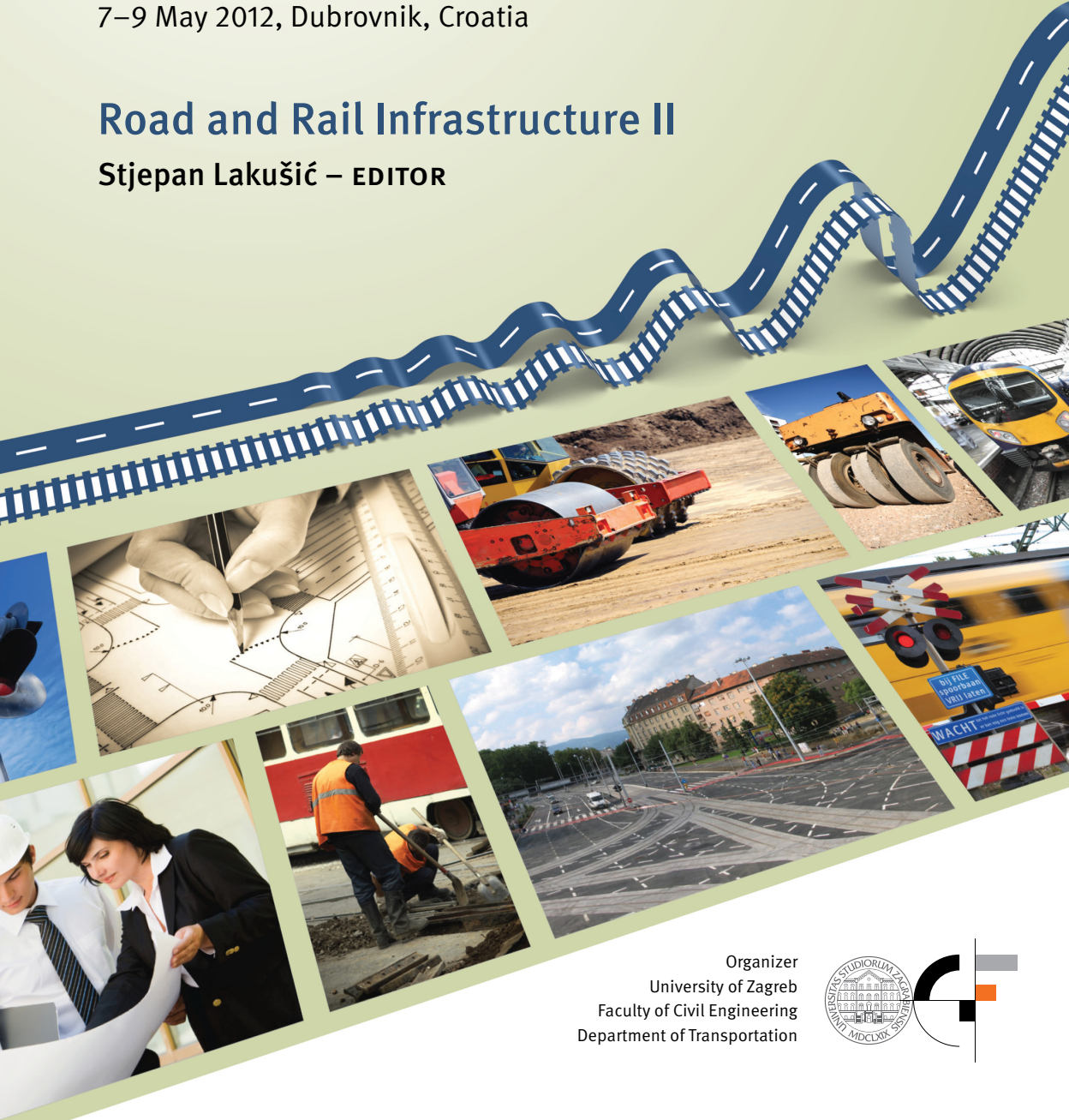


**CETRA**<sup>2012</sup>

2<sup>nd</sup> International Conference on Road and Rail Infrastructure  
7–9 May 2012, Dubrovnik, Croatia

## Road and Rail Infrastructure II

Stjepan Lakušić – EDITOR



Organizer  
University of Zagreb  
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# Road and Rail Infrastructure II

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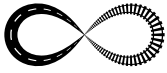
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## THE FIRST EXPERIENCE OF ETC USAGE IN THE SILESIA REGION

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### Abstract

Silesian industrial region is one of the most developed areas of Poland. The main power of the coal, metallurgy, machinery, car-building and other industries is concentrated in this region. Obviously, the transport problems of the region are key issues, since delivery of raw material and finished products is conducted from the region to many European countries. Beginning 1<sup>st</sup> of July 2011 Poland is, step by step, entering the system of electronic record-keeping for the payment of the transport tax. For this purpose, the vignette system is replaced with the ETC (Electronic toll collection) system and, in particular, with the viaTOLL.

Questions relating the implementation problems of this system are being considered. The stages of its implementation are also being studied. Since the Silesian region, in the matter of system implementation, is the leading region in Poland, it is already possible to evaluate the strengths and weaknesses of the system. The impact of tax policy on the environment is also considered. The feasibility of car parks update is being discussed on an example of a specific transport company. Also, a comparison with German and Benelux countries experience is carried out.

### 1 Introduction

On 1st of July 2011 the territory of Poland was to introduced with a new automated system for collecting vehicle tax from road freight transport and buses. Some of its deficiencies resulted in the fact that its actual putting into operation took place on 3rd of June, for which its developer, known Austrian company Kapsch will have to pay a penalty of almost 7,5 million zloty [1]. According to the data, 1560 km of road was put into operation and is now served by the viaTOLL system.

Initially it was planned [2] that the viaTOLL system will be introduced in four stages:

- Stage 1 – From 01.07.2011 the new system will cover 649 km of motorways, 554 km of expressways and approximately 370 km of national roads,
- Stage 2 – In January 2012 in the system 150 km of motorways and expressways will be included,
- Stage 3 – In January 2013 the system will include the next 970 km of motorways, express roads and some national roads,
- Step 4 – In January 2014 the system will include the next 200 km of motorways, express roads and some national roads.

Fig. 1 shows a road map of Poland [3], which was to be introduced with the electronic collection of transport charges. As is seen, most of these roads are located in the southern part of Poland, with the highest density of roads falling on the Upper Silesia.



Figure 1 Map of Poland with the specified sites of toll roads

Note that Poland is not an exception in this case, and is also not the first country in Europe where the same or a similar system has been introduced. In particular, Germany is using the Toll Collect system, Austria GO system, Myto cz system is implemented in Czech Republic, Myto sk system in Slovakia, Telepass and ViaCard systems in Italy, TIS–PL system in France, Via τ system in Spain and the LSWA system in Switzerland. In addition, a number of European countries use the opportunity to pay road tolls using electronic cards – dkv Card. The task of the authors did not include discussion on the advantages or disadvantages of one or the other system of electronic payments, as well as its design features. The main principles of work and organizational design are available on the viaTOLL official website [3]. Authors of this paper were interested, what specific effects will the introduction of this system bring to the transport operations in this specific region of Poland.

## 2 Upper Silesia transport situation

Payment changes, in connection with the introduction of viaTOLL for Silesian Economic Area, will have the greatest value in comparison with other regions of Poland. Upper Silesia is the most industrialized region of Poland. The majority of metallurgical and mining enterprises is concentrated in that region. Here, industries such as heavy and transport machinery, chemical and production of building materials are developed. All of this contributes to the development of road transport. Also, the densest road network is here, but the intensity of transport has its negative effects. In particular, road transport has a negative impact on the environment. This is due to different emissions in the form of exhaust gases, oil or dust waste. The situation with the recycling of outdated vehicles is still far from ideal and that also helps to increase

the number of motor vehicles waste. Noise and vibration in the neighborhood of intense highways is also a negative aspect that should be taken into account.

For road noise risk assessment the main value shall be automotive pressure ratio  $Z_m$ . Automotive pressure ratio is the product of the road length in the considered area and the average traffic in the roads network per unit area. In Poland this ratio varies from 1,0 for the Podlasie province to 5,5 for the Silesia province (Fig. 2 was developed based on [4]).

The introduction of a new payment system should stimulate the purchase of new cars that would have reduced emissions, noise, etc. On the other hand, the increase in fees will lead to an increase in budget revenues, which can and should be directed to the building of new roads, with better road surfaces, equipped with noise protection screens, etc. Thus, improving the payment system should promote the development of road transport and transport infrastructure in terms of their improvements and complement with world standards.

This trend is clearly visible in the new system of payments, if any, compared with the old vignette system, which functioned in Poland before the 01.07.2011. For example, a vignette on the annual operation of cars and trucks with a mass exceeding 12 tones and having at least 4 axes, in the previous system would cost an owner of a transport company 3371 PLN for vehicles with EURO3 standard or 2782 PLN for vehicles with EURO4 standard. Thus, if we take the norm EURO3 as a base, the savings for the owner are 17,5% without taking into account the annual mileage. It is obvious that the difference in 589 PLN was not significant and did not substantially contribute to stimulate the users in buying a new car.

Adopted rules now require payment for the car of the same class, when driving on motorways and express roads, of 0,37 PLN per 1 km for the EURO3 norm and 0,29 PLN per 1 km mileage for the EURO4 norm. The difference of 21,6% is not that important, as is the fact that this difference becomes significant for intensive use of the vehicle when the car has a significant annual mileage. If we compare the standards EURO3 and EURO5, the difference will be even more significant – 43,2%. The direction of input changes, which should significantly contribute in the improvement of the ecological situation on the Polish roads, as well as promote the development of a motorway and expresswax network, becomes apparent.

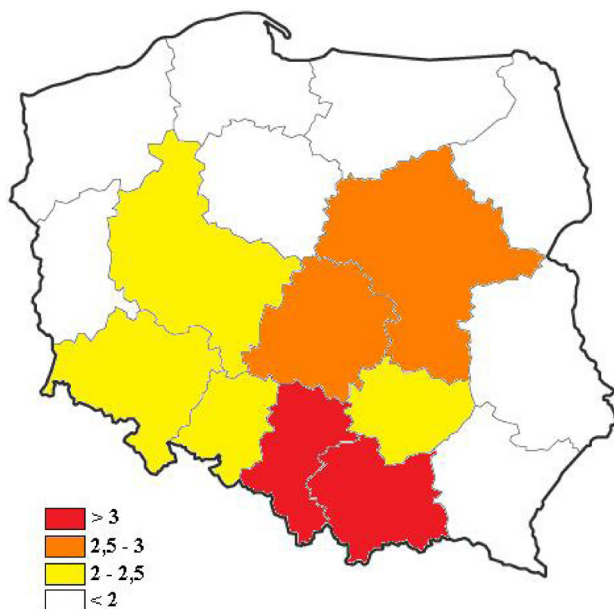


Figure 2 Automotive pressure ratio for Poland, divided into province

### 3 Effect of the new payment system on individual transport companies

As an example, a small transport company Intertransport, located in Upper Silesia in Ruda Śląska has been chosen. This company has been operating in the transportation services market since 1989, transporting various goods between EU countries. The company has three trucks with semitrailers available for the performance of transport. They are Mercedes models of different production years, relatively new (older vehicle Mercedes Actros is from the year 2002). These vehicles, in accordance with the year of production, belong to different environmental classes (from EURO<sub>3</sub> to EURO<sub>5</sub>).

In Table 1, examples of travel of two vehicles belonging to the environmental classes EURO<sub>3</sub> (Mercedes Actros 1840 number SL17055) and EURO<sub>5</sub> (Mercedes Axor 1843 number SL56367) were shown, in the duration of one month. Only journeys through Poland were indicated. The mileage on paid and free roads is analyzed.

**Table 1** An example of operation of cars on Polish territory

1	2	3	4	5	6	7	8
SL56367	Łaziska Górze	Olzszyna - granica PL/D	2010-01-11	393,83	361,76	32,07	91,9 %
	Moerdijk	Raciszyn	2010-01-14	519,26	263,54	255,72	50,8 %
SL56367	Łaziska Górze	Duisburg	2010-01-20	393,83	361,76	32,07	91,9 %
	Nieuwdoorp	Raciszyn	2010-01-22	519,26	263,54	255,72	50,8 %
SL56367	Łaziska Górze	Duisburg	2010-01-25	393,83	361,76	32,07	91,9 %
	Engis	Miasteczko Śląskie	2010-01-27	392,04	314,01	78,03	80,1 %
SL17055	Łaziska Górze	Duisburg	2010-01-25	393,83	361,76	32,07	91,9 %
	Engis	Miasteczko Śląskie	2010-01-27	392,04	314,01	78,03	80,1 %
SL56367	Łaziska Górze	Duisburg	2010-02-03	393,83	361,76	32,07	91,9 %
	Engis	Miasteczko Śląskie	2010-02-05	392,04	314,01	78,03	80,1 %
SL17055	Łaziska Górze	Duisburg	2010-02-03	393,83	361,76	32,07	91,9 %
	Engis	Miasteczko Śląskie	2010-02-05	392,04	314,01	78,03	80,1 %
SL17055	Łaziska Górze	La Louviere	2010-02-09	393,83	361,76	32,07	91,9 %
	Engis	Miasteczko Śląskie	2010-02-11	392,04	314,01	78,03	80,1 %
SL56367	Łaziska Górze	La Louviere	2010-02-09	393,83	361,76	32,07	91,9 %
	Engis	Miasteczko Śląskie	2010-02-11	392,04	314,01	78,03	80,1 %

1. Registration number of the vehicle; 2. Place of loading; 3. Place of unloading; 4. Date of loading; 5. Route length (km); 6. Toll sites (km); 7. Free sites (km); 8. The percentage of toll roads.



Specified vehicles were analyzed during one and a half year, from January 2010 to July 2011. In particular, road fee for the above SL17055 vehicle amounts to 5337,42 PLN. Extrapolating the data mileages for this vehicle at the same time, for example, from January 2012 until July 2013, i.e. in the viaTOLL payments system is shown in Table 2.

**Table 2** Extrapolating payments in Polish Zloty, for the SL17055 vehicle, in the viaTOLL system based on actual mileages two years earlier

Year	Month	SL17055	EURO5	Difference
2012	January	296,89	173,11	123,78
	February	890,67	519,33	371,34
	March	890,67	519,33	371,34
	April	919,64	536,34	383,3
	May	944,84	551,06	393,78
	June	1187,56	692,44	495,12
	July	919,64	536,34	383,3
	August	1232,1	718,6	513,5
	September	1068,53	623,11	445,42
	October	1223,51	714,1	509,41
	November	1215,67	704,74	510,93
	December	1626,65	949,05	677,6
2013	January	926,62	540,99	385,63
	February	926,62	540,99	385,63
	March	1272,88	742,54	530,34
	April	910,74	531,13	379,61
	May	1598,21	932,35	665,86
	June	1284,23	749,19	535,04
	July	895,89	522,4	373,49
		$\Sigma = 20231,56$	$\Sigma = 11797,14$	$\Sigma = 8434,42$

As we can see, such payment would led to an increment of 20231,56 PLN. An almost fourfold increase in payments would result in that the transport company would carry substantial losses. For comparison, in the same table data for a similar, but a vehicle of more modern date in correspondence with the EURO5 standard is shown, in which case the payment would have amounted to 8434,42 PLN.

- a Costs of road tolls for the SL17055 vehicle in the period from 01.01.2010 until 31.07.2011 totaled:
  - The purchase price for vignettes in Poland: 5337,42 PLN = 1334,36 €
  - The cost of road tolls in Germany: 18286,45 €
  - The cost of road tolls in the Benelux: 786 €
  - Total cost of tolls for the vehicle was: 20406,81 €
- b Cost of tolls, from the beginning of the viaTOLL system:
  - The cost of road tolls in Poland: 20231,56 PLN = 5057,89 €
  - The cost of road tolls in Germany: 18286,45 €
  - The cost of road tolls in the Benelux: 786 €
  - The total cost of tolls for the vehicle would be: 24130,34€

- c Cost of tolls for a EURO5 class vehicle, assuming that the viaTOLL system functiones:
  - The cost of road tolls in Poland: 11797,14 PLN = 2949,29 €
  - The cost of road tolls in Germany: 13894,07 €
  - The cost of road tolls in the Benelux: 786 €
- The total cost of tolls for the vehicle would amount to: 17629,36 €

Thus, during 18 months, the above mentioned vehicle in comparison with a new one, satisfying the EURO5 norm, would save 6,5 thousand Euros. It should be noted that at present the price of Mercedes Actros (EURO3) vehicle from the production year 2002 has a similar mileage range, from 65 to 80 thousand PLN, while the Mercedes Axor from the year 2007 (EURO5) varies from 145 to 170 thousand PLN. As a result, extra charge for changing would be about 100 thousand zlotys (or approximately 23 thousand Euros). If we assume that in the future car load will remain the same, during little over 5 years these investments must be recouped.

## 4 Conclusion

A similar analysis was conducted for all vehicles of Intertransport company, but also selectively taking into consideration other small transport companies of the Silesian economic region. Based on this, we can conclude that the introduction of a new system of road fees would lead to a temporary financial loss in transport enterprises. One method of solving this problem for companies is to invest in new vehicles or comparatively not old ones, which are in accordance with the EURO5 standard.

From the view of road management and countries economic foundations, the new system of road fees is advisable. They should contribute to the improvement of the environmental situation on the roads. Additional budget revenues must be used to improve the system of road facilities, because otherwise it may cause additional social tensions.

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