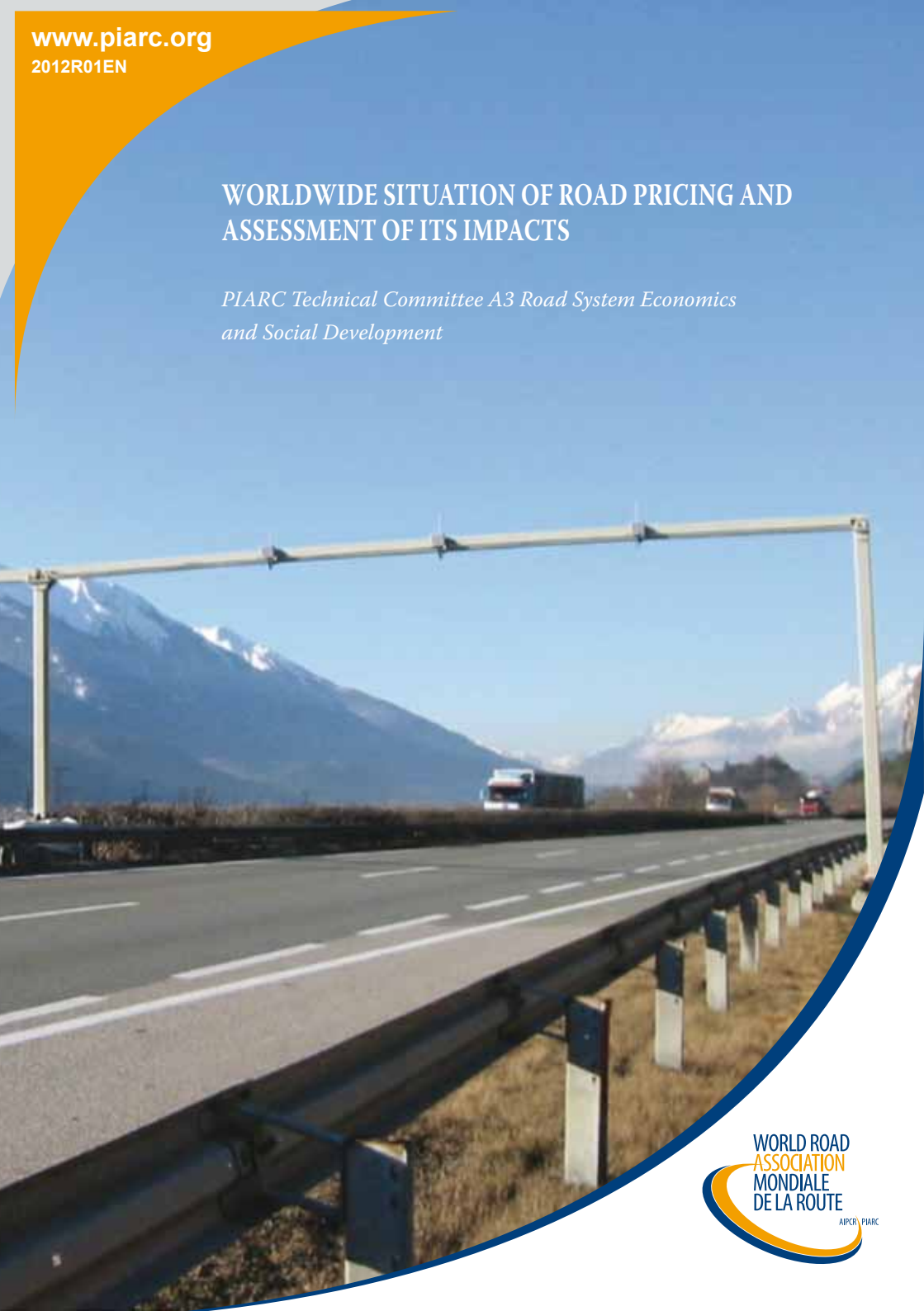
www.piarc.org
2012R01EN

WORLDWIDE SITUATION OF ROAD PRICING AND ASSESSMENT OF ITS IMPACTS

PIARC Technical Committee A3 Road System Economics and Social Development



WORLD ROAD ASSOCIATION
MONDIALE DE LA ROUTE
AIPCR | PIARC

STATEMENTS

The World Road Association (PIARC) is a nonprofit organisation established in 1909 to improve international co-operation and to foster progress in the field of roads and road transport.

The study that is the subject of this report was defined in the PIARC Strategic Plan 2008 – 2011 approved by the Council of the World Road Association, whose members and representatives of the member national governments. The members of the Technical Committee responsible for this report were nominated by the member national governments for their special competences.

Any opinions, findings, conclusions and recommendations expressed in this publication are those of the authors and do not necessarily reflect the views of their parent organizations or agencies.

This report is available from the internet site of the World Road Association (PIARC)
http://www.piarc.org

World Road Association (PIARC)
La Grande Arche, Paroi nord, Niveau 2
92055 La Défense cedex, FRANCE

International Standard Book Number 2-84060-242-3

This report has been prepared by the Technical Committee A.3 "Road System Economics and Social Development" of the World Road Association PIARC.

The Technical Committee was chaired by Alberto Compte (Spain). Maxime Jebali (France) and Guillermo Torres (Mexico) were respectively the French and Spanish-speaking secretaries.

The contributors to the preparation of this report are:

Albuquerque, Ernest (New Zealand)
Amonya, Fred (United Kingdom)
Balafrej, Anis (Morocco)
Chin, Kian-Keong (Singapore)
Compte, Alberto (Spain)
Cousin, Pascaline (France)
DeCorla-Souza, Patrick (United States)
Gade, Claus (Denmark)
Gnalin, Laurent (Côte d'Ivoire)
Goebel, Anton (Finland)
Kallander, Lennart (Sweden)
Leyton, Ana Maria (Canada)
May, Anthony (United Kingdom)
Morisugi, Hisayoshi (Japan)
Rotondo, Maurizio (Italy)
Samstad, Hanne (Norway)
Schwarz-Herda, Friedrich (Austria)
Seddi, Malika (France)
Siposs, Arpad (Hungary)
Skvor, Vratislav (Czech Republic)
Torok, Adam (Hungary)
Torres, Guillermo (Mexico)
Van Wortel, Monique (The Netherlands)
Wyss, Bernhard (Switzerland)

The translation into French/English of the original version was produced by Alberto Compte (Spain), Pascaline Cousin (France), Ana Maria Leyton (Canada), Maurizio Rotondo (Italy), Malika Seddi (France) and Bernhard Wyss (Switzerland).

Ernest Albuquerque (New Zealand), Ana Maria Leyton (Canada), Malika Seddi (France) and Bernhard Wyss (Switzerland) were responsible within the Technical Committee of the quality control for the production of this report.

The edition of the report was done by CEDEX (Spain), with the support of Concepción Sevillano and Mercedes Montero.

The French version of this report has been published under the PIARC reference 2012R01FR, ISBN: 2-84060-243-1

CONTENTS

CONTENTS

CONTENTS

CONTENTS

CONTENTS

CONTENTS

EXECUTIVE SUMMARY

The aim of this study – in accordance with the request received by Technical Committee A.3 from the PIARC Executive Committee – is to deepen the understanding of road pricing effects and the approaches for their assessment. Pricing schemes considered in this analysis include those for which the primary goal is to finance the construction and/or maintenance of road networks, as well as pricing schemes (also) used as traffic-management and/or environmental-protection tool. Single road (even bridge or tunnel) as well as region- or nation-wide charging schemes have been considered, as well as urban and interurban road-user charging schemes.

To accomplish its objective, the Committee organised its work through the collection of information from several case studies, either implemented or envisaged. For each case study, the Committee member in charge was requested to focus his/her research on the identification of (1) the effects that have been considered/analysed when the pricing scheme has been evaluated, (2) the significance/magnitude of these impacts, and (3) the evaluation methods/approaches used to determine the identified significance. In order to facilitate the identification and selection of the case studies, the Committee did in advance a review of the existing and envisaged pricing schemes worldwide. Taking as starting point a general overview of worldwide progress of road pricing, this report provides a review of the impacts that have occurred in schemes that have been implemented or likely to occur in planned schemes. Those impacts - which typically refer to travel time, mobility patterns, the environment, the economy, accessibility, equity issues, etc. – together with public attitudes towards pricing, are key issues for decision makers in planning and implementing road pricing schemes.

Worldwide situation of road pricing

The first part of this report reflects on some major trends in road pricing through an international review of recent pricing experiences within the countries represented in the Committee as well as other countries with innovative road pricing schemes. In particular, the following trends were identified:

- Toll in road infrastructure (main roads, bridges, tunnels) or on networks are still used widely. These relatively simple pricing systems provide revenues for road investment and/or maintenance. In countries with strong tradition of road or highway concessions, opening new toll highways has continued in recent years. Also some countries that historically have not used tolling of road infrastructure have chosen this solution. It is also worth noting that several developing countries have chosen to charge for their infrastructure too, including for roads already built, in order to guarantee their maintenance.

In some countries there are also *"asset development"* schemes; such schemes involve implementing a toll, through a concession or through a public-private partnership contract, on existing infrastructures that might need some upgrading or rehabilitation.

- National vignette systems payable for accessing all or part of the trunk network and for all vehicles (licensed in the country or abroad) are also widely spread, especially in Europe. This vignette can vary in order to favour certain vehicles compared to others, for instance the less polluting ones. It can coexist with other types of road pricing, namely tolls on specific roads or structures. This pricing system is simple to manage but commonly criticized for its rigidity and incapacity to regulate traffic and, more generally, the demand of road transport. It tends to decline (more for heavy goods vehicles, HGV) and gives way to the emergence of distance based pricing schemes.

- Since the beginning of this century, distance-based toll systems are increasingly being developed in parallel for one single vehicle category: heavy vehicles, and in most cases HGV. In Europe especially, distance-based toll collecting for heavy vehicles used in Central European countries are now increasingly being used in more peripheral countries. This is because European legislation encourages this kind of system and not so much the vignettes, and maybe also due to a greater public acceptance. These systems are based on electronic toll collection, which enables their implementation on the existing network without major changes of the infrastructure, like toll booths.

- Some vignette or kilometre-based toll systems previously mentioned may aim at encouraging the use of less polluting vehicles (price variation depending on vehicle's emission standard) or at regulating traffic congestion (especially by proposing variable rates depending on the period of the day/week/year). In these cases, fares are pre-determined and fixed for each period; they encourage users to reduce their trips on the infrastructure during peak periods, but they don't adapt to the real load on the network and they don't enable optimizing in real time the use of the total road capacity, even if in some systems, tolling levels are regularly revised.

- To meet these optimization needs, dynamic electronic pricing systems have steadily been tested and then introduced, mainly in the US. American experiences have specifically led to a system that consists of tolling High Occupancy Vehicle (HOV) lanes with variable electronic toll and in real time, depending on the traffic, and thus transforming HOV-lanes into High Occupancy Toll (HOT) lanes. This solution was proposed after observing that some HOV lanes were underused. A similar tolling system has also been used in the US to finance the construction of extra lanes to increase the capacity of existing highways.

- Another type of pricing scheme, zone-based pricing, also called urban toll, is increasingly being considered an option to reduce congestion problems in cities. In recent years, many municipalities – basically in developed countries - have studied the opportunity of implementing such city tolls. However, despite several successful examples, urban tolls still raise today strong debates in many countries.

- Apart from the above pricing approaches, other more comprehensive initiatives have been or are still being studied, although they have not been implemented. These initiatives may lead to fully revise road transport pricing and taxation approaches (still nowadays in most countries based on fuel taxation). In the Netherlands, for example, the entire road transport taxation system was thought to evolve towards mobility taxation through the implementation of a kilometre price system. On the other hand, the US is also seeking how to stabilize income for roads that come from fuel taxes nowadays by means of a distance based toll collecting system that could vary based on the level of congestion.

The impacts of pricing

With regard to the impacts of pricing, the following are the main findings:

- All pricing schemes (vignettes, facility-based tolls, urban pricing, mobility pricing) include an analysis of the new mobility characteristics when they are evaluated.

- The study of the new mobility characteristics focuses first on the changes in (or in the new) travel demand in the priced facility/area:
  - Road pricing schemes in urban areas for congestion management may likely lead to a 10-20% reduction in traffic demand, based on experiences from implementations in Singapore, London and Stockholm. Traffic studies for Helsinki also show similar expected reductions.
  - Traffic studies for the Dutch nation-wide mobility pricing scheme also show expected reductions of around 15%.
  - Tolling schemes (whole facility tolls, HGV tolls, HOT lanes and dynamic toll lanes) and vignette systems have been found to be less effective in lowering total traffic demand. Traffic may divert to alternative routes, and total traffic demand for the corridor remains similar. In some cases the travel demand may even grow significantly, due to induced traffic (e.g. new toll motorways built parallel to existing free roads).

- Other relevant mobility characteristics that are often considered during the evaluation of a pricing scheme include:

- Traffic diversion: potentially significant in some specific cases of HGV tolls and toll motorways, although this rarely occurs in practice.
- Transport mode change: transfer from private road use to public transport, cycling and walking is a key issue for urban pricing (annual increases of 5%-10% in public transport use is referred, depending on the city); on the other hand, some studies envisage a transfer from road to rail in the case of HGV tolls, although such results have not been confirmed in practice.
- Time of travel: this is an issue for urban pricing schemes and other schemes when they want to manage congestion.

- Environmental impacts are – after mobility characteristics – the second group of pricing effects most commonly evaluated. Environmental impacts are typically a direct result of travel impacts, and they usually concern emissions of key air pollutants and noise. Air pollutants can be an important issue for some schemes, especially in urban areas (their drop can be approximately in proportion with the vehicle-km driven) or for schemes in regions like Europe (very environmentally sensitive). Noise is not an issue, because people would require changes in traffic flows of around 50% to perceive a decrease or an increase in noise.

- The results of the evaluation of pricing effects in road safety are inconclusive in urban pricing schemes, although could be some minor reduction in personal injuries. In the Dutch kilometre price a more significant reduction of injuries has been estimated. In other cases, the impact is not clear, or even has not been considered as an issue.

- Most of the potential negative impacts of pricing that some people envisage on the economy have not been confirmed through experience.

- Urban pricing is recognised to have some impact on land use and on commercial and residential location. The risk of a 'boundary effect' seems greater in a single-cordon model. These effects are however rarely considered, probably because they are difficult to assess and take place in the long term.

- Effects on accessibility are basically considered in nation-wide pricing schemes studies, particularly in countries with strong sensitivity to territorial issues (e.g. Switzerland, Spain).

- Equity issues typically arise in planning and implementation across all pricing schemes, although they have rarely led to project termination, probably because experience shows that the perception of unfairness may be sometimes exaggerated.

- Social acceptability is probably the most critical issue in the implementation of a successful pricing project. This is particularly true for urban pricing schemes (especially if alternative public transport is not sufficiently considered), the Dutch kilometre price, or toll facilities with no alternative free route.