functions of the system

The proposed system for the implementation of this tax must ensure three major functions:

- collection of the base elements of the TPLN and the Alsace experimental tax, calculation of their amount, their announcement, their recovery and their payment to the State.

- enforcement of the TPLN and the Alsace experimental tax by manual and automatic means, including the observation and treatment of non-compliance cases.

- training, assistance and information to:
  - subscribers and non-subscribers liable for tax (information and assistance)
  - state officers involved in the system (training and assistance).

7.7.2. Toll collection for subscribers and non-subscribers

The system should allow detection of a vehicle liable for tax each time it passes an identified charging point. Each person liable for tax must have electronic equipment loaded on-board their vehicle, allowing the automatic recording of the necessary elements for the determination of the base of the TPLN and the Alsace experimental tax and especially to determine the past charging points.

The amount of the TPLN or the Alsace experimental tax due will be calculated by multiplying the estimated distance covered by the vehicle—reworked by adding the length of the charging sections corresponding to the passed charging points—by the applied kilometric rate, resulting from the vehicle category and its EURO emission class.

The system will distinguish two operating methods for the payment of the TPLN and the Alsace experimental tax, depending on whether or not the person liable for tax has chosen to subscribe to an electronic toll system service:

- Post payment for the subscribers liable for tax having subscribed to a contract with an authorised electronic toll system company. They will pay the TPLN or the Alsace experimental tax to this company periodically and after having used the taxable roads.
- Pre-payment for the non-subscribers liable for tax, who should make a deposit and a pre-payment from which the TPLN or the Alsace experimental tax will be deducted. This prepayment should be paid when collecting the on-board equipment and should be supplied by the person liable for tax as required in order to maintain a sufficient balance.

Continuity of service is necessary for non-subscribers liable for tax entering the taxable network at any time. This requirement implies that the system operator sets up a network of on-board equipment distribution covering the main entry points on the taxable network. Some distribution points can be set up outside mainland France, in order to allow the vehicles to be equipped. The overall number of necessary distribution points is estimated between 250 and 500.

The principle, for the subscribers liable for tax and for the non-subscribers, is the free collection service for the tax. This principle does not prevent the requirement of a deposit by the system operator during the supply of the on-board equipment to a non-subscriber, or the requirement of a deposit or guaranties by the electronic toll system companies when arranging a subscription. The gross total annual amount of the tax to be collected is estimated at 1.20 billion euros when the TPLN comes into effect.

### 7.7.3. The on-board unit (OBU)

All vehicles must be equipped with this GPS device, which is designed to be interoperable with other toll systems, both national and international. The device can be easily installed by the user. Before being installed in the vehicle by the road-user, the OBU is programmed on the basis of the vehicle characteristics at the time of registration. This information includes the vehicle's registration number, number of axles, the gross train weight, the gross vehicle weight, emissions class and full details of the owner.

The OBU installed in the vehicle uses state-of-the-art GPS satellite technology to determine with pinpoint accuracy whether the vehicle is travelling on a route that is subject to the tax and for what distance. Fixed check-points (173) and mobile check-points (500) located across the entire taxable network make it possible to determine whether an OBU is correctly installed and functioning normally and therefore to detect any non-compliance.

Data is stored in an encrypted format and processed by a central system that calculates the correct amount of tax to be paid by the road-user (as required by the CNIL – French Data Protection Authority). Invoices are then sent to post-paid users, or for pre-paid customers, the fee is deducted from a prepaid credit.

The eco-tax contractor has planned to produce, distribute and maintain 800,000 OBUs.

### 7.7.4. Enforcement

The enforcement system will be able to detect vehicles that do not comply with the conditions of the TPLN or the Alsace experimental tax, identifying and imposing penalties upon them. This system is strategic to limiting fraud. The enforcement system relies on the following means:
Automatic enforcement, allowing a larger number of checks on the taxable network including:

- Fixed automatic enforcement on the routes bearing strong traffic of vehicles liable for tax or on dedicated areas. The number of fixed automatic stations is estimated between 200 and 300 stations at the time of implementation of the TPLN.
- Moveable automatic enforcement, which is less predictable, to complement the fixed devices on other routes. The number of moveable stations is estimated between 100 and 200 at the implementation of the TPLN.

- So-called “manual” enforcement facilities which complete the automatic system through:
  - control of users liable for tax on control or parking areas, on the taxable network and beyond (on the conceded network, in particular)
  - post-control of companies.

The contractor will put the necessary equipment at the disposal of the officers responsible for “manual” controls. This equipment will depend upon the missions and the needs specific to each enforcement corps. The number of items of manual equipment is estimated between 2,000 and 5,000. The supply of vehicles used for performing these controls, in limited number, has also been considered.

- In case of non-payment (or partial payment) of the TPLN or of the Alsace experimental tax, the offender is liable for the amount of the evaded tax (real tax when the base data is known, if not, a lump sum tax)
- customs fine of up to 750 €.

**Automatic enforcement**

The automatic enforcement system will be implemented and operated by the contractor. The system should allow checking the legal situation of persons liable for the TPLN and the Alsace experimental tax, and that the:

- vehicle has an OBU or equipment
- on-board equipment is operational
- balance of the non-subscriber liable for tax is not negative
- subscribed person liable for tax does not appear on a black list
- euro class and category of the declared vehicle recorded in the on-board equipment corresponds to the vehicle
- vehicle registration is that declared and recorded in the on-board equipment.

The law authorises the contractor to take note of the detected non-compliance of accredited automatic enforcement devices and to collect evaded tax, if necessary, by debiting a lump sum amount. The compulsory payment of the evaded tax and application of the fine are the prerogative missions of the state, which does not enter within the scope of the mission entrusted to the contractor.
Manual enforcement

The execution of enforcement on the road and in companies is a state prerogative mission. These manual controls will be mainly performed from the control or parking areas and with the help of the manual tools supplied by the contractor. They can also be conducted ex-post in companies.

The contractor role concerning this system will be limited to supply and maintenance of necessary tools to state services to perform those controls and in particular portable interrogation devices for the following systems:

- on-board equipment
- automatic enforcement system of the contractor
- anomalies and non-compliance management.

On-board equipment should also be equipped with a device (light indicator or any other) allowing verification of, without specific material, the correct operation of this equipment and the regular situation of the person liable for tax.

Enforcement officers are entitled to record tax non-compliance and to apply and collect fines. Customs officers are also entitled to collect taxes. If necessary, all officers in charge of the enforcement can immobilise the vehicle until payment occurs.

7.7.5. The procedure for vehicles with OBU ‘Subscribers’

The collection of the TPLN and the Alsace experimental tax from subscribers will be ensured by the electronic toll system companies registered by the State and contracting with the contractor. These companies will be responsible for the supply of on-board equipment, invoicing and collection from the subscribers liable to the tax.

By the tenth day of each month, the contractor will clear and invoice to the electronic toll system company the amount of tax corresponding to all valid transactions of the previous month concerning the relevant subscribers. At the latest, on the tenth day of the month following the invoicing by the contractor, the electronic toll system company will pay the invoiced tax.

By the 25th day of the month following the invoicing, the contractor will transfer to the state, by bank transfer the total amount of the tax collected and will also send an analysis of the amount of the monthly tax.
7.7.6. The procedure for vehicles without OBU ‘non-subscribers’

The collection of the TPLN and the Alsace experimental tax for the liable non-subscribers will be ensured by the contractor, who will make the on-board equipment available against a security deposit and a pre-payment for the taxes.

This service should allow users liable to tax who do not wish to subscribe or do not have sufficient guarantees for the subscription, to have on-board equipment and to supply their down payment at any moment (specific distribution network open 24h/day, 365 days/year) without excessive formalities (on-board equipment installed by the driver).

The on-board equipment should be fitted with a device (indicator light or other) informing the person liable for tax of the state of his account balance. The passing of a charging point with an insufficient balance is considered as a breach.

At the latest on the tenth day of each month, or at the closing of the account by the person liable for tax on returning the equipment, the contractor calculates and invoices the tax amount corresponding to all the valid transactions of the previous month.

At the latest on the tenth day of the month following the invoicing by the contractor, or at the closing of the account by the person liable for tax, the down payment deposited with the contractor will be debited the invoiced amount.
The contractor will pay, via monthly bank transfer, to the state, before the 25th day of the month following the invoicing, the total tax amount corresponding to the invoiced transactions and will simultaneously send an analysis of the monthly amount of the tax.

7.7.7. Interoperability

The “Interoperability” directive aims at setting up a European Electronic Toll Service (called “EETS”) ensuring interoperability of all the European electronic toll systems came into force on 30 April 2004.

From January 1, 2007, all newly established electronic collection systems requiring the installation of on-board equipment on vehicles must use one of the three technologies indicated in the “Interoperability” instruction:

- Global Navigation Satellite System (GNSS)
- Mobile communication according to the GSM-GPRS standard
- Dedicated short-range communication (DSRC) at 5.8 GHz.

This directive requires that a user should be ‘free to apply’ for a unique subscription contract by a European issuer of his choice. This issuer supplies him with on-board electronic equipment, which can be used on all operators’ networks, collect the toll (or the tax or other duties) and pay the operators their due.
The European Electronic Toll System service will be an additional optional service, likely to be proposed by electronic toll system providers to paying customers.

The technology used for the enforcement and collection system of the base data of the TPLN and the Alsace experimental tax must be compliant with the requirements fixed by the “Interoperability” directive.

The on-board equipment, which will be made available for the collection of TPLN and of the Alsace experimental tax should be technically capable of operating with the existing heavy goods vehicle electronic toll system specific to the currently conceded road network (TIS-PL).

Furthermore, it is desirable that this on-board equipment must also be technically capable of operating with the devices of the heavy goods vehicle electronic toll systems of other European countries.

It is also desirable that the collection and enforcement system of the TPLN and of the Alsace experimental tax be able to accept some on-board equipment used in other electronic toll systems for heavy goods vehicles of other European countries.

On the other hand, the on-board equipment placed at the disposal of non-subscribers should not be useable in other systems or for other services, either because it does not have the necessary functions or because they are neutralised.

7.8. Institutional arrangements

7.8.1. The French State

The main missions and responsibilities of the French state regarding the eco-tax are to:

- define the taxable network, determine the charging principles, register the electronic toll system companies, approve the certifying organisations, approve the on-board equipment
- fix the kilometric rate and the parameters taken into consideration for adjustment of this rate
- define the adequate enforcement strategy, implement on-road and in-company controls, proceed with payment under compulsion and with fines
- account and tax report the collection of TPLN and of the Alsace experimental tax
- control the contracting performances of the system.

7.8.2. The eco-tax contractor “Ecomouv”

In compliance with the measures of chapter III of the article 153 of the LFI 2009 and with those of the order N° 2004-559 of June 17, 2004 on the modified partnership contracts, the state intends to entrust the holder of the future partnership contract, designated as “the contractor”, the execution of an overall mission including:

- financing, design, execution, operation, servicing and maintenance of the necessary system for collection and enforcement of the TPLN and of the Alsace experimental tax, including the automated processing device and placing the on-board electronic equipment at the disposal of the user liable for tax
collection of all necessary information for the establishment of the TPLN and the Alsace experimental tax, calculation of their amount (settlement), invoicing to the user liable for tax and to the companies authorised for electronic toll system (communication), invoiced sums recovery and payment to the state

financing, design, execution, operation, servicing and maintenance of the enforcement devices allowing detection of the vehicles not in compliance with the TPLN and the Alsace experimental tax

observation of non-compliance cases detected by means of certified automatic enforcement devices and notification to concerned liable for tax, or if necessary, to the companies authorised for electronic toll systems, of the all-inclusive tax, possible documentation fees as well as the recovery of the sums due, except for forced recovery

information and assistance to the user liable for tax (subscribers and non-subscribers) and to State officers

supplying of on-board equipment to any non-subscriber liable for tax who makes the requests (including the implementation of the distribution network), invoicing and payment of TPLN and of the corresponding Alsace experimental tax

collection of the TPLN and of Alsace experimental tax on behalf of the State and, for the events detected by the automatic enforcement, the collection of elements that allow noting the non-compliances, notification and collection of the lump sum or real tax

payment of collected tax to the state (nominal tax and lump sum or real tax).

In January 2001, the French Ministry of Ecology, Sustainable Development, Transport and Housing designated the Ecomouv’ Group, comprising Autostrade per l’Italia (ASPI), SFR, SNCF, STERIA, THALES, to be awarded the 13-year contract for financing, design, construction, operation and maintenance of the TPLN collection and control system.

The four French partner organisations each contribute their leading business expertise to the development of this comprehensive program:

Thales will supply the turnkey control system for the vehicles that are liable for this tax. That includes automatic control (fixed or mobile) of heavy goods vehicles conducted at 673 checkpoints, manual mobile control for control vehicles, manual portable control for agents, the technical supervision system and the centre for dealing with any anomalies. Thales has also contributed to the solution design for satellite positioning and the overall safety of the eco-tax system.

Steria is responsible for developing and implementing the central financial and technical management systems as well as the customer relationship system for the Ecomouv’ organisation. At the very core of the IT architecture, the financial management system will manage the information flow from the on-board equipment and provide accounting and billing, and tax accounting functionality. The technical management system provides overall system
management, data security and archiving, calculation of statistics and performance indicators and management of third party interfaces. Steria will host and operate the entire Ecomouv’ information system for the duration of the contract.

- **SFR** is providing use of their networks and managing all fixed and mobile telecommunications services required by the TPLN system. More specifically, SFR provides a machine-to-machine solution for the onboard equipment.

- The **SNCF** group, in conjunction with Geodis, is responsible for the logistics for the onboard equipment distributed by Ecomouv’ and for field maintenance operations thanks to the technical expertise and the national coverage of SNCF’s Infra teams.

**Autostrade per l’Italia** has overall responsibility for the toll collection system (including on-board equipment), the physical construction work required for the control system and the technical infrastructure required for the distribution network (including manned and automated point of sale terminals). Autostrade is also responsible for system integration and overall project management.

This equity agreement is an important step in the mobilisation of the eco-tax project, which will run for the next 13 years, with an initial design and construction phase lasting 21 months, followed by the operation and maintenance phase, at the end of which responsibility will return to the French state.

### 7.8.3. The registered electronic toll system providers

The registered electronic toll system providers will place the on-board equipment at the disposal of the subscribers liable for tax, invoice and collect the TPLN (and the corresponding Alsace experimental tax) and its payment into a secured account. The contractor keeps the responsibility of the tasks entrusted to the registered electronic toll system providers, according to the partnership contract terms.

### 7.9. Impact of the eco-tax

It is difficult to describe the impact of the eco-tax before its implementation. However, preliminary studies demonstrate that the following effects are likely to be observed.

#### 7.9.1. Impact on transport fare

It is anticipated that the introduction of the eco-tax will increase road freight transport fares by 5 to 13 per cent.

#### 7.9.2. Gaining support from the road industry

The French road transport industry has been moderately supportive of the eco-tax. However, it became rapidly clear to all stakeholders that the introduction of the eco-tax was an efficient way of securing funds for road maintenance from all road users, regardless of their country of origin. In particular, the eco-tax will secure the financial contribution from foreign transport operators, which are
likely to fill their petrol tanks in a neighbouring country and then extensively use the national road network.

7.9.3. Impact on the type of road network used

The French Ministry of Transport also anticipates a traffic shift from the national trunk network to be tolled in 2013 to the currently tolled highways operated by private companies. The average toll on the privately operated tolled highways is about Eur 0.17 per km. The traffic on this network may see an increase of 15 to 20 per cent, which would represent an extra 400 million euros in revenue for the companies operating private highways.
### 7.10. Summary

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Date of introduction</td>
<td>July-13</td>
</tr>
<tr>
<td>2</td>
<td>Institutional operator (levying of the fee)</td>
<td>The French State</td>
</tr>
<tr>
<td>3</td>
<td>Technical operator</td>
<td>The eco-tax contractor Ecomouv'</td>
</tr>
<tr>
<td>4</td>
<td>Type of vehicles charged</td>
<td>All freight transport vehicles weighing over 3.5 tonnes</td>
</tr>
</tbody>
</table>
| 5 | Charging objectives | 1. Reduce the environmental impacts of the road freight transport  
2. Rationalize road transport over the medium and short distances  
3. Obtain resources to finance the new infrastructures, in a multimodal perspective |
| 6 | Factors which vary charge rate | Distance, weight, Euro emission class, number of axles, type of road travelled. |
| 7 | Typical fee for a prime mover + semi-trailer (in cents per tonne.km) | EUR 0.12 per km (AUD 0.15/km) for a 5 axle truck |
| 8 | Technology used (GPS, DSRC, Tachograph) | DSRC/Gantry + GPS distance based charging. GPS used to determine whether the vehicle is travelling on a route that is subject to the tax and for what distance |
| 9 | On-board units in use | None yet |
| 10 | OBU cost | - |
| 11 | ID cards for foreign vehicles | - |
| 12 | Coverage | 10,000 km of main national roads and non-concessionary motorways and 5000 km of smaller, departmental roads. |
| 13 | Gantry numbers (where data was available) | GPS-based technology. No gantry needed |
| 14 | Border crossings with appropriate equipment | - |
| 15 | Automatic control stations | 173 fixed check-points |
| 16 | Self-service machines | - |
| 17 | Daily entries/exits with OBU in each direction | - |
| 18 | Daily entries/exits without OBU in each direction | - |
| 19 | Use of cameras/ANPR | At fixed enforcement stations |
| 20 | Interoperability | The French OBU will be interoperable with other toll systems, both national and international. |
| 21 | Economic impact | Road freight transport fare forecast to increase by 5 to 13%. |
| 22 | Per centage of foreign vehicles | Up to 30% road tonne.kms |
| 23 | Modal split | - |
| 24 | Cost of road side equipment and background system | - |
| 25 | Total investment | - |
| 26 | Gross income per year (expected) | EUR 1 billion (AUD 1.22 billion) per year in 2013 |
| 27 | Operating costs (in $ and as a % of toll revenue) | 15-20% of revenue |
| 28 | Total staff dedicated to the HVF | - |
| 29 | Revenue distribution | 63% of the income hypothecated for the government infrastructure agency (to finance large scale infrastructure project), 13% to the territorial authorities managing the future tolled secondary network and 19% to the eco-tax contractor. |
8. The New Zealand Road User Charge (RUC)

8.1. Background

New Zealand is an island country located in the south-western Pacific Ocean. The country geographically comprises two main land masses—that of the North and South Islands—and numerous smaller islands. The country has a varied topography. Sharp mountain peaks owe much to the tectonic uplift of land and volcanic activity. New Zealand measures over 1,600 kilometres along its north-north-east axis and has a maximum width of 400 km with approximately 15,134 km of coastline and a total land area of 268,021 sq km.

The population of New Zealand is approximately 4.4 million and are predominantly urban, with 72 per cent of the population living in 16 main urban areas and 53 per cent living in the four largest cities of Auckland, Christchurch, Wellington, and Hamilton. New Zealand is organised into 11 regional councils and 67 territorial authorities for local government purposes.

New Zealand's transport network includes 93,900 km of roads, worth 23 billion dollars, and 4,128 km of railway lines.

New Zealand has a state highway network of 10,895 km (5,974 km on the North Island and 4,921 km on the South Island, as of August 2006) including 170 km of motorways. The highway network is the principal road infrastructure connecting New Zealand's urban centres. It is administered by the New Zealand Transport Agency. The state highways carry 50 per cent of all New Zealand road traffic, with the motorways carrying 9 per cent of all traffic even though they represent only 3 per cent of the state highway network, and even less of the whole road network.

The state highway network links to 82,000 km of local authority roads—paved and unpaved—managed mostly by city or district councils. Some are fall under the control of other authorities, such as the New Zealand Department of Conservation or port and airport authorities.

Figure 62 Map of New Zealand
8.2. Introduction of the New Zealand road user charging system

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1954</td>
<td>Weight distance charge introduced</td>
</tr>
<tr>
<td>1977</td>
<td>Road User Charges (RUC) Review Group established to review road user charges</td>
</tr>
<tr>
<td>1978</td>
<td>Transit NZ established to replace National Roads Board</td>
</tr>
<tr>
<td>1989</td>
<td>Transfund established</td>
</tr>
<tr>
<td>1993</td>
<td>Dedicated fund re-established for roads spending</td>
</tr>
<tr>
<td>1996</td>
<td>Transfund and Land Transport Safety Authority combined to establish Land Transport NZ</td>
</tr>
<tr>
<td>2004</td>
<td>Full hypothecation of petrol and RUC introduced for all transport</td>
</tr>
<tr>
<td>2008</td>
<td>Transit NZ and Land Transport NZ combined to establish NZ Transport Agency</td>
</tr>
<tr>
<td>2009</td>
<td>RUC Review Group presented final report to Minister</td>
</tr>
</tbody>
</table>

The cost of using New Zealand’s roads is recovered from road users via levies in the price of some fuels (fuel excise duties FED) on petrol vehicles or through road user charges (RUC) a weight and distance-based charge on vehicles not powered by petrol (mainly diesel vehicles) and all heavy vehicles (vehicles over 3.5 tonnes gross licensed weight).

The initial RUC system was introduced in New Zealand more than 30 years ago with the passage of the Road User Charges Act 1977. The original road user charging system was introduced as a way of collecting taxes from users of diesel vehicles for road purposes. While minor changes to the system have been implemented over time, the same charging system has been in place for approximately thirty years. The Road User Charges Act 1977 sets out who is required to pay RUC, what the charges are, the basis for charging (i.e. actual weight carried on road and distance), licence requirements, vehicle requirements (e.g. vehicles must have a distance recorder) and administrative details, such as who may issue licences and refunds for off road use.

Institutional reform of NZ road institutions in the 1980s was driven by economic efficiency imperatives. Transit NZ was created as a stand-alone road provision body with a commercially focused board. Changes in institutions and funding arrangements over the years reflect differing approaches at the ministerial level to limiting decision-making to strategic oversight or having a more hands-on approach.

In August 2008, the Road User Charges Review Group was established to conduct an independent review of the New Zealand road user charges system. Following this review, the RUC Bill 2010 was introduced into the House of Representatives. The Road User Charges Act 2012 was passed on 14 February 2012. The Act contains a package of reforms to simplify and modernise the RUC system.

The Ministry of Transport is developing regulations that will support the Act and the NZ Transport Agency is making the necessary changes to its computer and administrative systems to allow the new system to come into force on 1 August 2012. The reforms comprise:

- changing the current system where operators nominate a licence weight for RUC purposes to one where each vehicle has its own permanent RUC weight
- removal of the time licence system and modernisation of the list of vehicles exempted from road user charges
- improvements to the system to enable greater compliance
• an improved regulatory framework for electronic management systems
• a fairer offence and penalty regime, especially for light diesel vehicles.

These changes to the system mean vehicles that are similar will pay similar levels of charges. Heavy vehicles as a group will continue to pay the same amount as at present, covering the road damage they are responsible for. The changes will also encourage the most efficient use of these vehicles.

8.3. Structure of the Heavy Vehicle Fee

8.3.1. Vehicles paying the fee

All diesel powered vehicles and other vehicles powered by a fuel not taxed at source, regardless of weight, must pay RUC. Vehicles powered by petrol, compressed natural gas (CNG) and liquefied petroleum gas (LPG) do not have to pay the RUC as those fuels are taxed at source.

Vehicles with a manufacturer’s gross laden weight of more than 3.5 tonnes (3500 kg) must also pay RUC.

Transport operators pre-purchase distance licences for their vehicles with fees per 1000 km graduated by axle combination and vehicle weight. Vehicles must be licensed for continuous distance, for example when the finish distance is reached a new licence is required.

RUC is collected by NZ Transport Agency agents, such as NZ Post shops and the Automobile Association, and via the NZ Transport Agency’s website. It is paid according to the distance on the vehicle’s odometer (or hubodometer for vehicles over 3.5 tonnes). It is enforced through NZ Transport Agency and Police checks.

Diesel fuel is not taxed at the pump like petrol because an estimated 36 per cent of diesel is used off-road, such as on farms, by manufacturing, industrial and commercial ventures, and boats. Taxing this would impose an unfair burden onto these sectors. Operating a refund system would be costly and cumbersome to administer and involve compliance costs without any related benefit.

8.3.2. Toll exempted vehicles

An exhaustive list of toll exempted vehicles can be found on the website of the NZ Ministry of Transport (www.transport.govt.nz/legislation/regulations/rucexemptions1august2012/). This list includes a large number of self-propelled vehicles (other than a tractor) or towed vehicles that are designed and constructed for agricultural and industrial purpose. It also includes light electric vehicles currently exempt from RUC. This exemption applies to any motor vehicle whose power is wholly or partly derived from an external source of electricity and whose gross laden weight is 3.5 tonnes or less.

8.3.3. Toll-road network

The RUC applies to the entire NZ road network.
8.3.4. Toll amount

Distance RUC licences are purchased in units of 1,000 km or in multiples. Vehicles must be RUC licensed for a continuous distance so that when the finish distance is reached a new RUC licence is required.

Distance RUC licensed vehicles are classified according to:
- whether the vehicle is powered or unpowered
- number of axles on the vehicle
- number of tyres per axle, either single tyred or twin tyred.

Different RUC rates apply to different vehicle configurations, depending on the number of axles and tyres. This is intended to reflect the different degrees of wear and tear on roads caused by different axle configurations.

In all cases the expected vehicle load should be added to the unladen weight to establish the RUC licence weight. This weight is then rounded up to the nearest tonne for the licence weight to be purchased.

All vehicles that operate with distance RUC licences must be fitted with a distance recorder of a type and accuracy sufficient to provide a reliable record of the distance travelled. Every motor vehicle requiring a distance RUC licence where the manufacturer's gross laden weight is more than 3.5 tonnes must be fitted with an approved hubodometer.

Operators may increase the nominated maximum weight of a current distance RUC licence by purchasing either:
- a new distance RUC licence at an increased total weight to replace the existing licence
- a supplementary RUC licence at an increased total weight which will supersede a portion of the current distance RUC licence.

In addition to paying the RUC, all vehicles that travel on road must pay an annual license fee, which can be paid annually, half yearly or quarterly.

Table 11 RUC rates for distance licenses for powered vehicles in NZ (GST inclusive)

<table>
<thead>
<tr>
<th>RUC Vehicle type number</th>
<th>Description</th>
<th>Weight Bands</th>
<th>RUC rate from 1 August 2012 ($ per 1,000 km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Powered vehicles with 2 axles (except type 2 vehicles)</td>
<td>Not more than 3.5 tonnes</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td></td>
<td>More than 3.5 tonnes and not more than 6 tonnes</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Any RUC weight of more than 6 tonnes</td>
<td>150</td>
</tr>
<tr>
<td>2</td>
<td>Powered vehicles with 1 single-tyred spaced axle and 1 twin-tyred spaced axle</td>
<td>Not more than 6 tonnes</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td></td>
<td>More than 6 tonnes and not more than 9 tonnes</td>
<td>79</td>
</tr>
<tr>
<td></td>
<td></td>
<td>More than 9 tonnes and not more than 12 tonnes</td>
<td>118</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Any RUC weight more than 12 tonnes</td>
<td>251</td>
</tr>
<tr>
<td>311 (Bus)</td>
<td>Powered passenger service vehicles with 3 axles</td>
<td>Not more than 18 tonnes</td>
<td>209</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Any weight more than 18 tonnes</td>
<td>337</td>
</tr>
<tr>
<td>RUC</td>
<td>Vehicle type number</td>
<td>Description</td>
<td>Weight Bands</td>
</tr>
<tr>
<td>-----</td>
<td>---------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>Powered vehicles with 3 axles, (except type 311 vehicles)</td>
<td>Not more than 12 tonnes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>More than 12 tonnes and not more than 18 tonnes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Any RUC weight more than 18 tonnes</td>
</tr>
<tr>
<td>14</td>
<td>14</td>
<td>Powered vehicles with 4 axles</td>
<td>All RUC weights</td>
</tr>
<tr>
<td>19</td>
<td>19</td>
<td>Powered vehicles with 5 or more axles</td>
<td>All RUC weights</td>
</tr>
<tr>
<td>308</td>
<td>308</td>
<td>Towing vehicles with 3 axles that are part of a combination vehicle with a total of 8 axles</td>
<td>All RUC weights</td>
</tr>
<tr>
<td>408</td>
<td>408</td>
<td>Towing vehicles with 4 axles that are part of a combination vehicle with a total of 8 axles</td>
<td>All RUC weights</td>
</tr>
<tr>
<td>309</td>
<td>309</td>
<td>Towing vehicles with 3 axles that are part of a combination vehicle with a total of 9 axles</td>
<td>All RUC weights</td>
</tr>
<tr>
<td>409</td>
<td>409</td>
<td>Towing vehicles with 4 axles that are part of a combination vehicle with a total of 9 axles</td>
<td>All RUC weights</td>
</tr>
</tbody>
</table>

Table 12 RUC rates for distance licenses for unpowered vehicles in NZ (GST inclusive)
8.4 Charging objectives

8.3.5. Enforcing the user-pays principle

Key drivers for the introduction of the RUC system were:

- recovery of capital and maintenance expenditures on roads: this is done by ensuring that each type of vehicle is taxed according to the costs it imposes on the road system, thus making the user-pays principle more evident in the financing of road construction and road maintenance
- introduction of more accurate road costs to provide an economic incentive to all road operators to economise on the use of roads
- adjustment of revenue from road taxation to match road expenditure attributable to heavy vehicles
- establishment of more economic price relativities between road and rail transport.

RUC rates are set according to vehicle types and weights and vary in proportion to costs to the network related to different vehicles. This is intended to encourage transport operators to make efficient choices when transporting freight, for example to use vehicles that balance direct operating costs and damage to roads.

All other things being equal, heavier vehicles do more damage to the road surface. Other factors also make a difference. In particular, a vehicle’s number of axles and tyres affects roadwear. For example, a four-axle truck with two double sets of wheels at the rear spreads its weight across the ground more evenly than a truck with fewer axles and wheels. This causes less wear and tear on the road and is why different vehicle weights and types have different RUC licence costs.

The end result is a requirement for two groups of vehicles to pay RUC; all diesel powered vehicles, and other vehicles powered by a fuel not taxed at source regardless of weight.

8.3.6. Recovering infrastructure costs

The cost base includes the expenditure of local and central governments on the direct costs of road transport maintenance and development. This includes:
- maintenance: local road network and state highways
- construction: local roads and state highways
- transport demand management
- passenger transport services
- regional development (funding for regions with acute transport needs)
- walking and cycling
- administration and project control
- research and performance monitoring
- promotion, information and education
- Land Transport NZ's operating expenditure
- NZ Police land transport activities
- costs of maintaining the motor vehicle registration and licensing system.

The costs to central government are estimated from the Land Transport New Zealand annual expenditure program.

The local authority share of expenditure is estimated by Land Transport New Zealand, based on their cost sharing policies.

**8.3.7. Calculation of the HVF rate**

The Ministry of Transport uses a cost allocation model to calculate the required level of road user charges for heavy vehicles and fuel excise duty for light vehicles necessary to recover road expenditure.

The cost allocation model allocates, where possible, road costs to the relevant vehicle characteristics. Key vehicle characteristics are:

- Gross Vehicle Weight (GVW), which measures vehicle strength imposed road costs such as bridge strength
- Equivalent Standard Axles (ESAs), which measures vehicle road wear costs resulting from the fourth power of the axle weights of vehicles
- Passenger Car Equivalent (PCE), which measures the vehicle's space-related road costs, such as additional road space (for example construction of additional traffic lanes) required to alleviate traffic congestion
- Power Vehicle (PV), which measures the costs of provide resources for motorists including signs, road markings and landscaping.

In calculating costs for vehicles over 3.5 tonnes, RUC rates are calculated on the assumption that a vehicle travels unladen at least 50 per cent of the time. Account has already been taken of any unladen running in the licence calculation.

**8.4. The NZ Cost Allocation Model (CAM)**

The current land transport revenue collection system is based on a costing allocation method (CAM) and a charging method (RUC).

**8.4.1. Concept of averaging**

The CAM essentially views the road system as a network rather than as a combination of separate and distinct roads. In the allocation of expenditures there is no recognition of the divergent quality of pavement source materials and standards of construction. A single wear exponent is applied regardless of the pavement strength and durability. Rates of investment and maintenance vary markedly across the whole network.

Traffic volumes and weather impacts are not distinguished between, even within geographic boundaries. Localised congestion related expenditure is spread across vehicle users nationally.
In short, CAM is a tool that allocates costs according to broad weight and distance criteria. It does not purport, nor can it be expected, to recognise those costs where the incidence changes according to time and place of network use. This degree of precision can only be achieved with a more sophisticated CAM.

There is also some averaging in RUC pricing. No regard is given to diverse operating practices and conditions in setting the allowance for backloads in the heavy vehicle diesel fleet. Light vehicles tend to be grouped together for common treatment irrespective of weight disparity, and whether they are used for business or private use. To do otherwise would significantly complicate the charging mechanisms and would contribute further to the overall cost of compliance and enforcement.

8.4.2. The Cost Allocation Model

CAM is designed to calculate the RUC rates and Fuel Excise Duties (FED) necessary to fund the National Land Transport Fund in any given year. The primary purpose of CAM is to allocate costs on the most equitable and efficient basis possible\(^1\). CAM also seeks to ensure that users pay according to the cost they impose, albeit with significant averaging in the distribution of costs.

“The marginal infrastructure cost associated with the use of a vehicle depends on several factors including the design of the vehicle, how it is maintained, how heavily laden it is, how the weight is distributed between the axles, how strong the road is and other factors connected with road deterioration” (Transport Research Laboratory Limited, 2009).

CAM allocates all costs to either use-related costs or residual costs.

Use-related costs are assigned between vehicle categories on the basis of the percentages of wear, strength and vehicle driver related costs generated by each vehicle category.

Residual costs cannot be attributed to a vehicle cost characteristic, such as the damage caused to roads by the weather or public transport costs. These are allocated across all vehicle categories on the basis of vehicle kilometres of travel. The total of use-related costs and net residual costs assigned to each vehicle grouping is then used as an input to setting the level of RUC or FED appropriate for each category of vehicle.

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\(^1\) Externalities are not taken into consideration by the CAM. They are often very difficult to quantify and in some cases are captured through other mechanisms (e.g. ACC, or the proposed emissions trading scheme).
8.5. Revenue generation and financing
8.5.1. Funding central government expenditure on transport

All revenue from road users (the specified transport taxes on petrol and LPG; Road User Charges; and that part of motor vehicle registration fees not used for accident compensation) is required by law to be paid, immediately after collection, into the National Land Transport Fund (NLTF).

The NLTF is a dedicated (or hypothecated) statutory fund administered by the Ministry of Transport. Once revenue has been paid into the NLTF it may only be used for legally specified land transport purposes.

The National Land Transport Fund pays for the following land transport activities:

- The State Highway network of approximately 10,900km of main roads and motorways that is the responsibility of Transit New Zealand, a Government owned operating agency. 100 per cent of the capital and maintenance expenditure on Transit New Zealand's network comes from the NLTF.
  ⇒ [53 per cent of NLTF spending for the period 2009-2012]

- 82000km of roads, owned by 75 territorial local authorities, are funded on average 50 per cent from rates (local property taxes) and 50 per cent from the NLTF, through what is known as the Financial Assistance Ratio (FAR). Some remote or low-income areas receive a higher share from the NLTF.
  ⇒ [22 per cent of NLTF spending for the period 2009-2012]

- A number of local road networks (especially in Northland and on the East Coast of the North Island) are 100 per cent funded from the NLTF in line with Government policy to promote regional development.

- NLTF funding is also available to Transit New Zealand (now NZTA) and local authorities to build and promote walking and cycling facilities.

- Public transport services are funded by the 16 regional councils (38 per cent) and the NLTF (62 per cent).
  ⇒ [10 per cent of NLTF spending for the period 2009-2012]

- NLTF funding is also used to fund alternatives to roads, including rail and local shipping services. The share between local input and the NLTF varies, but is largely met by the NLTF.

- Road safety research and education by the Land Transport Safety Authority is funded from the NLTF. All Police road safety activity, including all enforcement, is 100 per cent funded in terms of an agreement between the Minister of Transport and the Commissioner of Police.
  ⇒ [10 per cent of NLTF spending for the period 2009-2012]

- All administration costs for Transfund New Zealand and Transit New Zealand; all costs incurred in collecting revenue; and a proportion of local authority administration costs, are met from the NLTF.
Local authorities and other land transport agencies are required to submit bids for funding. The responsibility for deciding how the NLTF is spent rests with the Board of Transfund New Zealand. The Minister of Transport may not direct Transfund New Zealand on its decision on any specific land transport project.

Increases in RUC will ensure that diesel users continue to pay their fair share of land transport costs.

As of 2010, transport funding in New Zealand is still heavily biased towards road projects. The National government proposes to spend $21 billion on road infrastructure after 2012, yet only $0.7 billion on other transport projects (public transport, walking and cycling). This has been criticised by opponents of the current government strategy as irresponsible, in light of increasing fuel prices and congestion. Government has claimed that their priority on roads is in line with New Zealanders' favoured travel modes, and is the most promising in terms of economic benefits.

8.5.2. Revenue

RUC on diesel road vehicles collected by the NZTA is directly linked to the actual distance travelled and weight of the vehicle and represented total revenue of NZ$1.061 billion in 2010/11. In comparison, fuel excise duty generated revenue of $1.483 billion and motor vehicle registration fees revenue of $0.173 billion.

Figure 63 below represents estimated RUC revenue as in the CAM in respect of 2007/08. While light diesel vehicles were large in numbers the majority of RUC revenue was actually collected from the heaviest vehicles representing only 5.4 per cent of the diesel vehicle fleet.

![Figure 63 Estimated RUC revenue by weight](image-url)
8.6. Technology

8.6.1. Distance licences

A licence may be printed or displayed electronically. In each case the following requirements apply:
(a) for a printed licence, the licence must be printed on a label supplied or approved by the Secretary
(b) for a licence displayed electronically, the licence must be displayed on an electronic display panel that operates in conjunction with an electronic distance recorder.

A distance licence and supplementary licence must be in one of the following forms set out in the Schedule:
(a) form 1, in the case of a licence in printed format
(b) form 1A, in the case of a licence displayed electronically.

8.6.2. Hubodometers

Every motor vehicle to which section 5 of the Road User Charges Regulations 1978 applies and whose gross laden weight is more than 3.5 tonnes should be fitted with a hubodometer at all times.

Every motor vehicle to which section 5 of the previous Act applies and whose gross laden weight is 3.5 tonnes or less should at all times be fitted with another kind of distance recorder that accurately records the distance travelled.

Every hubodometer (other than an electronic hubodometer) fitted to a motor vehicle for the purposes of this regulation should be affixed by a rigid bracket to a non-lifting axle or wheel on the left-hand side (or the right-hand side, in any case where the Secretary has given written notice to the effect that he or she considers that it is impracticable to affix a hubodometer to the left-hand side) of the motor vehicle in such a manner that:

(a) it accurately records the distance travelled by the vehicle; and
(b) its face, unique serial number, and the distance travelled are readable from outside the vehicle
(c) its axis of rotation is central and parallel to the axis of rotation of the axle or wheel to which it is affixed
(d) it is not readily detachable from the axle or wheel to which it is affixed without the use of any tool.

Where an adjustable bracket is used to affix a hubodometer to an axle or wheel, the bracket should be welded, riveted, or otherwise modified to ensure that, once so affixed, the hubodometer’s position cannot be altered.

**8.6.3. eRUC**

The electronic RUC (eRUC) system relies on the purchase of paper-based licences that must be carried by the vehicle driver and be available to manually compare against the reading on the hubodometer for roadside compliance by the Police Commercial Investigation Unit.

New Zealand did preparatory work for an eRUC system in the period 2000 to 2004. The work foundered for a variety of factors, but principally due to Cabinet insistence that adoption should be voluntary. It was considered that there were not enough incentives to encourage a critical mass of operators to voluntarily take up the proposed technology and that without a programmed uptake the benefits of eRUC would not be realised.

The TR Telematics eRUC service is powered by EROAD, a 100 per cent New Zealand company, and industry leader and innovator. The EROAD solution encompasses an approved electronic distance recorder for trucks and trailers, and a bank-grade, web-based services gateway. EROAD is an approved Industry Agent for the NZ Transport Agency enabling eRUC customers to electronically purchase and display RUC.

*Figure 66 eRUC architecture*
In 2009, EROAD received approval from the NZTA to launch its online eRUC service. eRUC allows users to manage Road User Charges online and to do away with mechanical hubodometers. eRUC is based on a GNSS/Cellular system. Units used are incorporated with sensors that are easily capable of detecting any GPS jamming devices. Vehicles that have attempted to block or override a GPS signal generate a flashing light on the vehicle’s windscreen to indicate to the authorities that the unit being used is unauthorised. While ERoad is currently the only approved provider, the NZTA is working with another potential provider.

In 2012, 15per cent of all heavy transport road user charges in NZ was collected through eRUC.

Trailer units can be treated either as part of the prime mover (for example, tractor unit), or as a separate entity. In New Zealand, trailer units are treated as a separate entity. In this context, they are required to be registered separately and have individual in-vehicle or OBU installed. This adds to the cost of implementation.

Figure 67 eRUC OBU manufactured by eROAD
8.6.4. Enforcement

The compliance and enforcement responsibilities in respect of RUC are split between the Commercial Vehicle Investigation Unit (a division of the New Zealand Police) and the New Zealand Transport Agency (NZTA).

The Commercial Vehicle Investigation Unit (CVIU) is responsible for monitoring all areas of the commercial vehicle industry, which includes road-side checks. The Unit has 88 enforcement officers and 4 vehicle safety officers based around the country. 140,000 commercial vehicles are inspected annually, and 45 per cent of these vehicles are weighed. Approximately 25,000 offences are reported annually.

The NZTA is responsible for all other compliance and enforcement issues, with an annual budget of NZ$18.9 million (A$14.1 million) a year for the RUC regime.

8.7. Institutional arrangements

New Zealand is governed constitutionally as one single unit. Parliament consists of a single house, the House of Representatives. The House of Representatives approves the raising and spending of money by the government and passes laws.

Cabinet is the central decision-making body of executive government. Cabinet's role is to take decisions in a wide range of areas including major policy issues, important spending proposals and financial commitments and proposals involving new legislation or regulations.

New Zealand is a unitary state rather than a federation – regions are created by the authority of the central government. Local government has only the powers given to it by Parliament.

New Zealand is divided into sixteen regions. These form the highest level of local government. NZ is also divided into 74 territorial authorities, which are mostly within one region. Each of the regions and territorial authorities is governed by a council.

8.7.1. The Ministry of Transport (MOT)

The MOT administers RUC policy and has overall revenue management responsibility. Statutory responsibility for the application of the RUC system rests with the Chief Executive of the MOT. The Chief Executive has delegated responsibility for administration of the system to the NZTA. This includes collection of fees, recovery of unpaid RUC and management of refunds.

The Ministry of Transport uses a cost allocation model to calculate both the required level of road user charges for heavy vehicles and fuel excise duty for light vehicles necessary to recover road expenditure.

8.7.2. The New Zealand Police

The New Zealand Police (the Police) enforce the RUC regime through the criminal justice system.
The Police is responsible for:

- inspecting each proposed electronic distance recorder as part of the NZTA testing process and providing an endorsement that it meets their needs for roadside enforcement of RUC
- roadside enforcement, usually through roadside inspections and the issuing of offence notices.

8.7.3. New Zealand Transport Agency (NZTA)

Transit New Zealand was, from 1989 to 2008, the New Zealand Crown entity responsible for operating and planning the New Zealand State Highway network (10,900 km or about 12 per cent of New Zealand’s roads). It was responsible for providing integrated nationwide planning and funding of roads, passenger transport services, and road safety. It also concerned itself with developments close to State Highways—as it considered the potential additional traffic that these would create—and it was responsible for State Highway landscaping.

Transit New Zealand merged with Land Transport New Zealand to form the New Zealand Transport Agency on 1 August 2008.

1.1.1. The National Land Transport Fund

The National Land Transport Fund (NLTF) receives all road user charges from heavy vehicles, a proportion of the fuel tax paid by light vehicles, and all registration and licence fees.

NLTF’s income for 2010/2011 was $1.92 billion. During the same period, NLTF’s total expenditure was $1.95 billion.
8.7.4. Transfund New Zealand

Transfund New Zealand was set up as a Crown agency on 1 July 1997 under the Transit New Zealand Amendment Act 1995. It was formed through the separation of the former Transit New Zealand into two organisations, one being a funder (Transfund New Zealand) and the other a provider (Transit New Zealand).

The responsibility for deciding how the NLTF is spent rests with the Board of Transfund New Zealand.

The principal objective of Transfund New Zealand is to allocate resources to achieve a safe and efficient road system. A set of primary objectives link through to the Board's functions, as specified in the Transit New Zealand Act 1989. The primary objectives of Transfund New Zealand are to:

- maximise the benefits from resource allocation through prioritising and allocating funding consistently on the basis if expected national benefits for a given cost
- achieve through a collaborative approach an improvement in the alignment between regional land transport strategies and the outcomes of Transfund's resource allocation processes
- develop and apply policies which optimise the value of the road asset
- pursue efficiency in delivering roads and alternatives to roads through contestability and development of enhanced administrative, evaluation, and technical processes
- pursue safety at reasonable cost in the construction and maintenance of roads
- provide assurance as to the efficient utilisation of resources allocated for land transportation through rigorous audit processes
- maximise the resources available for allocation through proactive financial management
- provide relevant, accurate and timely advice to the Minister of Transport, road controlling authorities, regional councils and other key parties in the transport industry.

8.7.5. Regional Councils and territorial authorities

The region is the top tier of local government in New Zealand. New Zealand has 16 regions. Eleven are governed by an elected regional council, while five are governed by territorial authorities (the second tier of local government), which also perform the functions of a regional council and are known as unitary authorities.

Regional councils working together with the territorial councils have a clear local responsibility to plan and implement policies for road freight transport passenger transport services levels and road safety.
### 8.8. Summary

<p>| | | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1</td>
<td>Date of introduction</td>
<td>1977</td>
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<td>2</td>
<td>Institutional operator (levying of the fee)</td>
<td>The NZ Ministry of Transport</td>
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<td>3</td>
<td>Technical operator</td>
<td>NZTA</td>
</tr>
<tr>
<td>4</td>
<td>Type of vehicles charged</td>
<td>Heavy Vehicles (GVM&gt;3.5 tonnes)</td>
</tr>
</tbody>
</table>
| 5 | Charging objectives | 1. To recover capital and maintenance expenditures on roads  
2. To economise on the use of roads  
3. To recover costs attributable to heavy vehicles  
4. To establish more economic price relativities between road and rail transport. |
| 6 | Factors which vary charge rate | Distance, powered vs. non-powered, number of axles, number of tyres per axle |
| 7 | Typical fee for a prime mover + semi-trailer (in cents per tonne.km) | AUD 0.20 per km for a 5 axle truck with 30 t payload |
| 8 | Technology used (GPS, DSRC, Tachograph) | Hubodometers for paper based distance licences. GPS/Cellular system for eRUC |
| 9 | On-board units in use | In 2012, 15% of all heavy transport road user charges in NZ collected through eRUC |
| 10 | OBU cost | NZD 80 per month (data from eROAD’s website) |
| 11 | ID cards for foreign vehicles | N/A |
| 12 | Coverage | Whole of the NZ Road Network |
| 13 | Gantry numbers (where data was available) | - |
| 14 | Border crossings with appropriate equipment | N/A |
| 15 | Automatic control stations | - |
| 16 | Self-service machines | N/A |
| 17 | Daily entries/exits with OBU in each direction | N/A |
| 18 | Daily entries/exits without OBU in each direction | N/A |
| 19 | Use of cameras/ANPR | No |
| 20 | Interoperability | N/A |
| 21 | Economic impact | - |
| 22 | Percentage of foreign vehicles | Zero |
| 23 | Modal split | - |
| 24 | Cost of road side equipment and background system | N/A |
| 25 | Total investment | - |
| 26 | Total income per year | NZ$1.061 billion (AUD 0.830 billion) in 2010/11 |
| 27 | Operating costs (in $ and as a % of toll revenue) | - |
| 28 | Total staff dedicated to the HVF | - |
| 29 | Revenue distribution | National Land Transport Programme expenditure 2009-12  
State highways: 53 per cent  
Local roads: 22 per cent  
Road policing: 10 per cent  
Public transport: 10 per cent  
Other: 5 per cent |
9. Glossary

**Axle reference loads**: the load at which an axle with given characteristics generates a standard unit of road wear. It provides a measure of the effects that variables such as axle spacing and numbers of tyres per axle have on the road wear generated by a vehicle.

**Central data processing system**: This is where all the administrative work of the toll collection system, enforcement system and the points-of-sale is carried out. The system guarantees the technical and administrative operation of the entire toll system in real time ensures instant correction of any errors and provides information on the status of the various functional levels of the complete system, including traditional management functions (organisation, finance, administration, etc.).

**Data transmission network**: The network that ensures the transmission of data between all roadside systems and the central data processing system.

**Electronic toll collection**: electronic levy of the appropriate toll found from the data obtained by the electronic tolling system. The payment of the toll levied electronically may be made in cash, by a bank transfer, bank or fleet cards.

**Electronic tolling system**: set of means of computer and telecommunication technology including software and data operated by the system operator that enables mainly to charge the toll by means of technological device while the vehicle is driving without a need for stopping, slowing down its speed or without the obligation to use a certain lane and without the necessity of setting the route in advance.

**Enforcement**: set of activities focused on the control of the fulfilment of toll payment liability and other obligations.

**Enforcement stations**: equipment that serves to identify toll evaders and penalise toll offences. Enforcement stations are stationary, portable or mobile.

**Equivalent standard axle (ESA)**: a component of the cost allocation model that assigns durability costs resulting from axle weights (to the fourth power) such as pavement wear.

**Externalities**: costs or benefits arising from any activity that does not accrue to the person or organisation carrying on the activity and for which payment cannot be sought.

**Fourth power rule**: the assumption that structural road wear is related to the fourth power of a vehicle’s axle weight. A component of the ESA calculation, resulting in steep increases in RUC charges at higher axle loadings.

**Global positioning system (GPS)**: a global navigation satellite system that allows receivers to determine their current location, velocity and the time.

**Hubodometer**: means a hubodometer manufactured under the brand name “Abbott”, “Accu-Trak type AT”, “Argo”, “Chicago Rawhide”, “Engler”, “Jost”, “Macro”, “Mechanex”, “Stemco”, “Trailmark”, or “Veeder-Root” that records in kilometres and has on its face:
- a unique manufacturer’s serial number that cannot be altered without dismantling the hubodometer
- the tyre size or number of revolutions per kilometre for which the device is calibrated
- a display showing the actual distance travelled.

**On-board unit:** OBU installed in the vehicle, subject to toll liability when driving on specified road sections. Data collected from the on-board unit serves for the calculation of the toll in the electronic tolling system.

**Toll:** electronically calculated amount for the use of a specified road section based on electronically collected data according to a vehicle category.

**Toll gantries:** gantries built along the toll road network where the ground-to-board communication required for toll collection is ensured between RSE (roadside equipment) and the OBU.

**Toll section:** uninterrupted portion of a specified road section on which the toll liability of passing vehicles is detected.
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CZECH REPUBLIC

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FRANCE


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Official website of the ecotax contractor in France: http://www.ecomouv.com/en

GERMANY

Official website of Toll Collect. Truck Toll in Germany. Innovative, fair and reliable. Toll Collect.
http://www.toll-collect.de/en/


**NEW ZEALAND**


**SLOVAK REPUBLIC**


Myto. Guide for Electronic Toll Collection in the Slovak Republic. [https://www.emyto.sk/c/document_library/get_file?uuid=f8ae032e-7d7c-4fe6-be5a-6ec43a44060c&groupId=10136](https://www.emyto.sk/c/document_library/get_file?uuid=f8ae032e-7d7c-4fe6-be5a-6ec43a44060c&groupId=10136)
**SWITZERLAND**

Confederation Suisse. *Fair and efficient. The distance-related heavy vehicle fee (HVF) in Switzerland.* 2012.


Federal Department of Finance FDF. HVF in few words.

Appendix A - Summary table of Heavy Vehicle Schemes in seven countries
<table>
<thead>
<tr>
<th></th>
<th>Germany</th>
<th>Switzerland</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Date of introduction</td>
<td>Jan-05</td>
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<td>2</td>
<td>Institutional operator (levying of the fee)</td>
<td>The Transportation Infrastructure Financing Corp. or VIFG</td>
</tr>
<tr>
<td>3</td>
<td>Technical operator</td>
<td>Toll Collect</td>
</tr>
<tr>
<td>4</td>
<td>Type of vehicles charged</td>
<td>Heavy Vehicles (GCW&gt;12 tonnes)</td>
</tr>
</tbody>
</table>
| 5 | Charging objectives | 1. Applying the user-pays principle  
2. Secure funding for upgrade and maintenance of the transportation infrastructure  
3. Provide incentives to shift freight truck traffic to rail and waterways  
4. Promote environmental interests and more efficient deployment of HGVs  
5. Promote innovative tolling technologies | 1. To internalise the external costs of the freight transport industry  
2. To shift more freight transport from road to rail  
3. To protect the environment of the Alpine Region  
4. To finance new railway tunnels in the Alpine Region |
<p>| 6 | Factors which vary charge rate | Distance, number of axes and truck’s emissions class. | Distance, weight and emissions. Weight limited have lifted from 28-40 tonnes |
| 7 | Typical fee for a prime mover + semi-trailer (in cents per ton.km) | EUR 0.16/km (approx. AUD 0.20/km) | CHF 0.904 /km (AUD 0.92 per km for a 5 axle truck with 30 t payload) |
| 8 | Technology used (GPS, DSRC, Tachograph) | DSRC/Gantry ANPR for enforcement + GPS distance based charging + GSM for data transmission. Tachograph used as back up for distance measurements. | Tachograph to measure distance travelled + DSRC/Gantry for OBU activation + GPS to control the status of the OBU |
| 9 | On-board units in use | 700,000 (as in November 2011) | 555000 (53000 for domestic vehicles and the rest for foreign vehicles) |
| 10 | OBU cost | Approximately 250 Euros but provided free of charge by Toll Collect | Euro 800 per unit |
| 11 | ID cards for foreign vehicles | N/A | 300000 |
| 12 | Coverage | All German motorways (12,500 km of Autobahn) | Whole of the Swiss Road Network |
| 13 | Gantry numbers (where data was available) | 300 | 215 |
| 14 | Border crossings with appropriate equipment | N/A | 87 |
| 15 | Automatic control stations | 300 | 24 |
| 16 | Self-service machines | Manual log-on at Toll station terminals (does not require an OBU) | 151 |
| 17 | Daily entries/exits with OBU in each direction | N/A | Approx. 4000 |
| 18 | Daily entries/exits without OBU in each direction | N/A | Approx. 7500 |
| 19 | Use of cameras/ANPR | All gantries | At fixed enforcement stations |
| 20 | Interoperability | Interoperable with the Austrian Toll through the new TOLL2GO service released in September 2011 | Swiss OBU can be used in Austria. |
| 21 | Economic impact | Empty truck trip declined by 7%. 58% shift from dirtier truck models (Euro Class 1, 2 and 3) to cleaner trucks (Euro 4 and 5). | In the first year of the tax, the volume of HV traffic fell by 7% whilst price hikes feared by economists have not materialised. |
| 22 | Per centange of foreign vehicles | 35% of revenue expected to come from foreign vehicles. | Up to 75% road tonne.kms |
| 23 | Modal split | No significant impact. Modal shares remained unchanged at 70% for road transport, 17% for railways and 10% for waterways. | Rail - 72% (pre-toll when there was a ban on trucks over 28 tonnes) |
| 24 | Cost of road side equipment and background system | N/A | 150 M CHF |
| 25 | Total investment | € 2.2 bn | 240 M CHF |
| 26 | Gross income per year | € 4.5 bn in 2010 (AUD 5.5 billions) | 1441 million CHF in 2008 (AUD$1.468 billion) |
| 27 | Operating costs (in $ and as a % of toll revenue) | € 620 millions, estimated 20%. | 5-7% |
| 28 | Total staff dedicated to the HVF | 750 operations (toll collect) and 540 enforcement (BAG) | 120 |
| 29 | Revenue distribution | Finance transportation construction and expansion, promote HGV efficiency, Federal roads (50%), rail (38%), inland waterways (12%). € 560 million for “trucker” harmonisation program. | 2/3 of the net income dedicated to the Confederation to finance large-scale infrastructure projects in the public transport sector (Finöv) AND 1/3 dedicated to the 26 Swiss cantons for road infrastructure projects |</p>
<table>
<thead>
<tr>
<th></th>
<th>Austria</th>
<th>Slovak</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Date of introduction</td>
<td>01-Jan-04</td>
</tr>
<tr>
<td>2</td>
<td>Institutional operator (levying of the fee)</td>
<td>The Autobahn and Highway financing stock corporation “ASFINAG”</td>
</tr>
<tr>
<td>3</td>
<td>Technical operator</td>
<td>Europass (subsidiary of Autostrade)</td>
</tr>
<tr>
<td>4</td>
<td>Type of vehicles charged</td>
<td>Heavy Vehicles (GCW&gt;3.5 tonnes) from any country</td>
</tr>
<tr>
<td>5</td>
<td>Charging objectives</td>
<td>1. Reduce pollutant emissions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Improve road safety</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Improve and maintain Austria’s road infrastructure</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Factors which vary charge rate</td>
<td>Distance, number of axles, Euro emission classes, type of road.</td>
</tr>
<tr>
<td>7</td>
<td>Typical fee for a prime mover + semi-trailer (in cents per tonne.km)</td>
<td>0.35 euro/ km (AUD 0.43/km)</td>
</tr>
<tr>
<td>8</td>
<td>Technology used (GPS, DSRC, Tachograph)</td>
<td>DSRC</td>
</tr>
<tr>
<td>9</td>
<td>On-board units in use</td>
<td>N/A</td>
</tr>
<tr>
<td>10</td>
<td>OBU cost</td>
<td>Provided for free by ASFINAG (5 euros one-off processing fee)</td>
</tr>
<tr>
<td>11</td>
<td>ID cards for foreign vehicles</td>
<td>N/A</td>
</tr>
<tr>
<td>12</td>
<td>Coverage</td>
<td>2175 km of Austrian motorways (1700 km) and expressways (465 km)</td>
</tr>
<tr>
<td>13</td>
<td>Gantry numbers (where data was available)</td>
<td>400</td>
</tr>
<tr>
<td>14</td>
<td>Border crossings with appropriate equipment</td>
<td>N/A</td>
</tr>
<tr>
<td>15</td>
<td>Automatic control stations</td>
<td>At most gantries</td>
</tr>
<tr>
<td>16</td>
<td>Self-service machines</td>
<td>No but online payment possible with Go-Direkt</td>
</tr>
<tr>
<td>17</td>
<td>Daily entries/exits with OBU in each direction</td>
<td>N/A</td>
</tr>
<tr>
<td>18</td>
<td>Daily entries/exits without OBU in each direction</td>
<td>N/A</td>
</tr>
<tr>
<td>19</td>
<td>Use of cameras/ANPR</td>
<td>Surveillance cameras on enforcement stations</td>
</tr>
<tr>
<td>20</td>
<td>Interoperability</td>
<td>Interoperability with Swiss and German systems</td>
</tr>
<tr>
<td>21</td>
<td>Economic impact</td>
<td>Proportion of empty runs reduced (from 21.1% to 15.7%) and increased average charge per loaded truck</td>
</tr>
<tr>
<td>22</td>
<td>Per centage of foreign vehicles</td>
<td>N/A</td>
</tr>
<tr>
<td>23</td>
<td>Modal split</td>
<td>N/A</td>
</tr>
<tr>
<td>24</td>
<td>Cost of road side equipment and background system</td>
<td>N/A</td>
</tr>
<tr>
<td>25</td>
<td>Total investment</td>
<td>N/A</td>
</tr>
<tr>
<td>26</td>
<td>Gross income per year</td>
<td>Euro 1.031 billion (AUD 1.262 billion) in 2010</td>
</tr>
<tr>
<td>27</td>
<td>Operating costs (in $ and as a % of toll revenue)</td>
<td>N/A</td>
</tr>
<tr>
<td>28</td>
<td>Total staff dedicated to the HVF</td>
<td>N/A</td>
</tr>
<tr>
<td>29</td>
<td>Revenue distribution</td>
<td>80% of ASFINAG expenses are related to road construction and maintenance.</td>
</tr>
<tr>
<td></td>
<td>Czech Rep</td>
<td>France</td>
</tr>
<tr>
<td>---</td>
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</tr>
<tr>
<td>1</td>
<td>Date of introduction</td>
<td>Jan-07</td>
</tr>
<tr>
<td>2</td>
<td>Institutional operator</td>
<td>The Road and Motorway Directorate of the Czech Rep</td>
</tr>
<tr>
<td>3</td>
<td>Technical operator</td>
<td>Kapsch</td>
</tr>
<tr>
<td>4</td>
<td>Type of vehicles charged</td>
<td>Heavy Vehicles (GCW&gt;3.5 tonnes)</td>
</tr>
<tr>
<td>5</td>
<td>Charging objectives</td>
<td>1. User-pays principle (Change the time-based taxation to a more performance-based and fair one), 2. Secure funds for road infrastructure funding, 3. Introduce telematics services (safety and free flow)</td>
</tr>
<tr>
<td>6</td>
<td>Factors which vary charge rate</td>
<td>Distance, type of road, number of axles, Euro emission class, time of the week</td>
</tr>
<tr>
<td>7</td>
<td>Typical fee for a prime mover + semi-trailer (in cents per tonne.km)</td>
<td>EUR 0.25 per km (AUD 0.31) for a 5 axle Euro 4 truck on a motorways</td>
</tr>
<tr>
<td>8</td>
<td>Technology used (GPS, DSRC, Tachograph)</td>
<td>DSRC/Gantry + ANPR for enforcement. GPS used in a trial prior to Phase 2 which will cover the secondary network.</td>
</tr>
<tr>
<td>9</td>
<td>On-board units in use</td>
<td>540,000</td>
</tr>
<tr>
<td>10</td>
<td>OBU cost</td>
<td>N/A</td>
</tr>
<tr>
<td>11</td>
<td>ID cards for foreign vehicles</td>
<td>No</td>
</tr>
<tr>
<td>12</td>
<td>Coverage</td>
<td>1,300 km of road network, including motorways, expressways and 180km of class I roads. Phase 2 will add an extra 800 km of additional roadways by 2017, by including some arterial and local roads.</td>
</tr>
<tr>
<td>13</td>
<td>Gantry numbers</td>
<td>N/A</td>
</tr>
<tr>
<td>14</td>
<td>Border crossings with appropriate equipment</td>
<td>N/A</td>
</tr>
<tr>
<td>15</td>
<td>Automatic control stations</td>
<td>N/A</td>
</tr>
<tr>
<td>16</td>
<td>Self-service machines</td>
<td>N/A</td>
</tr>
<tr>
<td>17</td>
<td>Daily entries/exits with OBU in each direction</td>
<td>N/A</td>
</tr>
<tr>
<td>18</td>
<td>Daily entries/exits without OBU in each direction</td>
<td>N/A</td>
</tr>
<tr>
<td>19</td>
<td>Use of cameras/ANPR</td>
<td>Yes, at fixed enforcement stations</td>
</tr>
<tr>
<td>20</td>
<td>Interoperability</td>
<td>Yes</td>
</tr>
<tr>
<td>21</td>
<td>Economic impact</td>
<td>N/A</td>
</tr>
<tr>
<td>22</td>
<td>Per centage of foreign vehicles</td>
<td>40% of the trucks using the Czech highway system are foreign based</td>
</tr>
<tr>
<td>23</td>
<td>Modal split</td>
<td>N/A</td>
</tr>
<tr>
<td>24</td>
<td>Cost of road side equipment and background system</td>
<td>Total capital expenditures for Phase 1 were EUR 112 millions</td>
</tr>
<tr>
<td>25</td>
<td>Total investment</td>
<td>The capital costs for the initial implementation (phase 1) and future expansion (phase 2) of the system is estimated at approximately 700 million Euros.</td>
</tr>
<tr>
<td>26</td>
<td>Gross income per year</td>
<td>255 million euros (AUD 312 millions) in 2010</td>
</tr>
<tr>
<td>27</td>
<td>Operating costs (in $ and as a % of toll revenue)</td>
<td>N/A</td>
</tr>
<tr>
<td>28</td>
<td>Total staff</td>
<td>N/A</td>
</tr>
<tr>
<td>29</td>
<td>Revenue distribution</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NZ</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
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</tr>
<tr>
<td>1</td>
<td>Date of introduction</td>
<td>1977</td>
</tr>
<tr>
<td>2</td>
<td>Institutional operator (levying of the fee)</td>
<td>The NZ Ministry of Transport</td>
</tr>
<tr>
<td>3</td>
<td>Technical operator</td>
<td>NZTA</td>
</tr>
<tr>
<td>4</td>
<td>Type of vehicles charged</td>
<td>Heavy Vehicles (GVW&gt;3.5 tonnes)</td>
</tr>
</tbody>
</table>
| 5 | Charging objectives | 1. To recover capital and maintenance expenditures on roads  
2. To economise on the use of roads  
3. To recover costs attributable to heavy vehicles  
4. To establish more economic price relativities between road and rail transport. |
| 6 | Factors which vary charge rate | Distance, powered vs. non-powered, number of axles, number of tyres per axle. |
| 7 | Typical fee for a prime mover + semi-trailer (in cents per tonne.km) | AUD 0.20 per km for a 5 axle truck with 30 t payload |
| 8 | Technology used (GPS, DSRC, Tachograph) | Hubodometers for paper based distance licences. Charging. GPS/Cellular system for eRUC. |
| 9 | On-board units in use | In 2012, 15% of all heavy transport road user charges in NZ collected through eRUC |
| 10 | OBU cost | NZD 80 per month (data from eROAD's website) |
| 11 | ID cards for foreign vehicles | N/A |
| 12 | Coverage | Whole of the NZ Road Network |
| 13 | Gantry numbers (where data was available) | - |
| 14 | Border crossings with appropriate equipment | N/A |
| 15 | Automatic control stations | - |
| 16 | Self-service machines | N/A |
| 17 | Daily entries/exits with OBU in each direction | N/A |
| 18 | Daily entries/exits without OBU in each direction | N/A |
| 19 | Use of cameras/ANPR | No |
| 20 | Interoperability | N/A |
| 21 | Economic impact | - |
| 22 | Per centage of foreign vehicles | Zero |
| 23 | Modal split | - |
| 24 | Cost of road side equipment and background system | N/A |
| 25 | Total investment | - |
| 26 | Gross income per year | NZ$1.061 billion (AUD 0.830 billion) in 2010/11 |
| 27 | Operating costs (in $ and as a % of toll revenue) | - |
| 28 | Total staff dedicated to the HVF | - |
| 29 | Revenue distribution | National Land Transport Programme expenditure 2009-12.  
State highways: 53 per cent  
Local roads: 22 per cent  
Road policing: 10 per cent  
Other: 5 per cent  
Public transport: 10 per cent |
Appendix B – The Eurovignette directive  
(shortened version)


CHAPTER I - General provisions

Article 1

This Directive applies to vehicle taxes, tolls and user charges imposed on vehicles as defined in Article 2. This Directive shall not affect vehicles carrying out transport operations exclusively in the non-European territories of the Member States.

Article 2

For the purposes of this Directive:

(a) ►M1 'trans-European road network' means the road network defined in Section 2 of Annex I to Decision No 1692/96/EC of the European Parliament and of the Council of 23 July 1996 on Community guidelines for the development of the trans-European transport network as illustrated by maps. The maps refer to the corresponding sections mentioned in the operative part of and/or in Annex II to that Decision;

▼M1

(aa) 'construction costs' means the costs related to construction, including, where appropriate, the financing costs, of:
— new infrastructure or new infrastructure improvements (including significant structural repairs), or
— infrastructure or infrastructure improvements (including significant structural repairs) completed no more than 30 years before 10 June 2008, where tolling arrangements are already in place on 10 June 2008, or completed no more than 30 years before the establishment of any new tolling arrangements introduced after 10 June 2008; costs regarding infrastructure or infrastructure improvements completed before these time limits may also be considered as construction costs where:

(i) a Member State has established a tolling system which provides for the recovery of these costs by means of a contract with a tolling system operator, or other legal acts having equivalent effect, which enter into force before 10 June 2008, or

(ii) a Member State can demonstrate that the case for building the infrastructure in question depended on its having a design lifetime in excess of 30 years. In any event, the proportion of the construction costs to be taken into account shall not exceed the proportion of the current design lifetime period of infrastructure components still to run on 10 June 2008 or on the date when the new tolling arrangements are introduced, where this is a later date.

Costs of infrastructure or infrastructure improvements may include any specific expenditure on infrastructure designed to reduce nuisance related to noise or to improve road safety and actual payments made by the infrastructure operator corresponding to objective environmental elements such as protection against soil contamination;

(ab) 'financing costs' means interest on borrowings and/or return on any equity funding contributed by shareholders;

(ac) 'significant structural repairs' means structural repairs excluding those repairs no longer of any current benefit to road users, e.g. where the repair work has been replaced by further road resurfacing or other construction work;
(ad) ‘motorway’ means a road specially designed and built for motor traffic, which does not serve properties bordering on it, and which:

(i) is provided, except at special points or temporarily, with separate carriageways for the two directions of traffic, separated from each other either by a dividing strip not intended for traffic or, exceptionally, by other means;
(ii) does not cross at grade with any road, railway or tramway track, bicycle path or footpath; and
(iii) is specifically designated as a motorway;

(b) ‘toll’ means a specified amount payable for a vehicle based on the distance travelled on a given infrastructure and on the type of the vehicle comprising an infrastructure charge and/or an external-cost charge;

(ba) ‘infrastructure charge’ means a charge levied for the purpose of recovering the construction, the maintenance, the operation and the development costs related to infrastructure incurred in a Member State;

(bb) ‘external-cost charge’ means a charge levied for the purpose of recovering the costs incurred in a Member State related to traffic-based air pollution and/or traffic-based noise pollution;

(bc) ‘cost of traffic-based air pollution’ means the cost of the damage caused by the release of particulate matter and of ozone precursors, such as nitrogen oxide and volatile organic compounds, in the course of the operation of a vehicle;

(bd) ‘cost of traffic-based noise pollution’ means the cost of the damage caused by the noise emitted by the vehicles or created by their interaction with the road surface;

(be) ‘weighted average infrastructure charge’ means the total revenue of an infrastructure charge over a given period divided by the number of vehicle kilometres travelled on the road sections subject to the charge during that period;

(bf) ‘weighted average external-cost charge’ means the total revenue of an external-cost charge over a given period divided by the number of vehicle kilometres travelled on the road sections subject to the charge during that period;

(c) ‘user charge’ means a specified amount payment of which confers the right for a vehicle to use for a given period the infrastructures referred to in Article 7(1);

(d) ‘vehicle’ means a motor vehicle or articulated vehicle combination intended or used for the carriage by road of goods and having a maximum permissible laden weight of over 3,5 tonnes;

e) vehicle of the ‘EURO 0’, ‘EURO I’, ‘EURO II’, ‘EURO III’, ‘EURO IV’, ‘EURO V’, ‘EEV’ category means a vehicle that complies with the emission limits set out in Annex 0;

(f) ‘type of vehicle’ means a category into which a vehicle falls according to the number of its axles, its dimensions or weight, or other vehicle classification factors reflecting road damage, e.g. the road damage classification system set out in Annex IV, provided that the classification system used is based on vehicle characteristics which either appear in the vehicle documentation used in all Member States or are visually apparent;

(g) ‘concession contract’ means a ‘public works concession’ or a ‘service concession’ as defined in Article 1 of Directive 2004/18/EC of the European Parliament and of the Council of 31 March 2004 on the coordination of procedures for the award of public works contracts, public supply contracts and public service contracts (1);

(h) ‘concession toll’ means a toll levied by a concessionaire under a concession contract.
CHAPTER II - Vehicle taxation

Article 3

1. The vehicle taxes referred to in Article are as follows:

— Czech Republic: silniční daň,

— Netherlands: motorrijtuigenbelasting,

— Austria: Kraftfahrzeugsteuer,

— Slovakia: cestná daň,

— United Kingdom:
  (a) vehicle excise duty;
  (b) motor vehicles licence.

Etc.

2. Member States which replace any tax listed in paragraph I with another tax of the same kind shall notify the Commission, which shall make the necessary amendments.

Article 4

Procedures for levying and collecting the taxes referred to in Article 3 shall be determined by each Member State.

Article 5

As regards vehicles registered in the Member States, the taxes referred to in Article 3 shall be charged solely by the Member State of registration.

Article 6

1. Whatever the structure of the taxes referred to in Article 3, Member States shall set the rates so as to ensure that the tax rate for each vehicle category or subcategory referred to in Annex I is not lower than the minimum laid down in that Annex.

Until two years after entry into force of the Directive, Greece, Italy, Portugal and Spain shall be authorised to apply rates that are lower than, but not less than, 65 per cent of the minima laid down in Annex I.

2. Member States may apply reduced rates or exemptions for:

(a) vehicles used for national or civil defence purposes, by fire and other emergency services and by the police, and vehicles used for road maintenance;

(b) vehicles which travel only occasionally on the public roads of the Member State of registration and are used by natural or legal persons whose main occupation is not the carriage of goods, provided that the transport operations carried out by these vehicles do not cause distortions of competition, and subject to the Commission's agreement.
3. (a) The Council, acting unanimously on a proposal from the Commission, may authorise a Member State to maintain further exemptions from or reductions in taxes on vehicles on the grounds of specific policies of a socio-economic nature or linked to that State’s infrastructure. Such exemptions or reductions may apply only to vehicles registered in that Member State which carry out transport operations exclusively inside a well-defined part of its territory.

(b) Any Member State wishing to maintain such an exemption or reduction shall inform the Commission thereof and shall also forward to it all necessary information. The Commission shall inform the other Member States of the proposed exemption or reduction within one month.

The Council shall be deemed to have authorised maintenance of the proposed exemption or reduction if, within a period of two months from the date on which the other Member States were informed in accordance with the first subparagraph, neither the Commission nor any Member State has requested that the matter be examined by the Council.

4. Without prejudice to the second subparagraph of paragraph 1 and to paragraphs 2 and 3 of this Article or to Article 6 of Council Directive 92/106/EEC of 7 December 1992 on the establishment of common rules for certain types of combined transport of goods between Member States, Member States may not grant any exemption from, or any reduction in, the taxes referred to in Article 3 which would render the chargeable tax lower than the minimum referred to in paragraph 1 of this Article.

CHAPTER III - Tolls and user charges

Article 7

1. Without prejudice to Article 9 paragraph 1a, Member States may maintain or introduce tolls and/or user charges on the trans-European road network or on certain sections of that network, and on any other additional sections of their network of motorways which are not part of the trans-European road network under the conditions laid down in paragraphs 2, 3, 4 and 5 of this Article and in Articles 7a to 7k. This shall be without prejudice to the right of Member States, in compliance with the Treaty on the Functioning of the EU, to apply tolls and/or user charges on other roads, provided that the imposition of tolls and/or user charges on such other roads does not discriminate against international traffic and does not result in the distortion of competition between operators.

2. Member States shall not impose both tolls and user charges on any given category of vehicle for the use of a single road section. However, a Member State which imposes a user charge on its network may also impose tolls for the use of bridges, tunnels and mountain passes.

3. Tolls and user charges shall not discriminate, directly or indirectly, on the grounds of the nationality of the haulier, the Member State or the third country of establishment of the haulier or of registration of the vehicle, or the origin or destination of the transport operation.

4. Member States may provide for reduced toll rates or user charges, or exemptions from the obligation to pay tolls or user charges for vehicles exempted from the requirement to install and use recording equipment under Council Regulation (EEC) No 3821/85 of 20 December 1985 on recording in road transport (2), and in cases covered by, and subject to the conditions set out in, Article 6(2)(a) and (b) of this Directive.

5. A Member State may choose to apply tolls and/or user charges only to vehicles having a maximum permissible laden weight of not less than 12 tonnes if it considers that an extension to vehicles of less than 12 tonnes would, amongst others:
(a) create significant adverse effects on the free flow of traffic, the environment, noise levels, congestion, health, or road safety due to traffic diversion;

(b) involve administrative costs of more than 30 per cent of the additional revenue which would have been generated by that extension.

Member States choosing to apply tolls and/or user charges only to vehicles having a maximum permissible laden weight of not less than 12 tonnes shall inform the Commission of their decision and on the reasons therefore.

**Article 7a**

1. User charges shall be proportionate to the duration of the use made of the infrastructure, not exceeding the values stipulated in Annex II, and shall be valid for a day, a week, a month or a year. The monthly rate shall be no more than 10 per cent of the annual rate, the weekly rate shall be no more than 5 per cent of the annual rate and the daily rate shall be no more than 2 per cent of the annual rate. A Member State may apply only annual rates for vehicles registered in that Member State.

2. Member States shall set user charges, including administrative costs, for all vehicle categories, at a level which is no higher than the maximum rates laid down in Annex II.

**Article 7b**

1. The infrastructure charge shall be based on the principle of the recovery of infrastructure costs. The weighted average infrastructure charge shall be related to the construction costs and the costs of operating, maintaining and developing the infrastructure network concerned. The weighted average infrastructure charge may also include a return on capital and/or a profit margin based on market conditions.

2. The costs taken into account shall relate to the network or the part of the network on which infrastructure charges are levied and to the vehicles that are subject thereto. Member States may choose to recover only a percentage of those costs.

**Article 7c**

1. The external-cost charge may be related to the cost of traffic-based air pollution. On road sections crossing areas with a population exposed to road traffic-based noise pollution, the external-cost charge may include the cost of traffic-based noise pollution. The external-cost charge shall vary and be set in accordance with the minimum requirements and the methods as specified in Annex IIIa and shall respect the maximum values set out in Annex IIIb.

2. The costs taken into account shall relate to the network or the part of the network on which external-cost charges are levied and to the vehicles that are subject thereto. Member States may choose to recover only a percentage of those costs.

3. The external-cost charge related to traffic-based air pollution shall not apply to vehicles which comply with the most stringent EURO emission standards until four years after the dates of application laid down in the rules which introduced those standards.

4. The amount of the external-cost charge shall be set by the Member State concerned. If a Member State designates an authority for this purpose, the authority shall be legally and financially independent from the organisation in charge of managing or collecting part or all of the charge.
Article 7d

By one year after the adoption of future and more stringent EURO emission standards, the European Parliament and the Council shall, in accordance with the ordinary legislative procedure, determine the corresponding maximum values in Annex IIIb.

Article 7e

1. Member States shall calculate the maximum level of infrastructure charge using a methodology based on the core calculation principles set out in Annex III.

2. For concession tolls, the maximum level of the infrastructure charge shall be equivalent to, or less than, the level that would have resulted from the use of a methodology based on the core calculation principles set out in Annex III. The assessment of such equivalence shall be made on the basis of a reasonably long reference period appropriate to the nature of the concession contract.

3. Tolling arrangements which were already in place on 10 June 2008 or for which tenders or responses to invitations to negotiate under the negotiated procedure were received pursuant to a public procurement process before 10 June 2008 shall not be subject to the obligations set out in paragraphs 1 and 2 for as long as those arrangements remain in force and provided that they are not substantially amended.

Article 7f

1. In exceptional cases concerning infrastructure in mountainous regions, and after informing the Commission, a mark-up may be added to the infrastructure charge levied on specific road sections which are subject to acute congestion, or the use of which by vehicles is the cause of significant environmental damage, on condition that:

(a) the revenue generated from the mark-up is invested in financing the construction of priority projects of European interest, identified in Annex III to Decision No 661/2010/EU of the European Parliament and of the Council of 7 July 2010 on Union guidelines for the development of the trans-European transport network (1), which contribute directly to the alleviation of the congestion or environmental damage and which are located in the same corridor as the road section on which the mark-up is applied;

(b) the mark-up does not exceed 15 per cent of the weighted average infrastructure charge calculated in accordance with Article 7b(1) and Article 7e, except where the revenue generated is invested in cross-border sections of priority projects of European interest involving infrastructure in mountainous regions, in which case the mark-up may not exceed 25 per cent;

(c) the application of the mark-up does not result in unfair treatment of commercial traffic compared to other road users;

(d) a description of the exact location of the mark-up and proof of a decision to finance the construction of priority projects referred to in point (a) are submitted to the Commission in advance of the application of the mark-up; and

(e) the period for which the mark-up is to apply is defined and limited in advance and is consistent, in terms of the expected revenue to be raised, with the financial plans and cost-benefit analysis for the projects co-financed with the revenue from the mark-up.
The first subparagraph shall apply to new cross-border projects subject to the agreement of all Member States involved in that project.

2. A mark-up may be applied to an infrastructure charge which has been varied in accordance with Article 7g.

3. After receiving the required information from a Member State intending to apply a mark-up, the Commission shall make this information available to the members of the Committee referred to in Article 9c. If the Commission considers that the planned mark-up does not meet the conditions set out in paragraph 1, or if it considers that the planned mark-up will have significant adverse effects on the economic development of peripheral regions, it may reject or request amendment of the plans for charges submitted by the Member State concerned. These implementing acts shall be adopted in accordance with the advisory procedure referred to in Article 9c(2).

4. On road sections where the criteria for applying a mark-up pursuant to paragraph 1 are met, the Member States may not levy an external-cost charge unless a mark-up is applied.

5. The amount of the mark-up shall be deducted from the amount of the external-cost charge calculated in accordance with Article 7c, except for vehicles of EURO emission classes 0, I and II from 15 October 2011, and III from 2015 onwards. All these revenues generated by the simultaneous application of the mark-up and the external cost charges shall be invested in financing the construction of priority projects of European interest identified in Annex III to Decision No 661/2010/EU.

Article 7g

1. Member States shall vary the infrastructure charge according to the EURO emission class of the vehicle in such a way that no infrastructure charge is more than 100 per cent above the same charge for equivalent vehicles meeting the strictest emission standards. Existing concession contracts are exempted from this requirement until the contract is renewed.

A Member State may nevertheless derogate from the requirement of varying the infrastructure charge if:
(i) this would seriously undermine the coherence of the tolling systems in its territory;
(ii) it would not be technically practicable to introduce such differentiation in the tolling system concerned;
(iii) this would lead to diversion of the most polluting vehicles with negative impacts on road safety and public health; or
(iv) the toll includes an external-cost charge.

Any such derogations or exemptions shall be notified to the Commission.

2. Where, in the event of a check, a driver or, if appropriate, the haulier, is unable to produce the vehicle documents necessary to ascertain the EURO emission class of the vehicle, Member States may apply tolls up to the highest level chargeable.

3. The infrastructure charge may also be varied for the purpose of reducing congestion, minimising infrastructure damage and optimising the use of the infrastructure concerned or promoting road safety, on condition that:
(a) the variation is transparent, made public and available to all users on equal terms;
(b) the variation is applied according to the time of day, type of day or season;
(c) no infrastructure charge is more than 175 per cent above the maximum level of the weighted average infrastructure charge as referred to in Article 7b;
(d) the peak periods during which the higher infrastructure charges are levied for the purpose of reducing congestion do not exceed five hours per day;
(e) the variation is devised and applied in a transparent and revenue neutral way on a road section affected by congestion by offering reduced toll rates for hauliers who travel during off-peak periods and increased toll rates for hauliers who travel during peak hours on the same road section; and
(f) a Member State wishing to introduce such variation or changing an existing one informs the Commission thereof and provides it with the information necessary to ensure that the conditions are fulfilled. Based on the information provided, the Commission shall make public and regularly update a list containing the periods and corresponding rates during which the variation is applied.

4. The variations referred to in paragraphs 1 and 3 are not designed to generate additional toll revenue. Any unintended increase in revenue shall be counterbalanced by changes to the structure of the variation which must be implemented within two years from the end of the accounting year in which the additional revenue is generated.

**Article 7h**

1. At least six months before the implementation of a new infrastructure charge tolling arrangement, Member States shall send to the Commission:
   (a) for tolling arrangements other than those involving concession tolls:
      — the unit values and other parameters used in calculating the various infrastructure cost elements, and
      — clear information on the vehicles covered by the tolling arrangements, the geographic extent of the network, or part of the network, used for each cost calculation, and the percentage of costs that are intended to be recovered;
   (b) for tolling arrangements involving concession tolls:
      — the concession contracts or significant changes to such contracts, the base case on which the grantor has founded the notice of concession, as referred to in Annex VII B to Directive 2004/18/EC of the European Parliament and of the Council of 31 March 2004 on the coordination of procedures for the award of public works contracts, public supply contracts and public service contracts (1); this base case shall include the estimated costs as defined in Article 7b (1) envisaged under the concession, the forecast traffic, broken down by type of vehicle, the levels of toll envisaged and the geographic extent of the network covered by the concession contract.

2. Within six months of receiving all the necessary information in accordance with paragraph 1, the Commission shall give an opinion as to whether the obligations of Article 7e are complied with. The opinions of the Commission shall be made available to the Committee referred to in Article 9c.

3. Before the implementation of a new external-cost charge tolling arrangement, Member States shall send the Commission:
   (a) precise information locating the road sections where the external-cost charge is to be levied and describing the class of vehicles, type of roads and the exact time periods according to which the external-cost charge will vary;
   (b) the envisaged weighted average external-cost charge and the envisaged total revenue;
   (c) if appropriate, the name of the authority designated in accordance with Article 7c(4) to set the amount of the charge, and of its representative;
   (d) the parameters, data and information necessary to demonstrate how the calculation method set out in Annex IIIa will be applied.
4. The Commission shall take a decision as to whether the obligations of Articles 7b, 7c, 7j or 9(2) are complied with by:
   (a) six months after the submission of the file referred to in paragraph 3; or
   (b) where applicable, an additional three months after receipt of additional information pursuant to paragraph 3 requested by the Commission. The Member State concerned shall adapt the proposed external-cost charge in order to be in conformity with the decision. The decision of the Commission shall be made available to the Committee referred to in Article 9c, to the European Parliament and to the Council.

Article 7i

1. Member States shall not provide for discounts or reductions for any users in relation to the external-cost charge element of a toll.

2. Member States may provide for discounts or reductions to the infrastructure charge on condition that:
   (a) the resulting charging structure is proportionate, made public and available to users on equal terms and does not lead to additional costs being passed on to other users in the form of higher tolls;
   (b) such discounts or reductions lead to actual savings in administrative costs; and
   (c) do not exceed 13 per cent of the infrastructure charge paid by equivalent vehicles not eligible for the discount or reduction.

3. Subject to the conditions provided for in Article 7g(3)(b) and in Article 7g(4), toll rates may, in exceptional cases, namely for specific projects of high European interest identified in Annex III to Decision No 661/2010/EU, be subject to other forms of variation in order to secure the commercial viability of such projects where they are exposed to direct competition with other modes of vehicle transport. The resulting charging structure shall be linear, proportionate, made public, and available to all users on equal terms and shall not lead to additional costs being passed on to other users in the form of higher tolls. The Commission shall verify compliance with those conditions prior to the implementation of the charging structure in question.

Article 7j

1. Tolls and user charges shall be applied and collected and their payment monitored in such a way as to cause as little hindrance as possible to the free flow of traffic and to avoid any mandatory controls or checks at the Union’s internal borders. To this end, Member States shall cooperate in establishing methods for enabling hauliers to pay tolls and user charges 24 hours a day, at least at major sales outlets, using common means of payment, inside and outside the Member States in which they are applied. Member States shall provide adequate facilities at the points of payment for tolls and user charges so as to maintain normal road safety standards.

2. The arrangements for collecting tolls and user charges shall not, financially or otherwise, place non-regular users of the road network at an unjustified disadvantage. In particular, where a Member State collects tolls or user charges exclusively by means of a system that requires the use of a vehicle on-board unit, it shall ensure that appropriate on-board units compliant with the requirements of Directive 2004/52/EC of the European Parliament and of the Council of 29 April 2004 on the interoperability of electronic road toll systems in the Community (1) can be obtained by all users under reasonable administrative and economic arrangements.

3. If a Member State levies a toll on a vehicle, the total amount of the toll, the amount of the infrastructure charge and/or the amount of the external-cost charge shall be indicated in a receipt provided to the haulier, as far as possible by electronic means.
4. Where economically feasible, Member States shall levy and collect external-cost charges by means of an electronic system which complies with the requirements of Article 2(1) of Directive 2004/52/EC. The Commission shall promote cooperation between Member States that may prove necessary to ensure the interoperability of electronic toll collection systems at European level.

**Article 7k**

Without prejudice to Articles 107 and 108 of the Treaty on the Functioning of the EU, this Directive does not affect the freedom of Member States which introduce a system of tolls and/or user charges for infrastructure to provide appropriate compensation for those charges.

**Article 8**

1. Two or more Member States may cooperate in introducing a common system for user charges applicable to their territories as a whole. In that case, those Member States shall ensure that the Commission is closely involved therein and in the system's subsequent operation and possible amendment.

2. A common system shall be subject to the following conditions in addition to those in Article 7:
   (a) the common user-charge rates shall be set by the participating Member States at levels that are not higher than the maximum rates referred to in Article 7(7);
   (b) ►M1 payment of the common user charge shall give access to the network as defined by the participating Member States in accordance with Article 7(1); ◄
   (c) other Member States may join the common system;
   (d) a scale shall be worked out by the participating Member States whereby each of them shall receive a fair share of the revenues accruing from the user charge.

**Article 8a**

Each Member State shall monitor the system of tolls and/or user charges to ensure that it functions in a transparent and non-discriminatory manner.

**Article 8b**

1. Two or more Member States may cooperate in introducing a common system for tolls applicable to their combined territories as a whole. In such a case, those Member States shall ensure that the Commission is informed about such cooperation and the system's subsequent operation and possible amendment.

2. The common toll system shall be subject to the conditions set out in Articles 7 to 7k. Other Member States may join the common system.

**CHAPTER IV - Final provisions**

**Article 9**

1. ►M1 This Directive shall not prevent the non-discriminatory application by Member States of:
   (a) specific taxes or charges:
      — levied upon registration of the vehicle, or
      — imposed on vehicles or loads of abnormal weights or dimensions;
   (b) parking fees and specific urban traffic charges.
1a. This Directive shall not prevent the non-discriminatory application by Member States of regulatory charges specifically designed to reduce traffic congestion or combat environmental impacts, including poor air quality, on any roads located in an urban area, including trans-European network roads crossing urban areas.

2. Member States shall determine the use of revenues generated by this Directive. To enable the transport network to be developed as a whole, revenues generated from infrastructure and external costs charges, or the equivalent in financial value of these revenues, should be used to benefit the transport sector, and optimise the entire transport system. In particular, revenues generated from external cost charges, or the equivalent in financial value of these revenues, should be used to make transport more sustainable, including one or more of the following:

(a) facilitating efficient pricing;
(b) reducing road transport pollution at source;
(c) mitigating the effects of road transport pollution at source;
(d) improving the CO2 and energy performance of vehicles;
(e) developing alternative infrastructure for transport users and/or expanding current capacity;
(f) supporting the trans-European transport network;
(g) optimising logistics;
(h) improving road safety; and
(i) providing secure parking places.

This paragraph shall be deemed to be applied by Member States, if they have in place and implement fiscal and financial support policies which leverage financial support to the trans-European network and which have an equivalent value of at least 15 per cent of the revenues generated from infrastructure and external cost charges in each Member State.

Article 9a

Member States shall establish appropriate controls and determine the system of penalties applicable to infringements of the national provisions adopted under this Directive. They shall take all necessary measures to ensure that they are implemented. The penalties established shall be effective, proportionate and dissuasive.

Article 9b

The Commission shall facilitate dialogue and the exchange of technical know-how between Member States in relation to the implementation of this Directive and in particular the Annexes.

Article 9c

1. The Commission shall be assisted by a committee. That committee shall be a committee within the meaning of Regulation (EU) No 182/2011 of the European Parliament and of the Council of 16 February 2011 laying down the rules and general principles concerning mechanisms for control by Member States of the Commission’s exercise of implementing powers (1).

2. Where reference is made to this paragraph, Article 4 of Regulation (EU) No 182/2011 shall apply.

Article 9d

The Commission shall adopt delegated acts in accordance with Article 290 of the Treaty on the Functioning of the EU as regards:
— the adaptation of Annex 0 to the Union acquis,
— the adaptation of the formulas of sections 4.1 and 4.2 of Annex IIIa to scientific and technical progress.
The procedures set out in Articles 9e, 9f and 9g shall apply to the delegated acts referred to in this Article.

**Article 9e**

1. The power to adopt the delegated acts referred to in Article 9d shall be conferred on the Commission for an indeterminate period of time.
2. As soon as it adopts a delegated act, the Commission shall notify it simultaneously to the European Parliament and the Council.
3. The power to adopt delegated acts is conferred on the Commission subject to the conditions laid down in Articles 9f and 9g.

**Article 9f**

1. The delegation of power referred to in Article 9d may be revoked by the European Parliament or by the Council.
2. The institution which has commenced an internal procedure for deciding whether to revoke the delegation of power shall endeavour to inform the other institution and the Commission within a reasonable time before the final decision is taken, indicating the delegated power which could be subject to revocation and possible reasons for a revocation.
3. The decision of revocation shall put an end to the delegation of the power specified in that decision and shall take effect immediately or at a later date specified therein. It shall not affect the validity of the delegated acts already in force. It shall be published in the Official Journal of the EU.

**Article 9g**

1. The European Parliament or the Council may object to a delegated act within a period of two months from the date of notification. At the initiative of the European Parliament or the Council this period shall be extended by two months.
2. If, on expiry of that period, neither the European Parliament nor the Council has objected to the delegated act, it shall be published in the Official Journal of the EU and shall enter into force at the date stated therein.

The delegated act may be published in the Official Journal of the EU and enter into force before the expiry of that period if the European Parliament and the Council have both informed the Commission of their intention not to raise objections.

3. If the European Parliament or the Council objects to a delegated act, it shall not enter into force. The institution which objects shall state the reasons for objecting to the delegated act.

**Article 10**

1. For the purpose of this Directive, the rates of exchange between the euro and the national currencies of the Member States which have not adopted the euro shall be those in force on the first working day of October and published in the Official Journal of the EU; they shall have effect from 1 January of the following calendar year.
2. Member States which have not adopted the euro may maintain the amounts in force at the time of the annual adjustment made pursuant to paragraph 1 if the conversion of the amounts expressed in euro would result in a change of less than 5 per cent when expressed in national currencies.

**Article 10a**

1. The amounts in euro as laid down in Annex II and the amounts in cent as laid down in Tables 1 and 2 in Annex IIIb shall be reviewed every two years starting on 1 January 2013, in order to take account of changes in the EU-wide Harmonised Index of Consumer Prices excluding energy and unprocessed food (as published by the Commission (Eurostat)).

The amounts shall be adapted automatically, by increasing the base amount in euro or cent by the per centage change in that index. The resulting amounts shall be rounded up to the nearest euro with regard to Annex II, rounded up to the nearest tenth of a cent with regard to Table 1 in Annex IIIb and rounded up to the nearest hundredth of a cent with regard to Table 2 in Annex IIIb.

2. The Commission shall publish in the Official Journal of the EU the adapted amounts referred to in paragraph 1. Those adapted amounts shall enter into force on the first day of the month following publication.

**Article 11**

1. By 16 October 2014, and every four years thereafter, Member States which levy an external-cost charge and/or an infrastructure charge shall draw up a report on tolls, including concession tolls, levied on their territory and shall forward it to the Commission which shall make it available to the other Member States. That report may exclude tolling arrangements that were already in place on 10 June 2008 and which do not include external-cost charges, as long as those arrangements remain in force and provided that they are not substantially amended. That report shall comprise information on:
   (a) the weighted average external-cost charge and the specific amounts levied for each combination of class of vehicle, type of road and period of time;
   (b) the variation of infrastructure charges according to the type of vehicles and time;
   (c) the weighted average infrastructure cost charge and total revenue raised through the infrastructure charge;
   (d) the total revenue raised through external cost charges; and
   (e) the actions taken pursuant to Article 9(2).

2. By 16 October 2015, the Commission, assisted by the Committee referred to in Article 9c, shall present a report to the European Parliament and the Council on the implementation and effects of this Directive, in particular as regards the effectiveness of the provisions on the recovery of the costs related to traffic-based pollution, and on the inclusion of vehicles of more than 3.5 and less than 12 tonnes. The report shall also analyse, based on continuous monitoring, and assess, amongst others:
   (a) the effectiveness of the measures foreseen in this Directive in order to tackle negative impacts caused by road transport taking also into account, in particular, the impact on geographically isolated and peripheral Member States;
   (b) the effect of the implementation of this Directive to direct users toward the most environmentally friendly and efficient transport solutions and shall include information on the introduction of distance-based charges;
   (c) the implementation and effect of the variation of infrastructure charges as referred to in Article 7g on the reduction of local air pollution and congestion. The report shall also evaluate whether the maximum variation and peak period as referred to in Article 7g are sufficient to enable a proper functioning of the variation mechanism;
   (d) scientific progress in estimating external costs of transport for the purpose of internalising them; and
(e) progress towards applying charges to road users and ways of gradually harmonising the charging systems that are applied to commercial vehicles.

The report shall also evaluate the use of electronic systems to levy and collect infrastructure and external-cost charges and their degree of interoperability pursuant to Directive 2004/52/EC.

3. The report shall be accompanied, if appropriate, by a proposal to the European Parliament and the Council for further revision of this Directive.

4. By 16 October 2012, the Commission shall present a report that summarises the other measures, such as regulatory policies, taken to internalise or reduce the external costs related to environment, noise and health from all transport modes, including the legal basis and maximum values used.

In order to ensure fair intermodal competition while gradually charging the external costs of all transport modes, it shall include a timetable of the measures which remain to be taken to address other modes or vehicles and/or the external-cost elements not taken into account yet, taking into account progress in revising Council Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity (1).

**Article 12**

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive by 1 July 2000. They shall forthwith inform the Commission thereof. When Member States adopt such measures, they shall contain a reference to this Directive or shall be accompanied by such reference at the time of their official publication. The procedure for such a reference shall be adopted by Member States.

2. Member States shall communicate to the Commission the text of the main provisions of domestic law which they adopt in the field covered by this Directive. The Commission shall inform the other Member States thereof.

**Article 13**

This Directive shall enter into force on the day of its publication in the Official Journal of the European Communities.

**Article 14**

This Directive is addressed to the Member States.
Appendix C – Eurostat data for European countries
Goods transport by road in Europe (Millions of Tonne-kilometre in 2011)

Data displayed in this graph cover the carriage of goods by road by means of goods road transport vehicles registered in the reporting countries. The collection is based on the Council Regulation (EC) No 1172/98 of 25 May 1998. The reporting countries may exclude from the scope of these statistics the goods road transport vehicles whose load capacity is lower than 3.5 tonnes or the maximum permissible laden weight is lower than 6 tonnes.

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**Council Regulation (EC) No 1172/98 of 25 May 1998**

- The collection is based on this Council Regulation.
- Reporting countries may exclude certain vehicles from the statistics.
Haulage by vehicles registered in the reporting country (thousand millions tonnes.km)
Notes: only haulage of heavy goods vehicles (usually >3.5 tonnes load capacity).
Source: EU Statistical pocketbook 2011
### Road

**NATIONAL HAULAGE**

#### HAULAGE BY VEHICLES REGISTERED IN THE REPORTING COUNTRY

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<th></th>
<th>Thousand mio tkm</th>
<th>% of Total Haulage 2009</th>
<th>% Change '08-'09</th>
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**Notes:** only haulage of heavy goods vehicles (usually >35 tonnes load capacity).
## Road
### INTERNATIONAL HAULAGE (*)

### HAULAGE BY VEHICLES REGISTERED IN THE REPORTING COUNTRY

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**Notes:**
- (*) including cross-trade and cabotage.
- Only haulage of heavy goods vehicles (usually >3.5 tonnes load capacity).
- () CH: in contrast to the data for other countries, until 2007 the Swiss data do not include that part of international journeys by Swiss hauliers that takes place outside Switzerland.