

## **Toll Collection in Austria**

### **Implementation of a fully electronic system on the existing motorway network**

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#### **Abstract**

Since the late sixties and mid seventies of the last century some high cost sections of motorways in the Austrian mountains had been charged. In the early nineties suggestions raised for a further implementation of toll on the entire motorway network. The main motivation behind the decision to introduce a road-charging system was primarily the aspect of financing and to involve as much as possible those drivers using the network's toll roads in a fair cost coverage system. After 1996 the parliament had passed a legal basis for a future collection of tolls on all motorways and express roads a Vignette (time based sticker-system) had been introduced as a short-term intermediate solution 1997.

On from the 1<sup>st</sup> of January 2004 electronic toll collection is now in operation and allows payment in proportion to the distance travelled without obstruction of the traffic flow (free flow, multilane).

All vehicles above a permissible gross weight of 3.5 tons are obliged to pay a distance related toll. Light vehicles have still to pay a time related user fee by buying the Vignette.

All 2.000 km of motorways and express roads had been given into the responsibility of a state owned Motorway Company and are subject to the new toll collection system.

The main objective is to insure a sufficient financial basis for maintenance, operation, upgrading and further development of the motorway-network in Austria. All the revenue is earmarked for the use on the charged road network. No additional financial support is given to the company from the regular budget.

At least the infrastructure costs will be credited to the users on the basis of the distance travelled. The toll-rates result from an infrastructure cost calculation and are graduated in three classes according to the number of axles. On the road sections crossing the sensitive mountains of the Alps which cause higher costs and had been tolled already in the past higher toll rates are fixed.

Regulation is not an optional goal but several secondary effects are expected from the system as well:

The experiences of the first year of operation show that the system is almost well accepted by the users. The average number of toll transactions per workday reaches 1,8 millions. Although there occurred partial diversion of local and regional traffic to parallel roads the overall percentage remained around 2% of the total traffic performance on motorways. Summarising, the introduction of a kilometre-based electronic toll system in Austria is a significant step towards achieving a more equitable distribution of costs in the road transport sector.

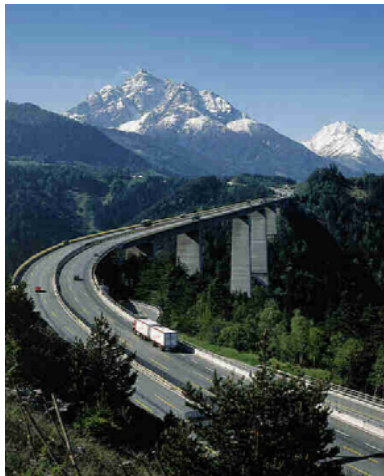
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## **1. Introduction**

Austria is geographically situated in central Europe with an extension of 84.000 square Km and a population of 8 million inhabitants. A big part of its territory is covered by mountains called the Alps with peaks up to 3.800 meters above sea level. This topography and winter seasons with lots of snow and frost effect primarily also the costs of construction and maintenance of the primary road network.

## **2. History of toll collection in Austria**

Since the late sixties and mid seventies of the last century some high cost sections of motorways in the Austrian mountains had been charged. Toll collection had been introduced after the government's decision to support the financing of the urgently needed high level roads crossing the alpine area by taking loans and credits on the capital market. In this first stage 145 km of motorways and express road sections consisting of tunnels and bridges in a very high percentage had been constructed in that way.



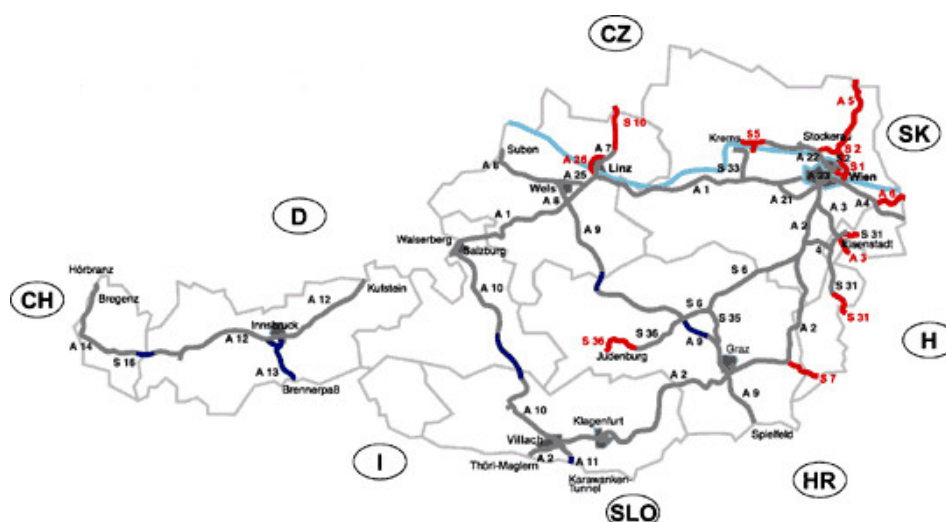
A 13 Brenner motorway, opened 1968, the first credit financed motorway in Austria

Later on credit financing was used also on new motorways not determined for toll collection. That lead to a permanent increase of road related debts that were guarantied in the state's budget.

In the early nineties therefore suggestions raised for a further implementation of toll on the entire motorway network.

But finally Austrias membership in the European Union which started 1995 and the coming Currency Union made it necessary to find acceptable solutions to reduce the debts in the state budget.

The strategy was to transfer the entire high level road network including the debts into the private sector. For that reason the existing state owned financing company ASFINAG, a stock company, got by law the responsibilities for the whole motorway sector (design, construction, maintenance, operation and financing). The company took over from the state the financial obligations concerning motorways (5,7 billion Euro) and got as a counterbalance by contract the right to collect toll and user charges on the entire motorway and express road network in its own name.



Network of motorways and expressroads in Austria -sections in red under construction or planification

### 3. Background and objectives for toll collection

The main motivation behind the decision to introduce a road-charging system was primarily the aspect of financing and to involve as much as possible those drivers using the network's toll roads in a fair cost coverage system. The main objective is to insure a sufficient financial basis for maintenance, operation, upgrading and further development of the motorway-network in Austria. All the revenue is earmarked for the use on the charged road network. No additional financial support is given to the motorway sector from the regular budget.

Although there existed considerations to allocate all costs, including externalities, caused by the traffic on motorways at least the infrastructure costs will be credited to the users on the basis of the distance travelled.

### 4. Steps towards implementation of toll

After the parliament had passed a legal basis for a future collection of tolls on all motorways and express roads 1996 a Vignette (time based sticker-system) had been introduced for vehicles up to 12 tonnes as a short-term intermediate solution 1997. For heavy trucks (12 or more tonnes) existed already a similar time based charging system since many years.

The vignette system still remains for vehicles up to 3,5 tonnes also for the next future. Available are Vignettes

for one year	for a price of	72,60 Euro
for two months	for a price of	21,80 Euro
and for 10 days	for a price of	7,60 Euro

On from the 1<sup>st</sup> of January 2004 electronic toll collection is now in operation for all vehicles with more than 3,5 tonnes highest permissible gross weight and allows payment in proportion to the distance travelled without obstruction of the traffic flow (free flow, multilane). For this group of heavy vehicles the electronic toll replaced the previous time based vignette and the user fee for heavy trucks.

#### Vehicles

	≤ 3.5 t	<12 t	≥ 12 t
2003	Vignette	Vignette	User fee (only trucks)
2004	Vignette	Distance-based electronic toll	

## **5. Structure of the toll system**

Toll collection takes place exclusively with an electronic toll-system, that allows payment in proportion to the distance travelled without any obstruction of the traffic flow (free flow, multilane).

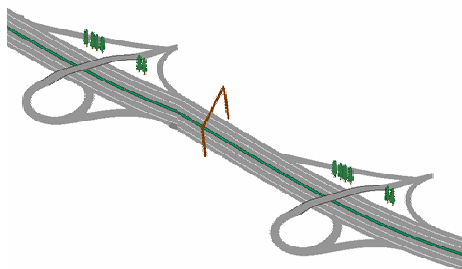
The tendering procedure for the Austrian toll system started with a call for interest in March 2001 and was terminated after the competition phase in June 2002. Austria was looking for a system operator that operates the toll system with its “own” toll collection technology on the basis of a ten years service contract to be concluded with the company ASFINAG the Austrian motorway operator.

In order to exploit the full innovative potential of the industry and to achieve the most reliable and efficient toll system possible, companies bidding for the contract were not restricted to any particular system technology.

Basis for the evaluation procedure was a share of 70 % price related and 30 % quality related factors.

The company ASFINAG, responsible for the introduction of the EFC system, decided finally for the Italian motorway operator Autostrade S.p.a. as the best bidder in the evaluation process. Autostrade, respectively its Austrian subsidiary EUROPPASS signed a ten years service contract with an option for a prolongation of another 5 years. The contract has an equivalent value of 750 million Euro. The operator uses for toll collection a microwave based DSRC technology, 5,8 GHz compatible to the CEN standard with road-side radio-antennas on each motorway section between junctions. The implementation of the system took 18 months as it was requested in the tender.

The toll system is an open system with one gantry for toll communication in each sector between exit/entry-points. More than 800 gantries (420 for each driving direction) had been implemented in the entire network.



The open toll system



Gantry for toll communication

The antennas carried by these gantries communicate with electronic devices (On Board Units, OBU) fixed on the windcreens of the vehicles passing by.

Users can get the OBU which is only of the size of a package of Cigarettes and called Go-Box at a high number of points of sale 24 hours a day for an administration fee of 5 Euro only. Around 480.000 Go-Boxes had been distributed till now. The Go-Box is equipped with a switch for the change of the vehicle class for instance in case of an additional trailer.



On Board Unit "GO-BOX"

### 5.1. Modes of payment

Users can choose between two different methods of payment

#### The pre-pay procedure

Users who rarely drive on the tolled road network can choose to pay the toll using the pre-pay procedure. This procedure is similar to that of a prepaid telephone card; the user charges the Go-Box with toll credit up to a certain maximum limit and the toll is then deducted from this credit as required by the toll system.




#### The post-pay procedure

According to this procedure, the owner of the vehicle registers with the system and provides an authorised means of payment, which is later used to pay the toll as required. The money is collected by the relevant card issuer (Maestro card, petrol card or credit card). More than 10 different card issuer can be chosen.

Almost 85 % of toll-transactions are actually been done by the more convenient method of post-payment.

### 5.2. Toll rates

The toll-rates result from an infrastructure cost calculation and are graduated in three classes according to the number of axles.

	 Vehicle class 2	 Vehicle class 3	 Vehicle class 4
Axles	2	3	4 + more
Toll rates Euro / km	0,130	0,182	0,273
Relation	1	1,4	2,1

toll rates in Euro / Km differentiated by vehicle class

These rates are based on the legal act concerning motorway tolling are fixed in a decree of the minister of transport.

On the road sections crossing the sensitive mountains of the Alps which cause higher costs and had been tolled already in the past higher toll rates are fixed.

### **5.3. Problems with high toll rates on certain motorway sections**

The fact of higher toll rates especially in the case of the A13 Brenner motorway connecting Germany via an 110 km long section through Austria with Italy lead to some differences with the European Commission concerning the interpretation of the European Union's directive on "Charging of heavy goods vehicles (HGV) for the use of certain infrastructures". [1]

This directive regulates that "the weighted average tolls shall be related to the costs of constructing, operating and developing the infrastructure network concerned". The Austrian cost calculation meets this condition in view on the entire charged road network. Analysing in a certain consideration the few Alp crossing motorway sections that had already been tolled for all vehicles since many years, primarily the A13 Brenner motorway, the toll revenue on these sections is higher than the allocated infrastructure costs are. That means in the view of the European Commission (EC) that the toll rates especially for heavy goods vehicles must be reduced.

But the problem on this motorway is not only a problem of revenue, it is much more a question of transport policy and environmental protection. This motorway stands in direct competition to transitroutes through Switzerland west of Austria. Switzerland referring to a contract with the European Union raised its existing user charge for HGV by nearly 70 % at the beginning of 2005. Austria reduced its toll on the Brenner motorway last year already by 20 %. The effect in the environmental sensitive alpine area was an increase of HGV on this route by more than 20 % in one year. There is no more political acceptance for an additional reduction of toll rates by almost 30 % following the EC request. It will now be a goal for political negotiations with the new Commission to find a solution acceptable for both sides.

## **6. Toll Enforcement**

Toll-enforcement which is one of the most important parts of an electronic toll system without barriers happens on the one hand by stationary toll-enforcement-gantries and portable enforcement equipments and on the other hand by a mobile control unit ( "toll-enforcement-officers" ).

100 permanent enforcement gantries are spread over the network primarily in the parts of higher traffic density. They consist of an equipment for automatic vehicle classification by laser scanner. Does the shape of a vehicle passing the gantry seem to belong to a vehicle due to toll payment and is there no toll communication or presumably a wrong vehicle class video cameras take a picture of the vehicles front. The licence plate is then read by automatic character recognition and sent to the enforcement office.

In the same way enforcement can be done by 20 existing portable equipments.



- [1] European Union: *Directive 1999/62/EC of the European Parliament and the Council of 17 June 1999 on charging of heavy goods vehicles for the use of certain infrastructures*



100 toll officers with 30 control vehicles form the mobile control unit belonging to the company ASFINAG. The officers are no second police, their competences are restricted only to toll but they are authorised by law to stop vehicles for reasons of control,

receive substitute payment, prevent toll dodgers from continuation of trip or start punishment procedures.

In addition to that there exist also 12 permanent traffic control sites on the most frequented motorway sections where also weight, technical and environmental vehicle conditions, driving time or dangerous goods can be controlled.

## **7. Experiences after the first year of operation**

The experiences of one year of operation show that the system is almost well accepted by the users. The average number of electronic toll transactions per workday reached 1,8 millions which means a total number of 50 million transactions during the year 2004. 3.250 millions of Km had been driven on motorways and express roads by vehicles due to pay toll.

The percentage of violation is less than 2 percent what means that there is almost a high discipline on the user's side..

The revenue of the new toll collection system that was expected by the company ASFINAG with 600 million Euro could be met exactly.

### **7.1. Traffic diversion**

The overall percentage of diversion remained around 2% of the total traffic performance on motorways. This represents only half of the percentage that had been estimated as a maximum for the first year of operation.

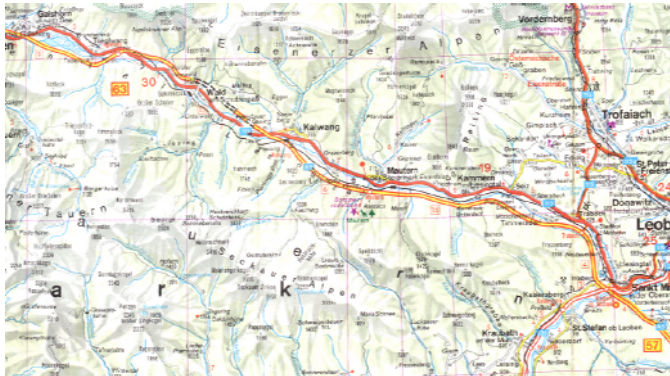
Nevertheless there occurred partial diversion of local and regional traffic to parallel roads with higher percentage that caused a more remarkable increase of traffic.

This higher diversion was almost restricted to typical situations within the road network or the traffic density concerned.

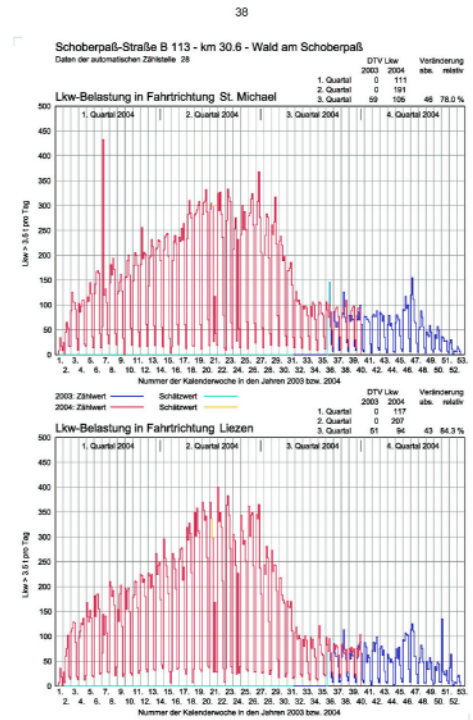
- A secondary road of good quality runs parallel nearby to the motorway for a longer distance
- The secondary road shortens the distance or travel time compared to the tolled motorway in an attractive size.
- High traffic density or road works that lead to frequent congestion on the motorway let the use of a comparable trunk road seem to be more efficient.

In any case based on the results of a study observing the development of traffic the regional authorities who are responsible for this secondary road network in Austria reacted with traffic restrictions or weight restrictions for heavy goods vehicles.

The following example taken from the A 9 motorway in Central Austria shows how the traffic on a trunk road (B 113) parallel to the motorway increased by traffic diversion after the start of the toll system and how it could be reduced again to nearly the previous size by setting traffic restrictions on the secondary road some months later.



Development of the frequency of heavy vehicles on a trunk road parallel to the tolled motorway A9



But there occurred also positive traffic diversion:

One of the mountainous toll sections on the A 9 that had in the past in a high percentage been bypassed via a 30 km longer but toll free express road had now after introduction of toll collection on the entire network a tremendous increase of heavy goods traffic while the previous alternative lost a lot of its former frequency.

## 8. Conclusion

Summarising it can be said, that the introduction of a kilometre-based electronic toll system in Austria was a significant step towards achieving a more equitable distribution of costs in the road transport sector. Although the experiences actually made in Austria with this system cannot be fully transformed to the situation in other countries we can recommend some elements of the Austrian strategy:

- Exact definition what the objectives and goals of the system should be
- Serious and detailed preparation of the design and the tendering procedure
- Necessary political support for all stages of implementation
- Balanced mix of experts experienced in the subject of charging or toll collection
- Choice of a system that is easy understandable for the users
- Early information and integration of representatives of the upcoming users.
- Decision of a realistic schedule for planification and realisation of the system although against political time pressure