Implementing Pricing Reform in Transport – Effective Use of Research on Pricing in Europe

Deliverable Three

Constraints and solutions: learning from best practice

Status: Final

Version: 1.1

Authors: Daniel Kendzia (FAV), Wim Korver (TNO)

Project Partners:
Institute for Transport Studies (ITS), Leeds
Forschungs- und Anwendungsverbund Verkehrssystemtechnik (FAV), Berlin
Istituto di Studi per l'Integrazione dei Sistemi (ISIS), Rome
Netherlands Organization for Applied Scientific Research (TNO), Delft

Funded by the European Commission

IMPRINT-EUROPE

GRD1-CT-2000-28034

Implementing Pricing Reform in Transport – Effective Use of Research on Pricing in Europe

---

Deliverable 3: Constraints and solutions: learning from best practice

This document should be referenced as:

Kendzia D. and Korver W., IMPRINT-EUROPE Deliverable 3. Funded by the EU 5th Framework Programme. University of Leeds, April 2003

Version No: 1.0

Authors: as above, with comments from other IMPRINT-EUROPE partners

---

PROJECT INFORMATION

Contract no: GRD1-CT-2000-28034

Implementing Pricing Reform in Transport – Effective Use of Research on Pricing in Europe

Website: www.imprint-eu.org

Commissioned by: European Commission – DG TREN; Fifth Framework Programme

Lead Partner: Institute for Transport Studies, University of Leeds (UK)

Partners: ITS, University of Leeds; FAV, Forschungs- und Anwendungsverbund Verkehrssystemtechnik Berlin; ISIS, Istituto di Studi per l'Integrazione dei Sistemi Rome; TNO, Netherlands Organization for Applied Scientific Research Delft

---

DOCUMENT CONTROL INFORMATION

Status: Final Version

Distribution: IMPRINT-EUROPE Partners, European Commission

Availability: Public (only once status above is "Accepted")

Filename: IMPRINT\d3-fin.doc

Quality assurance:
Coordinator's review:
Signed:

Date:

Contents

Executive Summary

This deliverable was prepared within the IMPRINT-EUROPE project following the third seminar in the scope of this project which took place 23rd-24th October 2002 in Brussels. The papers´ title is following the topic of the seminar: "Implementing pricing reform in transport, constraints and solutions: learning from best practice". It gives the reader an overview of the two days programme and the main results and questions the project partners have identified, therefore its structure is similar to the seminar´s agenda.

This seminar is a logical follow-up of the two preceding ones (the first seminar dealt with identifying the general issues related to implementing pricing reform in transport and the second one dealt specifically with modal issues). Within this third IMPRINT seminar the focus was on questions of implementation of transport pricing from a practical point of view and on learning from best practice.

The first day of the seminar looked ahead to the **proposed EU directive on charging for infrastructure use**. Following four policy-maker presentations on progress with transport pricing reform at the EU, national and local levels, four modal workshops on day one focused on issues of cost calculation and how a directive on charging for infrastructure use might be implemented in practice.

The main conclusions which can be drawn from these workshops are:

- Rail
  - Most evidence is based on the measurement of wear and tear costs and it is important to include renewals within this; studies which leave that out come to very low cost estimates.
  - The data concerning the renewal of railway infrastructure should be related to a relatively steady state condition. Otherwise a railway could be stimulated to allow its assets to run down.
  - several studies come to more or less the same estimate of the elasticity of maintenance and renewal costs with respect to gross tonne kilometres, namely 0.3, though the absolute cost levels vary a lot.
  - Finally, it was agreed that there was a need to do more research on the treatment of scarcity in marginal cost estimation.
- Road
  - Different degrees of consensus exist regarding the measurement of different cost categories. For congestion and environmental costs there appears to be a broad consensus. For infrastructure, the surprising answer seems to be that there is not really a consensus, though it is felt that infrastructure is the most studied element of costs of all. For accidents costs partly consensus can be found. For noise costs no consensus is found; there does not even seem to be a consensus about whether the marginal cost of noise increases or decreases as traffic increases. The costs of CO_2 emissions, due to the uncertainty of

the impact of the greenhouse effect, are unclear in terms of monetary costs and measurement options and no consensus is found.

- For the coming years in the research field attention should be given towards more case studies to enhance the basis on which the cost estimates are made.
- The participants underlined the need for simple policy guidelines.
- Since the Commission focuses particularly on interurban (or long distance) traffic, the exact definition of what is included in this and what is not needs still some refinement.

- Air transport
  - Specific for airports is the issue that there exists a difference of cost information between public and privately owned airports. Private airports generally have good cost information in terms of business accounts whereas publicly owned airports do not always present the cost information in a transparent way.
  - Fuel taxes for air transport do not exist. This leads, compared to other modes, to a severe distortion.
  - Scarcity is a big issue. Creating a market for slots could be the appropriate way forward. But this leads to the property rights issue, it remains unclear who is the actual owner of these slots. An ongoing study, commissioned by DG TREN, could be helpful in the economics of allocation of slots at airports. If the results are available before the end of the IMRPRINT project they will be very helpful for the development of policy recommendations.
- Ports and inter modal
  - This area seems to be the most difficult. Port charges cover lots of different activities. And it is difficult to disentangle them, it is not just a problem of loading and unloading ships, there are all sorts of other activities of surrounding ports, navigation, lots of services which may be entirely provided by private operators within a port even if the port is publicly owned. This all requires more research.
  - There is more agreement on the measurement of environmental costs than of infrastructure costs. Examples can be found in which the environmental costs are included in the charges (Scandinavia). A complicating factor for the measurement of infrastructure costs is, like it is the case in the air sector, ports are competing and sometimes privately owned and sometimes publicly owned.
  - Future research should focus more on the whole logistic supply chain and not only on port activities.

Despite the agreed need to do more research, the shared opinion was that we already know what the big distortions within the transport sector are. Hence, there is no need to wait for perfection; it is possible to start with simple pricing reforms which can then be refined later.

The second day of the seminar focussed on what can be **learned from successful examples of pricing reforms in the transport sector**. A number of lessons were presented, namely:

- Urban road pricing: the Singapore case:
  - Acute traffic problems are largely resolved and it is possible to overcome the opposition.
  - A price reform can not be implemented overnight. There is a clear need for phasing and packaging. In the case of Singapore this meant: a simple area charge, park and ride facilities and stimulating car pooling. In a later phase the Electronic Road Pricing (ERP) scheme was implemented, specially stimulated with reduced vehicle taxes.
  - The ERP scheme is in comparison with the old systems more effective. It is possible to charge each trip separately. However it is expensive to maintain: 6 million € / year at an turnover of 40 million € / year.
  - A particular impact on freight transport was that much larger vehicles are now in use.
- Public transport Pricing
  - Based on the experiences of a large amount of public transport operators success factors for pricing reforms are: simplicity, good and regular information to the customer and a clear authority.
  - But also a number of barriers can be distinguished: the lack of integration of road pricing with public transport fares, conservative institutions and technological problems.
  - Marginal social cost pricing is not seen as practical by the public transport companies. In real life pricing is always a compromise.
- Urban pricing: Parking
  - Success factors: offering alternatives (Park and Ride facilities, more public transport), phasing by starting at a small regional scale, integration with transport and planning policy and the concentration of expenditures and revenues in one body.
  - Barriers are the (increasing) supply of private and /or company parking and the possible negative economic impact on business, retail and/or tourism.
  - With the implementation of paid parking different stakeholders (residents, business and visitors) must be identified and appropriately handled.
  - Determination of the price level is not based explicitly on social marginal cost pricing, but on willingness to pay. Given capacity constraints, however, the two may amount to the same thing.
- Entrepreneurs point of view
  - A mobile network operator has an indirect interest in road pricing systems because his profits result from the traffic generated. This could be a conflicting aim with low system running costs and thereby acceptance of the users of the road pricing system.
  - Technical and systematical improvement of parking fee enforcement has to face a different legal framework from one EU member to the other which makes legislative changes necessary before introduction.

- In Copenhagen a field test for road pricing has resulted that the citizens oppose road pricing especially if the revenues are spent for public transport and not road infrastructure.
- An integrated public transport system consists of various operators but needs to look to the customer as one what is reached through harmonization of technical equipment, design, timetables and a superior booking system.

The overall conclusion of the second day was that pricing reforms are highly dependent on a supportive external environment, adequate resources and a project champion able and capable to organize support for the idea of pricing reform.

1. Introduction

1.1. The IMPRINT-EUROPE Thematic Network

This is the third report of the IMPRINT-EUROPE thematic network. It reports on the proceedings and outcomes of the third of a series of five seminars being held under the auspices of IMPRINT-EUROPE over a three year period.

The IMPRINT-EUROPE thematic network brings together researchers, professionals, policy-makers and operators in order to promote the implementation of transport pricing reform based on marginal cost principles. The network encompasses both urban and inter-urban transport and all of the main passenger and freight modes. The specific objectives are:

1) To facilitate the exchange of experience and transfer of knowledge among scientists and practitioners in the field of pricing;
2) To draw together the results of previous and ongoing research in the field of pricing and to make them accessible to policy-makers, practitioners, industry and other professionals in a series of seminars and deliverables designed to assist them in developing and responding to pricing policy reform;
3) To identify, through critical comparative work, the prerequisites for the development of an integrated approach to implementing the European Commission's proposed pricing reforms.

1.2. Results From The Previous Seminars

In the sequence of seminars of the Imprint-Europe project with seminar three the turnaround from analysis to implementation of transport pricing was set. While seminar one dealt with key requirements for implementing transport pricing reform [Mathews & Nash, 2002], the second seminar tried to identify mode-specific issues for pricing reform [Ricci & Fagiani, 2002].

The first seminar "Key Requirements for Implementing Transport Pricing Reforms" aimed at pointing out those aspects of the implementation of pricing policies that are still unclear or needing closer examination, and areas where an effective communication between researchers, stakeholders and policy makers should be enhanced. Thanks to the contribution of policy makers, researchers and stakeholders, these main issues were identified, thus providing immediate input to the design of the following seminars. They are briefly presented below:

- *Pricing doctrines* - in other words views on the key objectives and methods of pricing policy. These vary greatly between member countries, and even between modes in one country. What determines them and do they matter?
- *Institutional issues* - these are becoming increasingly important given both the range of public sector institutions involved in transport pricing and the increasing involvement of the private sector. Who sets prices and determines

investment, and how can they be given incentives to set efficient prices and investment plans?

- *Transport integration* – in many cases, this is seen as best achieved by a very simple pricing structure with the same ticket valid on all modes. This is directly counter to the finding that more efficient pricing means more differentiation.
- *Use of revenues* – as always, this remains controversial, but also crucial to the successful implementation of any pricing reform.
- *Sequence of implementation* – given that barriers exist that prevent the simultaneous movement to optimal pricing of all modes of transport, what are the best first steps to take and in what sequence should further actions follow?
- *Land use issues* – these are difficult to forecast and form the basis of the most serious fears that pricing reform may actually have important counter-productive side effects
- *Understanding complexity and transferability* – do we really need in depth studies of every mode in every location in order to implement pricing reform, or can we find ways of transferring results from one context to another?
- *Interesting politicians in marginal social cost pricing* – so far economists have not been very successful in convincing politicians of the potential benefits of pricing reform. Perhaps they need to concentrate on empirical results from cost-benefit studies rather than the prescriptions of economic theory.
- *Psychology of pricing* – there is little research in this field, on issues such as why people seem to find pricing perfectly acceptable in some contexts but not in others, and whether this is influenced by the form and complexity of the pricing system.
- *Is marginal social cost pricing approximately right*? Second best pricing, to allow for all the complications of the real world, is complex, and may be manipulated by interest groups for their own ends. Is simple marginal cost pricing a good enough approximation to the optimum to be worth implementation without too much concern for issues of second best?
- *Acceptability, simplicity and implementation strategy* – is it best to start with something simple but acceptable, to build up support, even if it is not on any theoretically optimal implementation path?
- *"Windows of opportunity" are crucial*. Revolutionary pricing reforms have been implemented, and it is important to learn how to recognise what factors make for the opportunity to do this.

The step from the big window towards a more detailed view of mode-specific issues was made at the second seminar “Identifying mode-specific issues”. The consideration of mode specific issues opened the discussion about constraints and solutions and what to learn from best practice which was continued and focussed on at seminar three. A dual approach was adopted in the second seminar, to address both transmodal and modal issues, with parallel sessions dealing with mode specific issues and plenary sessions covering transmodal and integrated transport pricing related issues, and drawing conclusions. Some of these conclusions were:

- The *trans-modal* session shed a light on the need of enlarging the focus on impact assessment: this means considering also economic, distributional and spatial impacts, include into the analysis the issue of revenues and deficits

from pricing reforms, and take into consideration relative impacts between modes. The issue of the impacts of pricing reforms in non-EU countries was raised, with a claim to have more resources devoted to research in this field.

- The strong message from the second seminar was that there is an urgent need to *reinforce two-way communication between researchers and policy makers*, also through the establishment of dedicated discussion platforms. This is essential in order to calibrate and validate research, and provide answers to basic questions such as: is research sufficiently advanced? Is the available information credible, especially when based on modelling?
- Despite a general agreement on the most global issues related to transport pricing reforms, a comparative analysis of research, reforms and *consensus within the single modes of transport reveals a very uneven state of advancement*. An extremely active situation was described during the urban transport session, when it was underlined that an increasing number of cities from European Union and the accession countries are already well into the process of rationalising and increasing the sustainability of their transport systems, notably through the design and implementation of pricing policies. The experience of cities suggests that dealing with pricing reforms in urban areas requires a pragmatic approach: starting with simple pricing schemes, although far from optimal prices, and reconsiders objectives and refine schemes in the long run. Local experiences seem to be hardly transferable from one city to another. Nevertheless, a strong political willingness and the presence of a champion together with a broad hearing of population can represent a great push forward in many situations. In any case, an integrated approach is necessary when designing transport reform strategies in urban areas, taking into account private, commercial and public transport, with a look to land use implications, notably those stretching in the long term.
- *Pricing reforms in interurban road transport* seem to have reached a stage of *maturity*, both in terms of methodological tools available and of consensus among researchers, stakeholders and policy makers. Some issues in this field remain critical, e.g. that of interoperability of charging systems, but much is happening: a “window of opportunity” is open.
- Discussion on *rail transport* focused on the highly significant issue of scarcity and allocation of railway capacity, and on possible capacity rationing means (e.g. auctioning). A strong point emerged from this session is that pricing is one of the facets of a wider policy framework (packages of measures including pricing, investment and regulation) aimed at achieving a more efficient infrastructure use and maintaining quality standards in service provision. A wide consensus emerged around the need of an independent regulator for rail transport.
- Beyond the vital situation of the urban, interurban road and rail transport, *other modes seem to lag behind*, mainly in terms of consensus around pricing issues and actual implementation: it is the case of air transport, maritime transport, intermodal freight. In all three modes there is a great need of increasing the knowledge of current market mechanisms and pricing rules: the lack of transparency is a concrete hindrance to any kind of reform.
- Concerning *air transport* the issue of capacity allocation needs to be urgently addressed through further in depth discussion and research.

- Similarly, efforts have to be enhanced also on the research in *maritime and intermodal transport*: in fact the knowledge currently available of the real costs of complex freight operations is not sufficient to devise pricing reforms. Wide bottom-up research projects aimed at clarifying the basic features of the market should be privileged. Complexity and institutional issues are crucial when dealing with intermodal and maritime sectors: an institutional platform gathering operators and policy makers, to design possible pathways of institutional reform, is forcibly needed. A more fundamental question was raised, on the actual effectiveness of pricing instruments in correcting inter-modal distortions: pricing policies impacts on demand and supply might be lower than expected in these sectors, due to the cost structure of a whole logistic chain.

Some of the questions above will be tackled in the following seminars: in particular the issues connected with how measures can be packaged and what should be the pace and phasing of reforms will be dealt with in the fourth seminar, while the perspective of the accession countries and their peculiar features and needs will form the agenda of a specific seminar, the fifth of the IMPRINT-EUROPE series.

1.3. Seminar Three: Constraints and Solutions – Learning from Best Practice

Looking back to the results and open issues concerning transmodal and modal issues from seminar two, it can be said that modeling always leaves us with the question if the generated results are credible, so the decision for seminar three was to increase the number of practical experiences as basis for discussion. The surpluses and deficits from transport pricing as well as the winners and losers must be identified across the whole system because they affect the acceptability of pricing reforms significantly. The idea of a “champion” in connection with the felt “window of opportunity” has to be confronted with the insight that no transferable model exists and each case seems to be unique when it comes to implementing transport pricing.

So according to the idea to learn from best practice the number of speakers from the policy side and the industry was increased for seminar three, because both groups tend to be less bound to theoretical concepts than to the experiences that are made with introduced pricing models.

The first day of the seminar looked ahead to the future EU directives on charging for infrastructure use. The papers and discussion during the first day of the seminar, in four different modal workshops on rail transport, air transport, waterways and inter-modal transport and inter-urban road transport, focused on the issue of cost calculation and how a directive might be implemented in practice. The second day of the seminar focused on what can be learned from successful examples of urban transport pricing reform.

A total of eight papers were commissioned from leading researchers and policy makers, peer-reviewed, and presented at the seminar. Also a number of eight additional presentations were given. The EC views and perspectives were presented

both at the global level (during the plenary sessions) and at more detailed level in the parallel sessions. All parallel sessions were chaired by representatives of the EU. In total 85 people participated in the seminar.

1.4. Reading Guide

This report summarizes the main contents of the third IMPRINT seminar and its structure follows that of the seminar programme. Chapter Two presents an overview of the opening policy maker presentations concerning their experiences and their views on the next steps forward. Chapter Three summarises presentations of the key findings of two particular research projects - UNITE and RECORD-IT – whilst *Chapter four* presents the outcomes of the four workshops on cost calculation and implementation by mode. *Chapter five* gives some general insights on best practices, followed in *chapter six* by more specific actual experiences of a number of „good“ examples of implementing pricing reform within urban areas. C*hapter seven* gives the views of a number of selected representatives of the industry on pricing reform. Finally in *chapter eight* the conclusions are given. In the appendix (a separate document because of its data amount) an overview of the program is given and copies of the slides used are presented.

2. The European Development in transport pricing, best practice examples

This part of the seminar was dedicated to get the feedback of policy makers about their experiences with introduced transport pricing in their origin countries and on the EU-level and their views on the next steps forward.

2.1. The European infrastructure charging policy

The seminar started with the presentation of Mr. Heinz Hilbrecht (EU DG TREN) stating that the last version of the White Paper stresses the problems we face in transport today, congestion and environmental concerns. The infrastructural bottlenecks need to be addressed to avoid having a breakdown or a standstill by the end of the decade. Emissions from road vehicles have been reduced by 90% from the 90ties, but increased motorisation results in further air pollution and greenhouse gas emissions which mean one cannot look only at further improvements of vehicle technology. A very important point is the planned action plan on road safety to reduce the enormous fatalities in road transport in the EU each year.

The Commission wants to address these problems first through market mechanisms. Transport is heavily taxed and charged but it is felt that it is inefficiently taxed and charged which leads not only to distortion of competition but also to inefficient use of the infrastructure. The users have a right to know exactly what they pay and what they pay it for. There is a large development in the EU member states to move towards new charging principles and it is very timely to co-ordinate these national attempts in order not to end up with a patchwork of different systems and to create new distortions. One can find very good arguments in favour and against marginal costs, but it is clear that one must find a system which will be able to achieve all possible objectives of a charging system. Under certain circumstances one may wish to have a higher charge than if only maintenance of infrastructure is taken into account. In particular if the objective is to finance new infrastructure. The other reason to have higher charging could be of course to attract private money for a public-private-partnership. A charging system the Commission aims at for the road haulage sector would consist only of two elements. One is the mineral oil tax which would include a global warming/CO_2 element and an infrastructure charge which is kilometre based and which includes the maintenance and internalisation of external costs. At the moment there is some opposition to include noise costs, because this needs a safer scientific basis on how to determine noise especially to average out the costs because it is very local. To come away from a situation where a big country such as Germany or France have a uniform charge level across the whole country, because the charges should reflect better the situation of congestion.

The Commission would like to start with a system that allows the member states to average out the charge over the whole country in the beginning and later on over certain regions. Instead of a full cost approach would be established a maintenance plus external cost approach.

The Commission thinks that they have no legal basis to address the problem of urban congestion or private cars by a legislation proposal made by the Commission. This depends on the influence of the actual developments and the courage of the member states.

The principle that the sector pays for the external costs that it provokes implies of course that the ships and planes pay for the environmental damage they cause. For the railway sector this principle was adopted but there is still a great heterogeneity in railway charging throughout the EU. But work to streamline the approaches is on-going.

In respect to the technical equipment to raise charges the goal is to have only one onboard unit which is interoperable with all DSRC, microwave, and satellite navigation systems. The question of interoperability of on-board and off-board equipment can not be overrated in its importance for interurban roads in the EU. And according to that there must be some kind of clearing house to facilitate the billing procedure and avoid 15 different bills.

The Commission is driven by the wish to ensure fair competition between the modes and within the modes in the road sector. The charging system shall reflect the problems, in the end it should be a system of more differentiated charging reflecting in particular congestion and the problems of zones, in particular in the Alps. The Commission wants to have transparent pricing structures for infrastructure use and to differentiate charges to encourage the use of less polluting means of transport and to encourage reorganization of the logistic chain and to adapt the modal choices according to very clear price signals which are not identical but which are more or less the same for all sectors.

The basic idea is that publicly owned infrastructure should adhere to the same principles as private infrastructure but the differences in accounting systems can be a difficulty to achieve this.

2.2. Road user charging, the way forward

This presentation was given by Prof. David Begg (Commission for Integrated Transport in the UK).

The basic problem is congestion which results from the fast growth of car ownership in Britain. The lesson learned is, that it does not matter how much money is poured on infrastructure, whether it is roads or public transport, congestion will not be beaten with that alone. One can get people out of their cars and onto public transport that buys time. But the road space that is freed-up will be taken up by suppressed demand. Either congestion constrains the volume of traffic or it is done via pricing.

The attitude of policy makers and the public towards marginal social cost pricing is that one does not need to care, it is an academic debate. What the public wants to know is why they should pay for road use, why should they pay anything extra?

The federal government in Britain has maybe not a honest position on congestion charging. The mayor of London´s local authority has received the power to introduce congestion charging to generate money for public transport, but if the federal government is asked if they are supportive of congestion charging they have been evasive and assert that it is up to the local authorities.

It seems that what happens in London, determines whether congestion charging will spread to other parts of the United Kingdom and will have a significant influence on the congestion charging debate throughout Europe. With the introduction of the congestion charging boundary for the inner parts of London the prediction is a reduction of traffic by 15 and 20 percent what can cut congestion by between 25 and 30 percent. The problem which has to be faced is the traffic diverting around the corner to avoid paying the charge. But the acid test if the London charging scheme will be a success, is if for those people who are paying the charge, the benefit outweighs the charge?

Another problem is: Where will people go if they are not bringing their car in? The mayor's plan for London is to improve the quality of life for the people who work and live in London. Congestion charging is not only about reducing traffic and congestion; it is about freeing up space for pedestrians, for cyclists and for public transport.

The importance of an independent economic regulator for the roads in order to win the confidence of the public was underlined. The general reduction of congestion can be reached because people will change the time at which they travel. Air fares, rail fares, there is always enough peak times. But in the road sector it does not matter when you travel, there are no price markers to try and influence decision making.

The debate about marginal social cost pricing is an interesting theoretical academic debate which will have to inform us. But the challenge on which the energy needs to be focussed is how can the hearts and minds of a sceptical public and politicians who are nervous be won? How can support for the principle of congestion charging be reached?

A relevant aspect is the question of social equity. Here the importance how to spend the revenues is obvious. If actually the revenues are put into public transport it is probably the most progressive pro-poor economic policy one can introduce because a high percentage on the lowest income level does not have access to a car. So the big equity issue is that the poorest in society are not being left behind and become marginalized, as shops and business become located more and more around the inner city.

2.3. Implementing transport pricing reform in Germany

This presentation was given by Dr. Wolfgang Hahn (German Ministry of Transport).

Germany is situated in the centre of Europe and the transit traffic affects the transport system significantly. Different scenarios for the future development in transport were done and the one with no policy reactions, no pricing option and no development of the infrastructure showed that in passenger as well in freight transport the winner of shares of freight volume is always the road.

But starting with a tolling scheme for all kinds of vehicles seems to be dangerous for the politicians which are always of course reluctant to introduce the pricing instrument. So it was decided to follow a scenario[1] that is called the transport integrated scenario and which leads to a tolling system just for heavy good vehicles. And the goal is to double the amount of railway freight transport through the creation of more competition on tracks. It is necessary to cope with the growing transport also in the context of infrastructure.

All modes of transport are considered for pricing. The first one will be the introduction of tolling for HGV, the second is a pricing system within the railway sector to promote a better competition and the third is something to be done in air transport.

The advantage of a distance related user charge is that it allows a more rigorous application of the user pays principle. It will be based at the beginning on the infrastructure costs and not on marginal costs. Later on it will proceed towards a kind of congestion pricing. The fully automatic system can be extended later on to other categories of roads. The toll rate will be set by a regulator. The revenues will not be spent only on roads but also to railways and waterways.

The decision was made to entrust a private operator to run the system because it is believed that the cost-effectiveness and consumer-friendly behaviour may be higher that with a public organisation. The operator has to pre-finance the system. The idea is to have a combination of tolling and public-private-partnership models. There was developed a model for this combination of tolling. In Germany it is called the A-model (German: Ausbau). It means widening of the motorways. The idea of these public private partnership is to give the duty of construction, maintenance and operation of motorways to a private partner who will receive a share of the tolls and that means the share of the lorry tolls which are collected on a stretch of motorway which is subject of the concession (that is given by the federal ministry of transport).

The acceptance of the solution for lorries will be high: private car users will not complain about that because their wish for a better performance on motorways will be fulfilled. A model aiming at a balance between user charges, tolls and taxes is

[1] The German Ministry of Transport developed several scenarios how traffic would develop in reaction to different amounts of the HGV charge. The different scenarios are described in the presentation of Mr. Hahn in the annex.

confronted with the problem that the tax system is not really flexible. The solution discussed in Germany is to reduce the tolls for hauliers that pay their mineral oil tax in Germany irrespective whether they are German or foreign companies.

There are modifications on the pricing systems concerning railways and for air transport landing fees must be cost related, non-discriminatory and transparent. In the discussion are landing fees which favour the reduction of green gas emissions.

2.4. Experience with charging for heavy goods vehicles in Switzerland

This was done in a short presentation by Mrs. Barbara Schärr (Swiss Ministry of Transport) about the newly introduced HGV fee in Switzerland by. The fee includes external costs of freight transport in infrastructure charging. It covers external health costs and damages to buildings caused by air pollution and external costs of noise and accidents as well. The new fee shall also raise revenues to finance large scale railway projects. At the same time, it is an important instrument to encourage transport of goods from road to rail. And finally it will contribute to environmental objectives. The fee has to be paid throughout the entire country and not just for transit on the highway system.

The trend over the past years towards a constantly growing number of lorries has been broken due to the new heavy goods vehicle (hgv) fee. The reasons for this are structural changes in transport industry and changes in fleet composition. There was a concentration in the transport industry because larger companies are able to manage their fleets with less empty kilometres. The fact that the rate of the fee depends on the weight and the emission of the individual lorry resulted in a significant renewal of the lorry fleets.

The shift of ton kilometres to the railways needs more time. According to calculations by the Swiss federal statistics office the national index for consumer prices rose 0,1% mostly as result of the hgv fee.

2.5. Discussion and conclusions

A number of issues were identified during the discussion following the proceedings.

- A major issue for the Commission in the heavy goods vehicle market is to ensure fair competition between hauliers based in different countries.
- The use of the revenues is important; in all three examples this was stated in advance and communicated towards the public.
- The whole issue of who sets the charges and how they are controlled. The situation in Germany and Switzerland regarding the setting of charges does not appear that is not simply whatever the government likes.
- A main enabling factor is that the environmental problems are evident to the public and this is a major concern. In the experiences presented (London, Switzerland) the support among the public for pricing reform is large.

- A lot of vehicles are called private cars, but of course a large portion of these motorcars are engaged in business.
- If hauliers are charged the result could be that all the freed up roads are suddenly filled by motorcars.
- Road pricing is a convenient way to raise tax or to reduce the amount of hgv traffic but in the long term one must find out whether the resources used are optimised or not, because in addition to the question of efficiency it also raises the question of equity between generations and regions.
- It seems that the language of cost benefit analysis is a language that is easily understood, people recognize that you look at the costs and the benefits and who gets the benefits and who bears the costs. That is much more transparent than the social marginal cost debate.

3. Measuring and generalizing marginal social cost: findings from UNITE and RECORDIT

3.1. The measurement of marginal cost – conclusions from the UNITE project

This presentation was given by Prof. Chris Nash (ITS Leeds). He outlined the conclusions on the methodology and transferability of estimates of marginal social cost from the UNITE project. This was a major 5th framework project with over 30 case studies of different elements of marginal costs spread across modes and countries.

Infrastructure costs

For road and rail, previous studies tend to use a cost accounting approach, based on a simple division into fixed and variable costs. But there is no agreement on which costs are fixed and which are variable, or with which output measure they vary.

Both econometric and engineering approaches can help with this problem. But data requirements are heavy. The econometric approach is best for getting general information about cost elasticities; it cannot identify the impact of different types of vehicles in great detail because of multicollinearity. The engineering approach is best for this.

In practice many studies will continue to use data from accounts, with cost elasticities and vehicle relativities borrowed from other studies. However even these parameters vary with context. For instance cost elasticities vary with traffic density, relative marginal costs of heavy vehicles are higher when infrastructure quality is low.

More research on costs elasticities is needed, particularly for road infrastructure, where considerable variation in the results was found. However, it appears that, whilst road infrastructure cost elasticities are in the range 0.4 – 0.8, rail are very much lower – probably 0.2-0.3.

Supplier operating cost

The main approach here is the cost accounting approach. Accounts are the obvious source of the relevant data. Standard formula on the lines of:

Cost = a + b train hours +b vehicle miles + c peak vehicle requirement

This does not necessarily deal adequately with effects of peaks on staffing levels; a better approach is to do a complete vehicle and crew scheduling exercise to identify no required and cost.

Econometric approaches are useful to check economies of scale; usually as in the air case here they are found to be low for this category of costs, meaning that an approach based on fully allocated cost should be adequate.

User cost

For road, studies using speed flow relationships, either for individual links or on a network basis is commonplace. Yet there is still considerable variability of results. The UNITE case studies produced results that are an order of magnitude less than some other case studies. This may simply be because the UNITE case studies concentrated on locations which were not particularly congested, but this is not always the case. For instance Greater Brussels was one case study where the UNITE figure is very much lower than other estimates. There is some indication that studies that simplifies, and do not consider the full range of reactions possible (route, time of day etc) get higher costs than more detailed studies.

For rail and air, there is very limited evidence on congestion. UNITE found low values in two rail case studies, and very much higher values in one case study for air. Further studies to confirm the UNITE case studies and to shed further light on them are needed.

For the Mohring effect, whereby increases in traffic lead to improvements in service which lead to benefits for existing users, evidence was found of significant effects for all scheduled transport, including freight, although this effect is largest for local passenger services.

Accident cost

Many studies in the past have failed correctly to distinguish between internal and external accident costs and used simple average figures.

The formula used in UNITE requires knowledge of:

- the accident risk for the mode and context. Such data is usually available;
- the relevant risk elasticity. UNITE research has extended knowledge of risk elasticities and how they vary but this is still an area of uncertainty;
- the value of a statistical life, which may generally be transferred using data on real incomes and
- the proportion of costs borne by the injurer, which will need to be estimated locally, as it varies with legal and insurance company provisions.

Because the case studies suggested that in many cases additional traffic actually reduces the risk for existing users, the UNITE case studies tend to produce very low external costs of accidents compared with earlier studies.

Environment

Values may be transferred between locations using real income. But physical impacts (except global warming) are more difficult to transfer. Bottom up impact pathway studies are best. The UNITE case studies show a great degree of variability. But transferability is possible if physical conditions (e.g. population density, climate) are similar.

The overall conclusion is that most elements of marginal social cost may be estimated using the methodologies developed in UNITE

The big gap where no work has been done to date is rail and air scarcity

More work is needed on:

1. Road infrastructure cost elasticities
2. Rail and air congestion and
3. Accident cost risk elasticities

3.2. "Paving the way to transferability: lessons from the RECORDIT experience. A simplified procedure to estimate marginal external costs"

This presentation was given by Andrea Ricci (ISIS) who presented the approach and the main results of RECORDIT (REal COst Reduction of Door-to-door Intermodal Transport, 5th RTD Framework Programme), a project aimed at developing a methodology for the calculation of real costs (internal and external) of intermodal transport.

In RECORDIT, the "usual" external cost categories are analysed (i.e. air pollution, accidents, noise, congestion, global warming), plus the so-called down-and up-stream costs, that is the external costs generated by the life cycle of the main devices used for the production of the transport service (excluding costs arising from the provision of infrastructure). Moreover wear and tear costs of infrastructure are estimated, but only for what concerns maintenance costs: depreciation costs, corresponding to the coverage of infrastructure provision, are not considered. Real costs were calculated for three door-to-door European corridors, covering 11 Member States (Austria, Belgium, Denmark, France, Germany, Greece, Italy, the Netherlands, Spain, Sweden, the United Kingdom) and four Accession Countries (Czech Republic, Hungary, Poland, Slovenia).

A full bottom-up methodology, based on the Impact Pathway Approach developed in the ExternE project was adopted to estimate air pollution, accidents and noise costs, since although uncertainties remain, it is generally considered to be accurate. For global warming, the IPA approach could be used, but the uncertainties that affect the bottom-up approach are too high. RECORDIT has therefore adopted the so-called *avoidance approach*, whereby the social cost associated to the emission of a ton of CO_2 is taken to be equal to the cost that one would face if adopting whatever measures are needed to avoid that the CO_2 is emitted in the first place. Wear and tear (maintenance) costs are also "top-down" values, i.e. derived from the overall costs of network maintenance at the level of each country. Finally, up- and down-stream costs are estimated in a fairly gross manner, based on top-down, national values that take into account the characteristics of national industry, including the mix of fuels used for electricity.

The issue of transferability/generalisation of the external cost calculation process from one corridor to another is varyingly problematic across the different external cost categories: a high transferability was found for what concerns global warming,

wear and tear and up/down-stream, while for air pollution, noise and accidents, cost drivers can be identified to allow extrapolation.

For congestion, no pattern is found to relate one corridor to another: congestion costs can only be calculated (or estimated) at the level of specific corridors.

On the basis of these considerations, RECORDIT has devised a procedure for estimating external costs on a given corridor without following the IPA approach. The RECORDIT procedure has been developed and validated for the first three categories of external costs (air pollution, noise and accidents). It is not needed for the last three categories (global warming, wear & tear, and up/down-stream), for which average, top-down values are used anyway. The only outstanding category is therefore congestion, for which corridor-specific calculations (or estimations) remain necessary in any case.

Cost drivers for air pollution, noise and accidents are identified through a three-steps process: i) set up a database of external costs values (observations), ii) identify a list of parameters (situational factors) influencing external costs (from literature or empirical evidence) and iii) carrying out analysis to assess the relationships between external costs and relevant parameters.

Then, the simplified procedure to estimate external costs of any given segment or corridor of the European transport network, based on a series of extrapolations/approximations derived from the sample of values calculated for the three RECORDIT corridors, is applied by means of an *ad hoc* piece of software, the so-called *DSS - Decision Support System*.

The effectiveness of the above procedure largely depends on the availability of a robust dataset from which derivations can be carried out. The RECORDIT database is a valuable starting point in this regard, as it includes external cost data obtained with a common methodology, and disaggregated by corridor, by mode, by cost category. It was not possible to carry out an in-depth analysis of internal and external costs of water transport (both short sea shipping and inland waterways), due to the poor availability of basic data. It must be stressed that by no means the simplified procedure described above can claim to produce external cost estimates with a degree of accuracy comparable to that of the IPA approach. Validation within the RECORDIT corridors has however been carried out, whereby external cost estimates produced by the simplified procedure have been compared to the “real” values calculated with the IPA, and no major, unacceptable gaps have been found.

4. Modal views and characteristics

4.1. Introduction

The emphasis in discussion about transport pricing implementation differs with the mode of transport and even within one sector it depends on the specific framework conditions. This means that the relevance of the discussed issues sometimes is more global and transferable to other modes and situations and sometimes linked specifically to the mode of transport or situation. Therefore the modal workshops were established to facilitate a consensus within one mode and analyse afterwards how far those specific results can be transferred to more global testimonies.

Three key questions were put to initiate discussion.

1 To what extent a consensus exists within each sector on how to measure the costs of transport, for pricing purposes;
2 What are the principle issues which need further research and
3 What would be the reaction of stakeholders in the sector to attempts to introduce more efficient pricing and how may possible opposition be overcome.

4.2. Air transport

As the focus in the air transport workshop at the second seminar was on slot trading and peak charges for congested airports, it was the idea to continue the debate from seminar two on slot trading with entrepreneurs at seminar three.

4.2.1. The draft amendment to the EU-council's NO95/93 on joint regulations for the allocation of time slots at European airports

The paper starts with an official statement of Fraport AG (Frankfurt Airport) on the draft amendment to the EU-Council´s Regulation EWG No. 95/93 on joint regulations for the allocation of time slots at EU airports. In this chapter only the short summary is given. The complete paper is available on the website www.imprint-eu.org.

Fraport AG is aiming to influence the discussion on a new regulation for the allocation of time slots at European airports from the point of view of a directly affected entrepreneur and therefore gives detailed criticism to the above mentioned EU regulation.

Slot Definition

Fraport AG considers the role assigned to the airports in the slot allocation procedure to be in no way satisfactory and unacceptable in the long run. One reason for this is the newly introduced definition of slots. Slots are described according to this draft as

“the authorization of an airline ..... to use the airport infrastructure of a co-ordinated airport .... for landing or take-off“. The Commission makes it clear by this that slots are not the property of the airlines. It does not however state explicitly that the airports may be considered as the owners. Fraport AG considers it correct to refer to the regulations for use of the airport in question.

Airport and Airway Slots

A distinction must always be drawn between “airport slots“ or “ground slots“ (slots which depend on the capacity of the airport infrastructure) and “airway slots“. Through their investments on the ground, the airports provide infrastructure which allows the airlines to land or take off. The airport slots are thus the airports’ prime and most important economic asset and are therefore their property. The DFS (German Navigation Services), on the other hand, is in Fraport AG´s opinion the owner of the “airway slots”.

Revenue from slot marketing

As the owner or licensor of airport slots the airport should be the main beneficiary - if there is one - of financial revenue from the sale or allocation of a concession. Fraport AG does not think that the sale of slots or the allocation of concessions should serve to increase the “normal” revenues of the airport. We could envisage a reciprocal system in which airports undertake to use their income from the sale or granting of concessions - depending on the situation - specifically for the reduction of infrastructural capacity bottlenecks. Through the creation of additional capacity the money spent on slots would then benefit the airlines.

The role of the airports

In Fraport AG´s opinion this draft also fails to do justice to the actual position of the airports in the allocation process. Some airports are already publicly quoted companies and thus have a responsibility towards their investors. This means they must focus more sharply on profit creation and value growth. At the same time they are exposed to increasing international competition among themselves and price pressure from airlines and airline alliances.

Efficient capacity utilization

The prime aim of any amendment of the Regulation on Slots should be a better and more efficient utilization of existing, limited airport resources and capacities, thereby creating added value for the airlines, airports and passengers.

New Entrant Definition

Fraport AG questions the extent to which the new and extended definition of “new entrant“ status is suited to the creation of greater competition and will thus benefit the consumer. In its comment of this point ACI EUROPE makes it clear in advance that an “effective competition rule” would be more suitable than “new entrant status”. The aim of this rule would be to create effective competition on certain routes dominated by individual airlines. This would give established, financially stable carriers better access to competition on certain markets, which would certainly be more beneficial to

the consumer than the emergence of so-called “no names”, carriers which often have only a short life and frequently close new routes again.

Sanctions in cases of slot misuse

The extension of the powers of the airport co-ordinator to impose sanctions and the powers of the member states where slot abuse has been discovered (immediate withdrawal of slot after a single warning), thus providing a means of acting more quickly and effectively, is an excellent move towards efficient capacity utilization. Rapid and effective action must be taken against slot misuse. Existing sanctions and procedures (such as through the LBA (German Federal Aviation Office)) have not proved effective. Only the actual immediate withdrawal of a slot can deter airlines from misuse.

Slot transfer / slot trading

It emerges clearly from the draft Regulation that only the transfers and exchanges regulated in the Regulation are permissible. Any other form of slot transfer, including the leasing or sale between airlines with or without financial compensation, is forbidden.

The role of the airport co-ordinator

We regard the desired improvement of the independent role of the airport co-ordinator - not only “de jure” but also “de facto” - as a guarantee of his neutrality to be an essential pre-condition for the allocation procedure. The question of the financial burden of the airport co-ordinator must not be allowed to lead to any individual airline exerting an influence on his work.

The rights and duties of slot usage

Slots (and thus the allocation of slots) give airlines not only the right to use the airport infrastructure, but also a duty to use it. In order to ensure an effective utilization of capacity for the benefit of all we believe it is essential for airlines to undertake to use the slots which they have applied for and which have been allocated to them. Appropriate sanction procedures must be created to ensure this.

In the conclusion it is stated that Fraport AG is basically in agreement with the existing draft amendment to the Regulation on Slots (EWG) No. 95/93 and the comments of the EU parliament and the EU Commission. They feel that the draft contains no radical proposals for change and that its impacts on airports and air transport may be seen in general as uncritical. On the other hand they do not regard the draft in its presently negotiated form as a suitable means of regulating the slot allocation procedure - and thus the problem of scarce and limited resources - in a way substantially more likely to improve capacity utilization than before. This can only be done through a radical re-orientation and amendment of the Slot Regulation. Greater attention must be paid to the central role of the airports who must be given a more active and responsible part in the allocation procedure. In their opinion this can only be done through a comprehensive change of approach.

4.2.2. The discussion

This summary aims to reflect the course of the workshop and to draw some conclusions for this session.

Consensus on costs

What costs with regard to air transport should be taken into account when we think of transport pricing? The first issue would be the cost of airport infrastructure. The idea was that maybe for big airports the charging system should be devised on the same basis (e.g. scarcity, pollution) as they exist for other transport modes. The idea behind this is that air transport should be treated like other modes of transport, without exception. Here the question arises how the cost consideration can be established in line with ICAO (International Civil Aviation Organisation) recommendations.

The second types of charges are charges related to ATC (Air Traffic Control). The view of the participants was that these must be differentiated into en-route charges[2] and terminal control charges in the cost analysis.

Then the third types of costs are the environmental costs, noise emissions and gas emissions. Here was the wish to have a common pricing methodology for charges per airport in relation to these environmental costs. In the end the system should be refined to take into account aircraft type, country and urban region.

The idea behind the pricing of slots is to make better use of existing airport capacities. The EU slot regulation of 1993 is now in place. When this regulation was up for revision the member states of the EU wanted the Commission to look at the issue of pricing slots for very congested airports mainly. There should be the possibility for airlines who want to fly at peak hours to pay equivalent for these slots. The Commission decided to adopt a two-step approach with regard to the revision. First, the technical proposal launched in June 2001 and which is discussed in the Council now. And the second step will be that the Commission looks at new mechanisms for slot allocation. To do this the Commission has launched a study to develop market oriented slot allocation schemes and assess the feasibility of these schemes. The goal is to ensure mobility of slots and more efficient transport of cargo and passengers. What must be overcome is that large airlines hold their slots granted by grandfather rights and have no incentive to hand them over.

At the moment there is no system for airlines to trade slots, so there is no price for slots in the market, although there is an exception in London where it seems that there is a grey market.

An unclear issue are the infrastructure costs, is it just tear and wear of the runways or is it something else? The question was risen how to separate infrastructure items

[2] Please see another contribution to this discussion from EUROCONTROL: www.eurocontrol.int/eatmp/events/ docs/env/10_SOEHNLE.pdf

from operating items, things that could be charged in different ways. The focus is still very much on the basis of facilities and services which are being provided. And the Commissions tends to abandon more or less the idea of social marginal cost pricing in respect to air transport because it is very difficult to identify them with the result to focus on tear and wear costs for the moment.

Which principle issues are not well covered and where is further research needed?

From the position of a private airport one important point is that state-owned airports should cover their costs and not be subsidized. And with the view on airport infrastructure costs there are the costs arisen out of September 11th, security and insurance costs. Compared to other modes of transport the aviation sector is paying its own security costs. And if we look on insurances there is also a difference between aviation and the railways, because the train travelling is in many European countries automatically insured by the government. The Commission addresses not really security, safety is addressed, the amount of normal accidents. So this issue is not covered in the Commission´s methodology and these are not the costs of use as such. Who should pay, and it is not necessarily the user, must be thought about.

Another open question concerns the air traffic control regime. How will these facilities or services going to be charged? At the moment the approach is to use the average cost pricing principle to recover the full costs.

What type of guidance is needed to give to policy makers in order to allow them to set the right charges?

Aviation is the mode that is exempt from all fuel taxes (except Germany where they have been introduced in October 2002). To change this situation it would not be a good idea if some member states of the European Union go alone on this particular issue and to levy kerosene on air transport service if that is not done in other parts of the world. If it is done it must be done worldwide through ICAO.

In fact the Commission´s procedure seems to be a bit contradictory, on the one hand it is said that a market oriented new regulation is in view and for that reason the study on slot allocation is given to a consultancy. The goal of this study is to explore market based options for slot allocation. But on the other hand in the existing draft the Commission tries to suppress the existing free market for slots (Frankfurt a.M., London) which seems to be a step backwards. The participants asked: “Does it make sense to suppress the free market for two or three years and take away the flexibility from the carriers and maybe reintroduce after the study is finished a real market?”

In Sweden an initiative has been taken by the Civil Aviation Authority. At present there is a differentiation of landing charges, a differentiation based on the different characteristics of the airplane engines for NO_x emissions and also for volatile organic emissions. This differentiation is today based on the estimation of abatement costs for engine technology. But it is now discussed to get an idea about and to agree on the damage cost differences. It will be interesting to see whether the abatement cost approach or the damage cost approach are more appropriate for these purposes, whether the differentiation fits when it is differentiated enough.

What for are the revenues of the charges used? For Sweden it is a basic system of user charges so that aviation has to pay full cost for using the landing facilities and services including ATC. This system has encouraged the use of less polluting aircrafts in Swedish air traffic.

The outcome of the air transport workshop was the question: Do we understand the relation between the carriers, the airports, the air transport authorities, do we understand the market mechanisms between them, so that when we come to practical questions like slot trading – does slot trading give an incentive to the airport to improve its infrastructure or capacities or do the carriers earn money by holding back slots a peak times and do not give them away? It is not quite sure if the mechanisms in this market are understood and how to set incentives that produce benefits for one of the market players, for the passengers maybe, or just for the airports or the carriers, the biggest share of the stakeholders seem to be the passengers. So the results of transport pricing in the air transport sector have to stand the cost benefit analysis question.

When we talk about using the advantage for passengers the outcome depends very much on where the money will be spent.

The Commission should have a look at the question whether security and insurance costs should also be addressed and at the taxing of kerosene. A need for clarity exists when the various terms and various definitions like taxes and charges are used, and the question of the use of the revenues needs to be answered.

4.3. Rail transport

The rail transport workshop was designed to continue the discussion from seminar two and answer some more of the open questions. Therefore a view from the policy on the implementation of transport pricing should help.

4.3.1. EU Task Force on Rail Infrastructure charging: summary findings on best practice in marginal cost pricing

The paper of John Thomas (Head of regulatory economics at the office of the rail regulator in Britain) was the foundation for discussion in the rail transport workshop. Here is given only the abstract, the complete paper is available at www.imprint-eu.org.

An expert group on rail infrastructure charging ('the charging group') was set up by the European Commission with a remit to report on best practice in rail infrastructure charging, consistent with the charging requirements of Directive 2001/14/EC. The group consisted of members with practical experience in the application of differing charging frameworks throughout the EU and who represented rail network operators, government departments and regulators. The group reported its findings to the Commission in June 2002.

The main charging provisions of EU Directive 2001/14/EC are as follows: charges shall be set at the cost that is directly incurred as a result of operating the train service (that is, the marginal cost resulting from operating the service); a charge may be included which reflects the scarcity of capacity during periods of congestion;

the infrastructure charge may be modified to take account of the cost of the environmental effects caused by the operation of the train. Charging of environmental costs which result in an increase in the overall revenue accruing to the infrastructure manager shall however be allowed only if such charging is applied at a comparable level to competing modes of transport; and charges may be averaged over a reasonable spread of train services and times.

Specific exceptions to the above principles are allowed as follows: in order to obtain full recovery of the costs incurred by the infrastructure manager a member state may, if the market can bear this, levy mark-ups on the basis of efficient, transparent and non-discriminatory principles; and for specific investment projects, the infrastructure manager may set higher charges on the basis of the long-term costs of such projects if they increase efficiency and/or cost-effectiveness and could not otherwise be undertaken.

There are also provisions in the Directive related to discounts (generally allowed only where such discounts reflect actual cost savings to the infrastructure manager), reservation charges (to discourage capacity being requested and not used), and compensation schemes for unpaid environmental, accident and infrastructure costs of other modes. The paper summarises the main findings of the group, reporting on examples of identified best practice in relation to the determination of marginal costs. No single country yet implements ‘pure’ marginal social cost pricing although there are examples of good practice in implementing individual components of marginal cost. These individual components consist of: the marginal cost of maintaining and renewing the infrastructure (wear and tear costs), marginal environmental and accident costs; marginal congestion costs and scarcity costs.

The paper highlights areas of inconsistencies between countries (Finland, Sweden and Great Britain) in estimating wear and tear costs, even where marginal cost pricing is applied. The paper does not deal with the potential difficulties in implementing marginal cost pricing since these have been considered in papers presented at previous IMPRINT seminars. The member states who took part in the infrastructure charging working group were: Germany, France, Italy, Austria, Portugal, Finland, Sweden and the UK (The Netherlands also joined the working group for the final meeting.). Existing charging policy only in these countries was considered.

The paper presents a summary of the findings of the working group on best practice in marginal cost pricing. It was agreed that the two approaches to determining marginal wear and tear costs discussed, i.e. the econometric approach used in Sweden, Finland and Austria and the approach used in Britain, could be considered as best practice and could be followed by other Member States when implementing the charging principles laid out in Directive 2001/14. There is limited application of

environmental charges and as yet, no instances of pure scarcity pricing, although Britain does include congestion charges in its framework. Scarcity pricing, in particular, is an area where further research is needed. Focusing on the charging principles, there remains an inconsistency of approaches, even between countries which use the same modelling framework. This inconsistency arises, in particular, in the inclusion or otherwise of renewals costs which has a significant effect on the level of marginal costs.

4.3.2. The discussion

A number of key questions were identified by the session chair:

- Is there consensus on how internal and external costs should be measured?
- Is more research needed on cost calculation?
- What is the position of stakeholders towards marginal cost pricing in the rail sector?
- What obstacles are there to implementing Directive 2001/14 and how might those be overcome?

First, a concern was raised that the huge variation in the actual marginal cost estimates between different countries may compromise their credibility. Thomas agreed that this was a concern. He highlighted that whilst the Task Force had identified potential reasons why, in principle, the estimates might differ, there was a need for further research to examine the nature of the differences in much greater detail.

A second contributor asked whether there was a need for more guidance on how to calculate the costs of infrastructure use, so as to promote harmonisation of approaches. Thomas suggested that the current guidance, which allows countries the flexibility to use the approach which best suits their circumstances, seems sensible and highlighted dangers in being too prescriptive. His view is that the differences between the estimates might actually have more to do with differences between data sets and different countries' rail systems than to do with methodological issues.

A Swedish representative highlighted research that recommends the reform of the Swedish system; principally to introduce renewals costs, to substantially increase the environmental components of charges and to revise accident-related charges. However, he highlighted that there would be opposition to doing this, even in a country which has a stated policy of marginal cost pricing of transport.

The feasibility of implementing marginal cost pricing of rail infrastructure use was then raised as an issue. It was re-iterated that the finding of the Task Force was that it is technically feasible, but that it did not say that it was politically feasible, nor even that it is technically straight forward. It was highlighted that the Directive 2001/14

attempts to incorporate a degree of political feasibility by permitting deviations from marginal cost pricing in certain situations and according to particular criteria.

The issue was then raised as to whether there is a pattern in the cost elasticities – the ratio of average costs to marginal costs - that can be used to assist in cost calculation. This was something that the Task Force had not come to a conclusion on, though three studies – in Finland, Britain and France – which appear to have found similar cost elasticities were highlighted as providing promising indications that it may be possible to transfer cost elasticity values from one place to another. However, the ability to do this as a means of estimating marginal costs was thought to be linked to the earlier question relating to the nature of the differences in costs between different countries.

The final contributor provided a stakeholder viewpoint, highlighting that rail infrastructure charging has been implemented very differently in Britain as compared with Sweden, despite them both, apparently, being based on marginal cost principles. He suggested that it was not enough to provide guidance on calculating marginal costs and that it might actually be more important to agree how the rail industry should be financed, as this seemed to be the key difference between the two systems. It was agreed that investment and financing are key issues, but it was also highlighted that reform is a staged process and that currently attention is being placed on establishing and implementing agreed charging principles, at the same time as encouraging greater transparency regarding financing issues.

Key Issues

- Most evidence on wear and tear
- Must include renewals as well as maintenance
- Must use ‘steady state’ data
- Cost elasticity transferable (0.3)
- Absolute cost levels vary a lot
- Research priority is scarcity

4.4. Waterways and intermodal transport

All waterways transport must be intermodal if the origin and destination of goods are situated in ports and the external effects of waterways transport are low per ton-kilometre. For the development of intermodal freight transport concepts hinterland ports and short sea shipping become more important. All reasons to continue the discussion on the implementation of transport pricing for waterways and intermodal transport at the third seminar.

4.4.1. Marginal cost pricing in the maritime sector. Cost calculation, acceptance and Swedish infrastructure charging practice

The purpose of the paper from Henrik Swahn was to introduce into the discussions of implementation of marginal cost pricing three important issues. Cost calculation, acceptance and Swedish infrastructure charging practice." The complete paper is available on the website www.imprint-eu.org. Therefore here is given only the abstract.

The first concern is to provide some input for a discussion on how far cost calculations really have to be elaborated in the framework of implementation of marginal cost pricing. The paper questions the idea that to solve the pricing problem in the context of infrastructure charging for seaports it would also be necessary to take into account the whole of port activity, which is very complex. The second issue is to bring into the marginal cost pricing discussion once again the option to differentiate infrastructure charges, an option which has been used successfully in Sweden.

It has been argued that accurate marginal cost calculation is an almost mandatory prerequisite for the implementation of marginal cost pricing. In this paper this view is questioned from two different perspectives. First it is argued that reasonable priorities for cost calculations could be established. In the case of port infrastructure charging it is argued in the paper that given certain boundary conditions of accounting and transparency, the entire pricing issue could be left with the ports as market actors without causing any significant distortions. Second, referring to Swedish practice a case is developed for e.g. environmental differentiation of charges in an imperfect world where fiscal considerations and international interdependencies makes pure marginal cost charges problematic. Finally some Swedish institutional arrangements for dialogue and reconciliation of views between shippers, transport industry and policymakers are presented briefly.

While the principles of marginal cost pricing lately have been endorsed by most transport sector players the prospect of concrete steps being taken towards an actual implementation of such a charging regime seems to provoke resistance. This is not only true for the maritime sector but by and large also for road and air transport. This is seemingly a contradiction, which needs to be scrutinised. What are the reasons for the persistence over the years of co-existence of acceptance in principle with resistance to practical implementation? Why is it that regulation based on standards eventually seems to be more acceptable than economic instruments which in most cases could be demonstrated to be superior from an efficiency point of view.

There are a bundle of well known arguments advanced in favour of postponing the actual implementation of short run marginal cost pricing, of which some of the most frequent arguments are listed below:

International competition will be distorted both in product markets and in transport services market

Paramount uncertainty exists of the precise level of cost for different elements which constitute the marginal cost

Cost of charging system and enforcement will be too high or even impossible to devise.

Conflicts with existing international or national legal frameworks

The effectiveness to divert traffic between modes is questioned

The effectiveness to reduce pollution is questioned

It would be unethical to rely on economic instruments to control pollution

Political acceptability is low

Some of these arguments are touched upon in the paper in the context of discussing other slightly more technical issues of marginal cost pricing in maritime transport.

The first one has to do with the problems of estimation of relevant marginal costs, which is sometimes looked upon as an insurmountable task. Starting from a simple structure of the relevant cost items the discussion in the paper tries to establish the relative importance of the various cost items. As for marginal costs of ports, which have proven to be a notoriously difficult issue, it is argued that, from an efficiency point of view, omitting the port costs from the infrastructure charges would not seriously hamper the structure of maritime charges, since the port costs would anyway be included in a reasonable way as market determined prices. Provided this position is correct, research on cost as a basis for marginal cost based infrastructure charges could initially focus on other issues. The alternative priorities are discussed in the paper. The crucial remaining cost item turns out to be the marginal environmental costs.

The second theme is differentiation of infrastructure charges. From Swedish infrastructure charging practice there are examples of differentiated infrastructure charging schemes, where differentiation could address environmental properties of vehicles/vessels/craft or other priority dimensions. A differentiated scheme could be demonstrated to be inferior to a pure marginal cost pricing scheme from an efficiency point of view. However, in the light of international competition in transport and other sectors second best alternatives could be worth considering.

The third theme, which is only briefly touched upon, is to report on a couple of institutional arrangements in Sweden, which aim at improving the knowledge base for marginal cost pricing as well as to establish and maintain a forum for a dialogue between shippers, transport industry and policy makers.

4.4.2. The discussion

The subsequent discussion clearly highlighted that the maritime sector is far more complex than is usually thought, and its analysis cannot be reduced to port issues: in fact, in addition to the loading and unloading of goods and passengers, and the related activities that are deployed in ports, it also includes the navigation in coastal waters and the access to ports (navigation from coastal waters to ports).

The approach to the sector, whether from the research or from the policy side, must therefore be comprehensive: both the features of these activities and the relative importance of the various cost items (the marginal costs for the infrastructure

services provider, the cost effect of the interaction between users and the marginal external costs) should be better understood, in order to avoid neglecting important cost drivers that are relevant for pricing purposes. Other aspects should be further investigated as well: commonalities and differences among different ports or port areas in competition all along European coasts (including the Baltic Sea, that is becoming more and more an internal matter, as the EU enlargement process proceeds) should be identified, and possibly adequately reflected in the EU programs and directives.

No broad consensus has been achieved so far on the measurement of marginal costs in the maritime sector; various methodological issues are still unresolved and call for further research (e.g. deriving a production function for port services, dealing with regional effects of ships emissions, considering the implications on pricing of the public good nature of some infrastructure, etc.).

Despite these areas of uncertainty on measurement, a clear suggestion emerged from both the attendants and the speaker on the adoption of a pragmatic approach to maritime transport pricing. The implementation of simple pricing schemes should start even though a perfect agreement on measurement is not achieved yet, and fine-tuning of the mechanisms could then be carried out. Much can be learned along these lines from the few systems already in place such as the environmentally differentiated fairway charges system in Sweden.

Competition is a key issue, although geographical conditions favour the existence of oligopolistic or partly monopolistic positions, a margin for competition between port managers exists. In this sense the maritime sector bears a strong similitude with the air transport sector, while markedly differing from the road and rail sectors, where the infrastructure manager is not - in general – directly competing with other providers. Pursuing the implementation of a single infrastructure charging model (mainly derived from the road sector) may therefore prove to be misleading.

The reaction of stakeholders to the introduction of charges will probably vary with the type of infrastructure user, and might in some cases be less marked than expected, in fact, it is likely that small, private end users, who are the most sensitive to prices, will respond to price variations in a more consistent way than high volume shippers and large logistic operators. The weight of charging costs on total operators' costs is relatively limited, and marginal changes are not likely to significantly affect them, this is probably the reason why they do not currently appear particularly concerned about the possible impacts of the introduction of charges on overall transport costs.

Reactions are also likely to come from third countries, international agreements on the freedom of the sea exist, such as UNCLOS (United Nations Convention on the Law of the Sea) and the IMO (International Maritime Organisation) regulations, which actually limit the scope and concrete possibility of charging for maritime transport infrastructure use.

4.5. *Inter-urban road transport*

The biggest steps forward in transport pricing have been achieved in inter-urban road transport over the last years. This means that a lot of research has been done in this field and the experiences with it are assumed to be the most substantial and advanced which need to be analysed how far we have learned what the best practices for this and other modes of transport are.

4.5.1. Implementing interurban road pricing reforms: consensus and constraints

The initial point for the discussion in the urban road transport workshop was a paper from Gunnar Lindberg (Swedish national road transport research institute). The complete paper is available on the website www.imprint-eu.org. Therefore here is only given the abstract.

The development of the Transport Policy in the European Union has awakened the idea of marginal cost based pricing and consequently the need for a more flexible distance based charging system. The paper summarises the basic features of recent estimates on marginal cost and it discusses the possibility to find a consensus on the estimates. Furthermore, the paper evaluates the current European legislation, an adjusted legislation is proposed and an implementation path discussed. It is concluded that the current European legislation is a barrier for the introduction of marginal cost based pricing. In addition, it is noted that both the legislation on fuel excise duty and user charges/tolls has to be amended to ensure a well differentiated charging regime. It is suggested that the vehicle tax can be abolished. Finally, the possibility to introduce all these changes with a voluntary implementation path is shortly discussed.

We still await the latest step on this development.

The near future will most probably include a km-tax system. Switzerland is already now running a scheme and Germany is planning to introduce a scheme by 2003. Switzerland introduced the Swiss Heavy Vehicle Fee in January 2001, which is distance related and differentiated according to weight and environmental characteristics. All vehicles, passenger and freight, with a total weight above 3.5 tonne has to pay the charge. As an implementation path the charge is 0.01 €/tkm in 2001, raising it to 0.016 €/tkm in 2005. The charge is calculated by the distance driven on Swiss territory (km) and by the maximum permissible laden weight (tonne) adjusted with an emission factor.

Germany is the dominant player in the current Eurovignette system. After some years of discussion a decision has been taken to introduce a new kilometer based system (LKWMaut) in the summer 2003. The kilometer-charge will be paid by all HGVs with a gross permissible laden weight above 12 tonne and is limited to the German motorways. The charge will be differentiated according to emission standard and number of axles. The charge will replace the Eurovignett and some percentage of the mineral oil tax. The average charge will be 0.15 €/vkm and will vary between 0.10

€/vkm and 0.17 €/vkm. While the Swiss system is introduced on the whole road network the German system is limited to motorways due to EU legislation.

The purpose of this paper is to discuss to what extent it is a consensus today within the road sector as to how to measure the price relevant cost and to identify the principal issues in cost measurement needing further research. In addition, the paper examines if the current legislation in the European Union constrains an introduction of a more (marginal) cost based pricing policy. With 'price relevant cost', are meant the external marginal cost of transport, which could be internalised with charges/taxes. The term external is based on an individual definition, i.e. one studies a single decision maker (e.g. car driver) and examine the consequences of his decision that is not included in his weighting of pros and cons. With marginal, are meant the 'extra' consequences that fall from his decision and, implicitly discussed is a decision on an extra trip (or kilometre).

The conclusions are summed up in a short discussion on implementation path. It is a bold strategy to go from the current system with a high uniform fuel excise duty and a low user-charge to a system with low fuel excise duty and a high kilometrecharge.

Voluntary strategy

One strategy would be to base the system on voluntary participation. The first step would then be to define a two level fuel excise duty. The low level equals the cost of green house gases and in the high level has an additional component been added to make the total tax close to (some) average of marginal costs. The level could be around the current maximum tax or higher. In the second step, a kilometre-charging system is voluntary introduced. Vehicles, of any kind, that buy and install an on-board-unit will pay a kilometre-charge based on the marginal cost excluding the cost of green house gases. In compensation, they will only pay the low fuel excise duty. In the third step the fuel excise duty will be re-estimated as the average cost of the remaining vehicles will increase when users with low cost vehicles chooses the km-charge system instead.

A traditional step-wise introduction

A number of possible step-wise approaches can be envisaged. One alternative, which implicitly tries to minimize conflicts due to sudden cost increases, is presented in the paper.

The first step should be to amend the 'Eurovignette' directive to allow user charges on all roads. In a second step, or third depending on the choice of order, the scope of the directive could be expanded to cover lighter vehicles and vehicles of stricter standards than Euro II. The third step, or second, reform the user charge to a kilometre charge. This charge will be low, around 2 €/100vkm. The average cost of an operator will be unchanged. In a forth step the vehicle taxation is abolished and the kilometre-charge increased so that the sum of the fuel excise duty and the kilometre charge equals the total marginal cost. In a fifth step, the fuel excise duty is reduced to a carbon dioxide tax and the kilometre charge adjusted to cover all other marginal costs.

4.5.2. The discussion

The chairman commenced with the remark that in the morning session Prof. Begg, did not actually care about the academic marginal cost debate. His interest is more in seeing the results and then determining the costs in order to reach a reduction of congestion. Nevertheless, following the research on marginal cost pricing, it can be concluded that there is a lot of information on costs, may be there is even too much information on costs, because the costs vary dependent on location, vehicle type and time of day. So, the major challenge is to think about what type of guidance do we need to give to policy makers in order to allow them to set charges? How much or how little differentiation do we need in the end in this sector?

Consensus of costs

Mr. Lindberg showed a comprehensive table which summarizes the consensus, in his view, on marginal costs estimates. Six categories are distinguished: infrastructure, congestion, air pollution, noise, greenhouse gases and accidents. Aspects to be discussed can be: Cost evaluation – what is the basis for the costs? Do we have a discussion on external and internal costs? And what do we know about the marginal costs?

Ad1) Infrastructure costs

Remarkable is that for actual infrastructure costs still so much is unknown. Although one should expect that there has been much more research in road infrastructure costs, and especially on road marginal costs. But there has been very little research on it. On the costs evaluation there is a discussion on the annual expenditures or the question to take the present values or the future renewal costs. So clearly there is no consensus. Also for the distinction between external and internal costs problems still exist. On the marginal side consensus is lacking. The results are still not stable. Different studies come up with different results. The only explanatory variable that explains the change in costs seems to be the ratio of heavy good vehicles to passenger cars. One starts to think, if you increase the passenger cars, the heavy good vehicle will be cheaper.

For the maintenance costs everything is based on the fourth power rule[3], on the standard axles, and it has not been researched if it really is the fourth power rule (since 1954, when the test was made) what describes the costs correctly. From the discussion it appeared that the fourth power is not too bad on average, but for well-built roads, it is more like a third power, for poor roads, it is more like a fifth power.

Ad2) Congestion costs

[3] Fourth Power Rule: Road wear results from two technological facts. The equivalence factor for an axle rises very steeply with its load, as its third power and the weight per axle matters and not the total vehicle weight.

On actual congestion costs more consensus can be found for value of time and speed flow relations functions.

Mr. Lindberg thinks it is possible to reach a consensus on estimates. But the thing here is not about the value, it is about the possibility of implementation, with a lot of mixed winners and losers in a city.

From a scientific point this can all be true, but a number of participants underlined that using the general figures coming from research do not give enough guidance for implementing congestion pricing.

Ad3) Air pollution costs

For air pollution there is consensus maybe because it is a monopoly power on models of environmental costs, the externeE model: Mr. Lindberg thinks it is possible that we will find consensus on this, even if it is the same uncertainty as with the axle costs, because it is based on value of statistical life somewhere in the start of the model. And of course, there are a lot of detailed discussions on dose response functions, single dose response function.

On the marginal air pollution costs not much study has been done. The reason is that the average costs are in most cases a good estimate. If another vehicle is added to the traffic stream the increase on air pollution is strongly correlated to the number of km driven.

Ad4) Noise costs

On noise costs no specific extra information was given. From the discussion it appeared that is a very difficult subject which should not be neglected. For example the UNITE project showed that trucks driving through Stuttgart at night should be held responsible for external costs which are ten times higher than a passenger car. This means from a purely scientific or technical point of view we need more research in terms of noise cost valuation.

Ad5) Greenhouse gases

It is obvious that on the valuation or cost of greenhouse gases no consensus is found. The real impact of the greenhouse effect is unknown.

Ad6) Accident costs

There is a consensus. The willingness-to-pay approach seems to be accepted, but the actual level is uncertain. Another difficult point stays the negative risk elasticities. This implies we should look at other measures to govern speeds in which case the whole relationship might change - stimulating car mobility could be a possible outcome. In practice these negative marginal costs imply that the road authorities should invest in a little bit better roads, resulting in a small increase of traffic volumes.

For external costs Mr. Lindberg thinks that consensus has not been reached yet. Here we have the discussion on the cost allocation approach, internal/external costs; do you kill yourself or not, that turns out to be an important discussion. When we try to estimate the marginal cost we end up with this relationship between the number of vehicles and the accident risk and the consequence of that accident. From several studies it is shown that the risk is declining very often and it turns out that the

accident costs are very low in many studies. It could be because a lot of hidden costs are not observed. People are protecting themselves in ways that we cannot see.

Table 1: Consensus on marginal cost estimates for inter urban road.

Category	***Costs/valuations***	***External***	***Marginal***
1. Infrastructure	No, discussion on expenditure/costs	Yes. All costs external	No studies not conclusive
2. Congestion	Yes (VOT, Speed-flow)	Yes (if we take the individual perspective discussed here)	Yes
3. Air Pollution	Yes, ExternE (but same uncertainty as for accidents)	Yes, all costs	? (too few studies)
4. Noise	-	-	-
5. Greenhouse gases	No	Yes	No
6. Accidents	Yes (Willingness to pay approach used) but the actual level is uncertain	No (too few studies)	No (too few studies)

Source: Lindberg, 2002

Which principle issues are not well covered and where is further research needed?

It is interesting to see that, among other reasons, due to more data coming out of estimating the social marginal costs the discussion is shifted from the question whether or not to charge road users to the question to charge the dirty road users more at the right time of the day on an unsafe route. Nevertheless for a lot of figures the results are still very unstable and we need to do more studies on marginal costs.

One thing which is very encouraging is the acceptance of the willingness-to-pay approach. Of course the value of statistical life is probably wrong but people tend to accept the willingness-to-pay approach when it comes to values of statistical life and environmental aspects.

In the view of Mr. Lindberg the current European Union legislation is almost a barrier for implementing transport pricing reforms. His recommendation for the new EU directive is to include kilometre charges. The most important question is if this kilometre tax introduced, how to differentiate it, and to have some space for differentiation in the charges without going up to high. A major implication is to adjust at the same time the fuel excise duty. A possible solution could be to use two levels of charges: for vehicles kilometre charges and a fuel excise duty, and another component for other duties.

One point risen, deals with the generalization issue. The speaker suggested that really every time we want to measure marginal cost we need to get a detailed data base and do a thorough bottom-up study. After a small discussion it was concluded that a better approach is to go for more studies enabling us to find generalized figures and demand responses (elasticities).

What type of guidance is needed to give to policy makers in order to allow them to set the right charges?

That needs to add a fourth column to Table 1 which refers to the right guidance for policy which would allow to implement. And if this would be done than some evaluation in the table might change. Take congestion for instance which presented saying that everything looks beautiful and well under control. But if you are talking about how to approach the measurement of congestion in a specific situation, – and provided that we agree incidentally on definitions – we can agree on the fact that we know how to handle value of time and that we know how to handle infrastructure performance in terms of the street correlation. But does that allow to generalize the right guidance as how to estimate the actual marginal costs of congestion on any given piece of infrastructure? This was questioned by the participants.

A second point raised was how far European guidance can go in pricing. It will be very difficult to get a rational structure. From the single market point of view, the Commission is mainly interested in long distance links and cross-border traffic.

But there are issues that can not be fully solved within the Commission and their discussions. Here is a question what should be compulsory or allowed.

A possible start could be to use a voluntary system. From a safety perspective some proposals are already being made. This could be a high fuel excise duty for people that are not interested in kilometre charging systems, and a low fuel excise duty if a consumer adepts a kilometre charging system.

The question raised if the Commission intends to promote pricing as an instrument to solve existing problems, when at the same time scientists claim that on a number of aspects there is a lack of consensus. This will not be seen as a recommendation. At the same time we saw in other presentations that policy makers are following a pragmatic approach. What is the Commission doing with these results? In general it was agreed that the presented table is useful, but not fitted to be used in a policy document. An option could be to use typical regions with an average of mean values of congestion in certain type of a city.

In terms of what we actually need to do on pricing congestion was seen as the major item. It has very much to do with trips into and out of the main conurbations. So well designed conurbation road pricing schemes should tackle most of it. That is a simplification but maybe the key. Not just city centre schemes like London, they have got to be much wider than that, but equally not necessarily national.

Another point raised that might be interesting for the Commission - to explore the conditions to implement road pricing on a regional level. The second experience in the Netherlands last year was that variabilization of taxes is a national essential condition for road pricing. The second point is not possible without the first point. So maybe the Commission could stimulate members to make this – to do something on purchase taxes. Maybe that would be more effective than defining categories of urban or interurban areas.

5. Policy making achievement and barriers

This part of the seminar was dedicated more to the research aspects of implementation issues of transport pricing to balance out the policy and entrepreneurs views.

5.1. Lessons from travel planning and road user charging for policy-making: through imperfection to implementation

The paper of Dr. Ison (Loughborough University) and Dr. Rye (Napier University) was the one of the two papers functioning as base for this session. The complete paper is available at www.imprint-eu.org. Therefore here is given only the abstract.

The aim of the paper is firstly, to critically assess travel plans and road user charging in the UK with respect to the preconditions for perfect implementation put forward by Gunn and secondly, to use theory to pinpoint why some road user charging schemes have been considered – but have failed to progress beyond the proposal stage. Finally, the paper aims to highlight the elements of good practice, pertinent to the implementation of road user charging, in the process of the implementation of travel plans. Overall, the paper uses Gunn's theoretical framework as a basis for recommendations for better decision-making that will aid the wider implementation of both travel plans and road user charging.

In 1978 Gunn published a seminal paper which explained why implementation of policy is so difficult. The paper set out ten preconditions[4], which should be satisfied if perfect implementation is to be achieved. Whilst it is clear that perfect implementation is not possible in the real world, and Gunn has subsequently been criticised for his 'top-down' approach to decision-making, these preconditions do, nonetheless act as an effective framework through which to evaluate good practice in the implementation of urban transport policy instruments. Two urban transport policy instruments, which form an increasingly important element of the Government's strategy in the UK for reducing the demand for private transport as set out in a New Deal for Transport [1998], are travel plans and road user charging. Travel plans are a

[4]The ten preconditions detailed by Gunn are as follows: 1. The circumstances external to the implementing agency do not impose crippling constraints. 2. That adequate time and sufficient resources are made available to the programme. 3. That the required combination of resources is actually available. 4. That the policy to be implemented is based upon a valid theory of cause and effect. 5. That the relationship between cause and effect is direct and that there are few, if any, intervening links. 6. That there is a single implementing agency which need not depend upon other agencies for success or, if other agencies must be involved, that the dependency relationships are minimal in number and importance. 7. That there is complete understanding of, and agreement upon, the objectives to be achieved; and that these conditions persist throughout the implementation process. 8. That tasks are fully specified in correct sequence. 9. That there is perfect communication and co-ordination, between the various elements or agencies involved in the programme. 10. That those in authority can demand and obtain perfect compliance.

relatively recent policy instrument in the UK and seek to reduce trips to work by car by providing, through individual employers, a targeted, integrated package of incentives and disincentives to influence commuters' choice of mode of travel to and from the workplace. Road user charging, whereby motorists are charged for the road space they use in urban areas, seeks to reduce the congestion problem via the price mechanism, and has a longer history in the UK. To date the implementation of travel plans in the UK has been more widespread than that of road user charging: there are no road user charging schemes as yet in place, but there are some Travel Plans (see DTLR[5], 2001 for an estimate of the take-up of the latter in England). It is fair to say, however, that the widespread implementation of both urban transport policy instruments is a complex and sensitive area for decision-makers.

From the experience of travel plans that have been successful in influencing the way in which employees travel to work, there are some lessons for good practice in travel behaviour change more generally. These include the following:

• Developing the plan in close consultation with employees, and making clear its benefits.

• Offering a mixture of "push" and "pull" measures (incentives and disincentives).

• Promoting and gaining acceptability of behavioural change in transport. This has links to work that has been carried out on individualised marketing in transport; when carried out effectively and judiciously, the travel plan can be a vehicle to offer such individualised marketing packages to employees for their trips to and at work.

• Parking charge implementation. Few travel plans have featured the implementation of parking charges and/or controls, due to the perception that this would be too contentious. However, organisations that have done so – such as Sheffield University and Pfizer in Kent – have found that acceptability can be increased by careful design of the parking charge measure.

• Partnership working. In some cases, such as Buckinghamshire County Council's travel plan, significant benefits have been achieved for both employer and other partners – in this case, the local rail operator. Delivery of effective behavioural change in transport is increasingly dependent on partnership and the lessons of travel plans are therefore instructive in this regard.

In the paper it is suggested that the most important aspects of the implementation of road user charging and Travel Plans that should be addressed by policy makers if they are to achieve success are as follows:

• Only try to adopt these measures in a situation where external circumstances can be demonstrated to merit them;

• Demonstrate a clear link between cause and effect, to demonstrate to others that the policy will have the intended effect;

• Ensuring that a single implementing agency is responsible for all implementation (although in practice this would be difficult to achieve!); and

• Allocate resources to programme implementation.

[5] Department of Transport, Local Government and Regions in the UK

5.2. Implementing Urban Road pricing – Achievements and barriers

This paper was written by Jo Baker (Transport & Travel Research). The complete paper is available at www.imprint-eu.org. Therefore here is given only the abstract.

The paper provides some general background to the issue of Urban Road Pricing, a very brief summary of the state of the art, including an introduction to plans for new schemes. It then addresses some of the barriers which have prevented take-up of Urban Road Pricing, and offers some general conclusions on the issues raised.

Specifically, the paper concludes that the rationale for implementation of urban road user charges is well established. The incidence of implementation, however, is limited, and even when committed schemes are taken into consideration, there are few examples within Europe or worldwide.

This lack of take-up of a solution to the critical problems of traffic congestion and environmental impact can be attributed to a number of factors. The following, however, appear to be paramount:

- Road user charging as a concept is supported by EC policy documents, but could be well served by some modifications to legislation. The EC does not currently impose any obligation upon Member States to permit the introduction of road user charging in urban areas, and it would appear that in many states there is no immediate likelihood of such schemes even being legitimised.
- Where urban road user charging is permissible, the onus for introduction is generally placed upon local authorities. Whilst this level of local empowerment and accountability is desirable, the interaction of the political processes at different levels of government may preclude the identification of a period in which a controversial scheme can be the subject of a single poll, and implemented or rejected as a consequence.
- Financial, operational and engineering issues are unlikely to pose a fundamental barrier to implementation, but represent very real obstacles to scheme progression. A shortage of suitably qualified staff, and the range of staff needed to enable implementation, may impede progress.
- Finally, if a scheme can progress to the point at which implementation becomes viable, the acceptability of the scheme to commercial and public interests will almost certainly govern decision-making. The degree to which the problems driving necessitating scheme development are understood, the severity of those problems, and the effectiveness of the communication strategy supporting the scheme by presenting such information are all central to ultimate success.

5.3. Discussion and summary

The discussion started with the identification of a need for specific man power for administrative matters when one starts with a new charging system. For instance in London the experience is that it is not easy to recruit the staff needed. And based on other large scale changes this could become a critical factor. Another human factor which was seen as important is the project champion. This can be a positive factor, but also it is important to know that such a person could be a representative from the opposition as well! When possible this should be taken into account setting up a pricing reform scheme, which means that when the policy field is entered other than pure scientific arguments gain importance.

The acceptability of the general public is of course a major factor when we are talking about implementing pricing reforms. But at the same time it was identified that it is impossible to design a pricing reform scheme from which all people will benefit. So gaining acceptability is important, but never a goal in itself.

6. Urban transport

The layout of this part of the seminar resulted from the insight that in the urban area all transport modes are interweaved in a way, which makes it impossible to act towards the implementation of transport pricing in one sector without changing the framework conditions for another.

6.1. Urban road transport

The key issue in urban transport are the problems resulting from the exhaustive use of the private car which lead to congestion and pollution and reduce the quality of urban life. So all measures to solve the most acute problems need to tackle this mode of transport first in the urban areas.

6.1.1. Road Pricing – Singapore´s Experience

Dr. Chin´s (Singapore Land Transport Authority) paper was the base for discussion in the urban road transport workshop. The complete paper is available at www.imprint-eu.org. Therefore here is given the abstract only.

In the field of transportation, road pricing or congestion pricing has long been associated with Singapore. Indeed, road pricing started in Singapore in June 1975. Many changes have been made to the road pricing scheme since that time. Initially, a manual scheme based on paper permits and applicable during the morning peak period only, it has evolved over the past 27 years to an electronic version that operates almost throughout the day presently.

Road pricing is an important component of Singapore's overall transportation strategy. While road capacity continues to be increased judiciously to meet rising travel demand, the strategy also calls for greater reliance on public transport usage and demand management. One aspect of demand management is the restraint of vehicle ownership, either through the imposition of high upfront ownership costs or restriction on the actual growth of the car population. The former type includes the custom duties and vehicle registration fees, which amounted to almost one-and-a-half times that of the car's open market value, while the latter is managed through a Vehicle Quota System. The other aspect of demand management is the restraint of vehicle usage through the levy a charge on motorists based on the quantity, place or time of the use of their vehicles. Generally, the more one uses his car the more one has to pay. The road pricing schemes, petrol tax, diesel duty, and parking charges are measures in this category.

One of the goals set out in the demand management strategy of Singapore is to move away from relying predominantly on vehicle ownership costs, to a better balance between it and usage costs. The resulting system would be a fairer and

more equitable one. The paper looks at Singapore's experiences with road pricing over the past years, from the manual scheme to the current electronic one.

6.1.2. The discussion

The first question was about price elasticity and whether Singapore has identified a relationship between increasing the price and decreasing the traffic. Dr Chin said that when ERP (Electronic Road Pricing System) was introduced in 1998 they had tried to measure elasticity values but without success. Instead, they use a simple rule such that whenever speeds go above or below a threshold, the price is either decreased or increased by 50 cents (Singapore Dollars). The issue was raised as to how road users are informed of price changes. Any changes are identified in the print media but Dr Chin highlighted that, whilst there were some initial adjustments to prices following the introduction of ERP, prices have now more or less stabilized at a level slightly lower than under the paper-based scheme (non-electronic system).

There was then discussion of the use of pricing revenues and the funding of investments. Dr Chin explained that, currently, they are collecting approximately 80 million Singapore dollars a year and that this simply goes to the central government for them to decide how it should be spent, be it on education, health, transport etc. It was noted that the costs of ERP are quite considerable; the gantries themselves cost about 200 million dollars, including all the in-vehicle units, it costs about a further 12 million a year to maintain the system and funds were also needed for preparatory work prior to implementation. In each case, these funds are secured via a request to the central government.

The issue of earmarking funds for investment in related transport schemes was then raised. For example, in the early days park-and-ride-sites were created with shuttle buses but it was found that people did not use them.

Actually there are a lot of motorists who prefer to wait in front of the toll ring entries. They are not coming in for work. So there is no urgent time to respect. They can afford to wait and create a lot of congestion outside the big entries. Very interesting in peoples behaviour is that on the one hand they are prepared to pay a very substantial amount to own a car (certificate of entitlement) and on the other hand they are reluctant to pay cents to pass the entries at certain times.

The charges are set at a level which is a balance between making the tariff model easier to understand and accept for the public and the traffic influence goals. Motorists in Singapore largely accept pricing as something necessary. They do not question the principle; they do question the fares and operating hours.

Due to the fact that a flat rate is paid for the entry into the city centre companies are changing to bigger lorries, but until now there was no effect on smaller companies that they had to leave the central area and were not able to compete.

Unfortunately land use is controlled by a different authority, not by the Land Transport Authority. And the way planners work there is based on many other considerations not such as transport. The pricing itself has not many impacts on land use. But it has impacts on shopping hours. Shops do open doors later in the morning and close later in the evening because of the pricing scheme.

The investment in a good, efficient public transport is something very important in Singapore. The improvement of public transport did not result in a major shift of car owners to public transport. Car owners paid so much for their cars that they do not want to leave their cars that easily. It is probably even better to persuade them not to buy a car in the first place and make public transport efficient in parallel.

6.2. Parking

A measure of transport pricing introduced in nearly all European urban areas since decades are parking fees. These parking schemes are mostly not very differentiated in respect to certain goals of the municipalities. Out of this reason existing parking schemes have to be analysed in the frame of a comprehensive urban transport pricing strategy.

6.2.1. Parking is Manoeuvring

Mr. Van der Schaaf´s (Municipality of Amsterdam) paper was the base for discussion in the urban road workshop on parking. The complete paper is available at www.imprint-eu.org. Therefore here is given only the abstract.

The paper describes the trends in traffic and transport with regard to Amsterdam and, in addition, provides an overview of the new Amsterdam Parking Policy ("Parkeren is Manoeuveren" -"Parking is Manoeuvring"). Parking policy is not an end in itself but rather a function of, and contributes to, the accessibility of the city and the quality of life in Amsterdam.

Mobility in Amsterdam is on the increase and will continue to increase due to the following factors:

1. Amsterdammers are travelling more often and further
2. An increase in new suburbs means a rise in the city's population. In addition, visitor numbers are rising (jobs and urban amenities).

The proportion of external traffic travelling within the conurbation will continue to increase as a result of:

1. The uneven balance between in coming and outgoing commuter traffic. Increasing numbers of Amsterdammers work outside the ring road and increasing numbers of those working in Amsterdam come from outside the city.

2. The increasing attraction of the amenities the city has on offer.

The density of traffic, especially on the ring road, is growing sharply. Within the ring road density continues to decline but the rate of decline is gradually levelling out.
The growth in the provision of public transport fits in perfectly with the demand for a fast and high-quality public transport system within the Amsterdam region.
Within the ring road bicycle traffic is still on the increase but the role played by the bicycle will inevitably reduce as the commuting distances grow.

Parking policy has an important influence on and consequences for car traffic.

1. The introduction of paid parking has had a restrictive effect on car traffic although it would appear that, to some degree, habituation to paid parking has begun.
2. Accessibility of the inner city for the car has greatly improved. The accessibility for the car to the areas around the ring road is being put under pressure.

The primary traffic regulation measure taken in Amsterdam is the levy of a parking tax.
Regular increases in parking rates for the three tariff areas need to be implemented in order to limit all non-necessary traffic.

Raising the cost of a permit to a cost-effective level would require far too great an increase. Since April 2002 permit tariffs have shadowed the price-indexed enforcement costs in order that the gap between the costs of and proceeds from permits does not grow.

6.2.2. The discussion

Mr. Van der Schaaf showed in his presentation that implementing parking charges is a step by step process and that a number of lessons can be drawn for implementing (other) price reforms in transport. In this report the overall discussion is summarized in six lessons.

Lesson 1: implementing a new price measure starts at a small regional scale
The scheme started in the inner city, paying around €1 or less; the payment then increased gradually on an annual basis depending on the district concerned.

Lesson 2: social marginal cost pricing was (and is) not taken into account
Amsterdam uses two tariffs: permits for the inhabitants and a street charge for visitors (including commuters). The gap between cost of enforcement and cost of a permit is considered, and this cannot rise. So every year the price of a permit rises by the rate of the price index of the enforcement cost. For the tariffs on the street there is not really a relation between the increase in tariffs and the need to get more money for the mobility fund. Merely if you do not raise the tariff, people get used to them and

the behavioural impact disappears. It is important to increase the charges every year just a little bit. It is in effect a political compromise. From the discussion it was concluded that social marginal costs pricing was not really taken into account by the Amsterdam policy makers. This is probably true for other regional authorities as well.

Lesson 3: a differentiated price scheme is needed

An interesting point is, which is so far mostly not recognised with proposals for urban road pricing, that the Amsterdam parking policy is making an explicit distinction between residents and non-residents. Residents have to apply for a permit to park their car, but at the same time the charges are relatively low. For visitors and workers from outside Amsterdam the parking charges are much higher. Such an approach increases the support for strict parking policies.

Tariff setting is considered carefully. Initial proposals were for a higher rate which had little public support, or a lesser charge which would have less influence on driving habits which did get support. In the end, a compromise was made so that inner city charges were higher than those in the other areas.

Target groups were identified to receive considerations, e.g. doctors, midwives, carers for the elderly, so that permits were issued. It is also possibly for elderly residents to apply for a permit so that visitors to their home (e.g. a family member) can park on street.

Lesson 4: pricing policies are part of an overall transport policy

In Amsterdam revenues helped to pay for enforcement costs as well as paying for a new Metro development scheme. Secondly, for gaining public support, it is important to invest at the same time in transport alternatives – e.g. parking garages and improving public transport in general. In Amsterdam there are three major park and ride facilities with another planned. All have good links into the city centre. This has had the effect of decreasing central parking.

Does this all mean that there is a strong integration in terms of planning of parking and planning for public transport? Mr. van der Schaaf is not sure if there is a strong relation between parking policy and public transfer policy, but definitely sure that because of the new parking policy the development of Park & Ride areas has developed faster. But it must be realised that parking policies is just one way to decrease car mobility. Good public transport is another.

A remarkable conclusion was drawn from the discussion: it seems that cities which have the most positive response to parking policy also spend a lot on public transport (Metro/Light Rail).

Lesson 5: expenditures and revenues have to be concentrated in one body

Another success factor was that the revenues of parking charges are going directly to the municipality of Amsterdam. In the early 90's parking was a big problem and the need to cut down the number of car km in the inner city was seen as large. But parking was not seen as effective because revenues went directly to Ministry of Finance, so the incentive to enforce strict parking policies was small. Amsterdam

forced the Government to pass an Act which meant that enforcement costs are for the City with a maximum fine which the Government sets.

The Municipality of Amsterdam developed a so-called Mobility fund. This ensures that the parking money is earmarked for infrastructure or traffic measures. This contributed to the success considerably. Total revenues of the parking charges were 40 mill.€ and the enforcement cost were 20 mill.€ in 2001.

Lesson 6: Paid parking places can be beneficially for local business

Initially a lot of shop owners were worried about paid parking, but have found their customers can now come in and park, because generally space is still available. The Chamber of Commerce did get involved in monitoring and also the target groups. This is underlined by the number of visitors coming to Amsterdam. The amount increased from 1995 onwards. It is likely this will continue to increase. Parking policies are in Amsterdam a benefit to local shop & businesses. From the discussion it appeared that this is also true for Edinburgh. Traders were negative at first but realised that commuter spaces were being left free for customers. Elsewhere, parking is banned before 10 a.m., leaving spaces for shoppers.

The chairman ended the discussion with the remark that a somewhat neglected item is private parking policy of companies. Often there are more private spaces in a city than public spaces. In Copenhagen, outside the city centre district, parking is free, which encourages people not to take cars in. There might be a cultural problem – say for different places like Edinburgh with many visitors versus Manchester. And also a cultural divide, Northern Europe versus Southern Europe countries. People expect different things. In Amsterdam particularly the aim was to reduce cars in the city. It is a historic centre with many visitors. Rotterdam, in comparison, which was heavily damaged during the war, has had new road developments and is not perceived as “historic”.

6.3. Public Transport

The session was opened with a proceeding of Yves Amsler (UITP). The topics were examples of fare pricing structural changes, the real factors of success and some official recommendations of UITP.

In terms of transport pricing policies the example of London shows that structural changes can lead to huge changes in use of the private car and bus traffic. A fare pricing development should be defined from taking a wider view than only fare pricing, it should be an element of comprehensive fare policy and incorporate all urban transport modes and not only public transport.

The deregulation policy of public transport led to decreasing subsidies in the UK. And another conclusion which can be taken is that public fare transport policy should aim at fare integration as in London where there was a raise in the bus and underground traffic due to the fare integrated system.

The basic fare policy parameters are: the responsibilities of authorities, the relationship between the various transport modes, the fare system´s technical attributes, the public transport funding conditions and the pricing of the use of the various service modes. In France exists a specific tax which is called the "versements de transport", which is paid by employers with more than nine employees. The tax is based upon the wages and according to the size of the urban area up to 1.85%. Which means this gives a main resource for funding the public transport system in France and represents 30% coverage of the whole expenditure for investment and operation of urban public transport systems.

Another important fare policy parameter is the priority given to the various public transport modes. E.g. what are the priorities between long distance services and regional and local services and is the bus system a competitor to the rail system? And if one has this hierarchy it is very difficult to identify the cost of each mode, because the way one operates the bus system depends on the way the rail system is operated. So one needs to get a common approach of both to get an average cost for the whole system.

Another very important competitor of public transport is the private car as it competes for the road space. If buses are in congested areas the users will if they can use another mode, leave the bus system to take a car. This increases congestion, lowers bus commercial speed, which means to cover the costs you need to increase the fare. By this the attractiveness of the mode is declining and other users will drive by car increasing congestion.

Public transport has to face social objectives and objectives of services of general interest which need some harmonization at the European level.

The categories of tickets have also huge importance in setting up a coordinated fare policy. The ticket´s sale validation and control practices are another point. One has to face technical problems and the sale-revenue problems in terms of payments. When the revenue are divided between various operators passengers have to be counted, to estimate the level of demand on each mode or on each operator. There is a need for fare cooperation, for cooperation in common management functions and ticket selling. It can be a fare community with fare integration which is in that case total or partial achievement of a common pricing regulation with the same tickets.

A very important parameter to consider, are the funding conditions. Funding relates basically to investment, but it has to be analysed what is charged to the operator when he is not the owner of the system. What happens with the side equipment, for the interchange stations, for the passenger information system in a situation with several operators? And who will pay for the expenditure which is not charged to the operator´s account? It is important to know who the final payer is. Is it the tax payer, is it at the national or local level, are there indirect beneficiaries for the employees through taxes on the employer or is the fuel tax used to feed transport fund.

In average the revenues from ticket selling represent less than 15% of the costs (except in GB). But there can be revenues from side activities like advertising. Since

1996 in the EU there exists the regulation that makes the authorities responsible for the compensation of the concessionary fare they decide to the operator.

In the economic theory one should apply the social marginal costs as the basis for setting a price policy. But in fact one does not face a perfect market. It is totalled in urban areas by the externalities and most of them result from the use of private cars. The customer is not standardized. Some are dependent on public transport, e.g. poor people, some others have specific needs, e.g. disabled persons. The conclusion of the problem if the economic theory is regarded is that it can not be applied in practice which leads to the result that urban public transport fare pricing is a very difficult compromise, it is the extension of the level of integration you want to achieve. One needs also to take into account the car use and implement park and ride policies, infrastructure charging in urban areas etc.

Pricing is not only a problem of congestion. It is also a problem of sustainable development, of social impact, of mobility policy and land use effects. All modes should be taken into account, even pedestrians and bicyclists to define a fair fare policy. E.g., the users of public transport use public space more effectively than private cars. The parameter to measure the effects of the use of the various transport modes is by square meter per hour, the time space required for a given trip purpose. The average proportion of space requirement is one to six or nine from public transport to private car.

To know the marginal costs has a secondary importance for price building because a fair price and fare integration is much more important because of a better understanding of the system and a better accessibility than having the marginal costs reflected exactly in the prices, because we have different operators and each has different marginal costs. A lot of money might be saved if there is an organizing authority which takes over the co-ordination of the different operators than having the best operator on a lower cost level in a smaller area.

To move towards marginal social cost pricing and a differentiation as for roads would mean higher fares at peak times than off-peak, and higher fares in modes which are heavily used compared to less used modes. But the car users pay less from their total social costs than the public transport users. If one wants to influence the usage of transport means in the peak hours the public transport fares should be lowered, because the main problems are in the peak hours. One must provide a seamless travel feeling, people must have enough information what to do to get from their origin to their destination for the whole chain of transport modes. A smartcard system could help. The intelligent mobility devices have to be improved so that people know during their trip where they are and how long they have to wait. The smartcard is an ID at the same time which means that you have individual clients and can customize services. Which means with the smartcard and the entry control on real-time you will be able to size the level of your supply and reduce costs and improve services.

7. Entrepreneurs point of contact with transport pricing

Private companies must have a focus on their profits that is the way they look on all transport pricing concepts. That seems to be far away from the dimensions used in national economics. But the experiences with selling solutions to the customer can give an idea how to promote transport pricing in the eyes of politicians and a critical public.

7.1. Telecommunication industry´s view

The presentation was given by Mr. P. Tilanus from KPN (NL). His presentation is based on the experiences with a road pricing project in the Netherlands, as one of the private companies involved. He presented a mobile telecommunications perspective on road pricing for the Dutch situation.

The main reason for mobile telephone operators in general to participate in such a project is to have subscriptions which will generate revenues. An important question was therefore what will be the (new) services offered in the car and what will be the impact on data communication.

The first aspect is the subscription fee. From the provider perspective there is no ground to offer the subscription fees for free. The fees have to cover the mobility management and the billing costs. Mobility management means that the mobile operator has to keep track of the car if you are going to communicate with it. And of course, you have to send a (monthly) bill.

There are possibilities to reduce the costs, but these could be in contradiction with the mobility objectives of introducing road pricing. An option is to implement an intelligent application that attracts the mobility management and is switched on the mobile when a connection is needed and it switches off the connection when the connection is no longer needed. In that way, you can negotiate lower subscription fees. Nevertheless, you will not be able to reduce it to zero. And when it comes to billing, wholesale billing is in general much cheaper than retail billing. But this is not the best way to influence travel demand.

The second aspect is the assessment of the possible revenues. Road pricing systems generate telecommunication traffic. Every now and then, there is information about the position, but it is not a substantial amount of traffic that is generated. And also, the geographical distribution of the traffic is often very bad. Again, referring to the proposed project – looking at the cost of mobile communication, compared to the other costs – in green (see figure 1) – it can be seen that much more money is spent on the on-board units and the installation costs. So, only based on the generated data traffic the conclusion from this draft is that you should not ask a mobile operator to participate in funding of the onboard units.

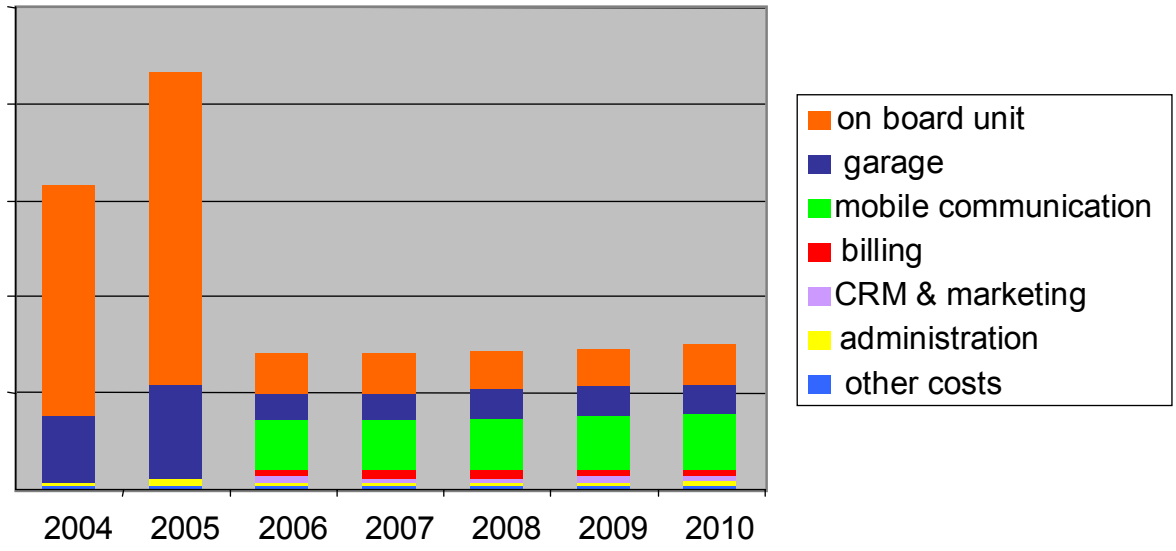

Figure 1: Expected costs for the Dutch KM charging system split up to several components.

Of course new services could generate extra data traffic. There are many possible mobile inquiry services, and often, when you have a road pricing system in place, these can co-exist with mobile inquiry services. It is a way of making money on one service, while subsidising the other ones, usually subsidizing the road pricing. We distinguish two main categories of services. One is for the driver or the car and one is for the owner of the car. They are often mixed up; in particular, when it comes to leased cars and rented cars, there is quite a difference. KPN studied a number of services and when it comes to the private user, it is mainly the real time route planner which was seen as promising. If you have everything in place for road pricing, then with a little extra effort you can offer real time route planning. Also parking is a possible service offered by this device.

Also people want to find the nearest – as a result of the road pricing system the location of the car is known – whatever it is – it can be a restaurant, or if the window is broken, the car user wants to find the next car glass shop and have it repaired. A particular service for the owner of the car is monitoring the behaviour of the driver. This is interesting for rental and leasing companies. But also for insurance companies it could be an interesting service, because usually consumers pay for having their cars insured irrespective of the number of miles they are driving. Based on the mobile road pricing technology this insurance could be based on the actual numbers of km driven. An example is already found in Ireland, where one of the insurance companies has a special arrangement for young drivers under 25, if they agree to be monitored and they give the insurance company the guarantee that they do not break the speed limit, then they get half price, and that is quite essential.

Many of the mobile inquiry services require the position of the car, and because of the position of the car, the link to road pricing can be made. Now, when it comes to

road pricing systems attractive to the mobile then it should be based on the geographic location of the car. But furthermore, we want a location accessible to our applications. If it is a location just for road pricing and nothing else, then a telecom operator can not do anything with it. If that location is available a major demand is to have an open interface.

One thing which appeared from the presentation is that the interest of the mobile operator in road pricing systems is indirect, because there is a service provider providing the mobile inquire service. And only the traffic that is generated is charged by the mobile operator. But the remainder is charged by the service provider. However, the mobile operator usually offers the billing as a service to the service provider. So from a consumer perspective it all looks the same, but looking at the business modelling and what is the proper business model – who is getting money out of this, then it should be realized that the interest of the mobile operators is indirect.

The conclusion of the speaker was that synergy of mobile inquiry services and road pricing is possible but then their involvement should be planned from the early stages of the project. But on the other hand it must be realized that the interest of the mobile operator is indirect, and as consequence one should not expect the mobile operator to take the lead in implementing a road pricing system like this.

7.2. Introducing new technologies in parking, political and social constraints

Mr. Zuckers´ proceeding was mainly a presentation of the MobiPower technology in-vehicle based solution for parking management and their experiences from field test and implementation.

Research has shown that the average car is parked 95% of its lifetime[6]. At the same time the goal is available parking with user friendly parking schemes.

The parking challenge comprises four major areas. The municipalities want to facilitate the flow of traffic, to have accessibility to shops and business. At the same time they want to raise revenues. The driver wants access and ease of use. And the enforcement, to make sure that people stick to the policies for which a lot of data is necessary. What are the actual parking spaces available within the private parking lots. What is the actual behaviour of parkers, what is the peak time of parking? If all this data is collected the policies can be improved and facilitated and the revenues maximized.

The MobiPower solution is based on an in-car device with which the driver selects the time, the zone and starts parking by pressing a button. When returning to the car he stops the session and the information is transferred via SMS to a data center for a monthly cost statement. The warden walks with a small device on his belt, he is tracked via GPS, and so the issuing of tickets. Just by walking along the street the

[6] Or in other words: only 5% of 24 hours a car is moving.

warden´s device communicates with the in-car device and identifies it. The city gets the information from the data center that the transaction took place, so they know their income from parking month by month.

The day-to-day life could be improved for example concerning the loading and unloading parking zones. Loading bases are usually overloaded many times, trucks have to do double parking, obviously influencing the flow of traffic in the city centers. With the in-car-device and a variable rate with e.g. the first twenty minutes free and then not the regular fee, but maybe five times the regular fee to encourage them to leave the space and let other truckers come in. If the law says so it can be preferable for a company to pay a parking fee instead of a fine because it is tax deductible. This is the incentive for companies. But the legal framework can be different, e.g. in the Netherlands the taxation covers parking only and not loading and unloading.

The in-car device has got a GSM antenna, so in one case the truckers who did not want to be monitored via the monthly parking bill hided behind their health concerns for their opposition against the system. In the end the antenna had to be installed more away from the driver in the truck.

Within ten years it is estimated that a large percentage of the cars will be equipped with a telematic unit with GSM where the software for such parking approaches can be integrated.

Parking becomes business, cities are looking on it on a profit and loss base.

By incorporating new technologies in parking, it is tried to improve the quality of service, to reduce congestion and allow accessibility to city centres. New policies based on real data that can be gathered from the devices to give various services to the motorists. On the financial side, new sources of revenues like from truck loading and unloading can be explored. Improved collection and a monthly direct billing lead to lower enforcement costs. Once those funds are available they can be reinvested for the citizens' benefit.

7.3. Attitudes and field trials about road pricing in Copenhagen

Mr. Poul Sulkjaer, from the City Council of Copenhagen, presented the experiences with the field trials with road pricing in Copenhagen.

Mr Sulkjaer started with the identification that the traffic problems in Copenhagen are increasing, but still not at the level as they are for instance in London. Car traffic in Copenhagen is increasing on average 3 or 4 percent every year. Compared to London however, where the average speed during the rush hour in London is 15 kilometres per hour, the traffic is still flowing: average speed in Copenhagen is about 30 kilometres per hour in the rush hour.

Mr. Sulkjaer divided his presentation in two parts, the first part was about the attitudes of the citizens towards road pricing as it is regarded in Denmark and secondly the results of the field trial in Copenhagen.

The citizens were surveyed and asked for their opinion on road pricing. In general it can be said that they are more positive towards road pricing than towards conventional taxation (see figure 2). This opinion is also split up in car owners and non car owners, and of course people who do not own a car are more in favour of a road pricing system than people who have a car. It is interesting that even amongst car owners there is a majority for the road pricing system. The opinions among females and males are very similar. And also within the different income groups the same pattern occurs, there is no difference.

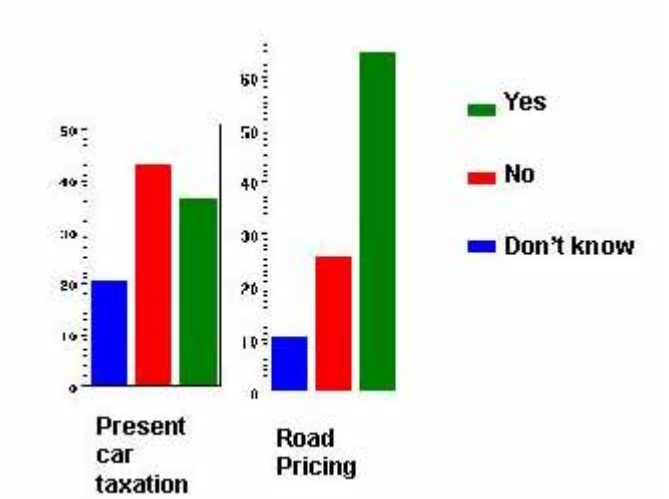

Figure 2: Percentage of the citizens that is sympathetic to Road Pricing compared to present car taxation.

More specifically people were asked for their opinion on road pricing in rush hours – and this is the situation where road pricing is needed – then the majority of car owners is against road pricing. So when road pricing is really needed, the majority of people are against it. Also people were asked about the use of the revenues. Several options were proposed. The first was in relation to spending the money on the topic the respondent preferred (see figure 2). Even then the majority is not in favour of road pricing. This becomes even worse if it is proposed to spend the money on public transport. This means that people begin to think that this is just higher taxes instead of a charge which revenues are bound to the infrastructure used.

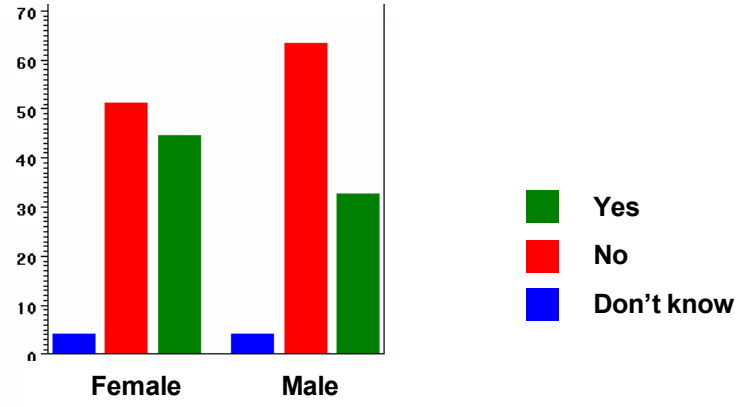

Figure 3: Percentage that is sympathetic to Road Pricing if the revenue is used as the respondent prefers

The second part of Mr. Sulkjaer presentation dealt with the question what people intend to do if road pricing is introduced. In the field trial 500 people (volunteers) where equipped with a special road pricing device.

The research approach was that at first for about two months the normal driving of the people is measured. Based on this the normal charge was calculated. To the participants this is communicated and they are offered that if they change their behaviour the possibility to be paid back a part of this charge. The fee used in the centre of Copenhagen is 0.7 Euro per kilometre. So most people think this is expensive. Outside rush hour it is half price. The next zone is cheaper and the outskirts of the city are nearly free. People are well informed so they could plan to save money. In the car a taximeter is installed. On the display the charge is given.

The evaluation showed that:

- the system is very accurate and
- 80% of the people changed their driving behaviour.

7.4. Public transport pricing strategy in Berlin-Brandenburg

In his proceeding Uwe Stindt (VBB GmbH) gave an overview of the integrated public transport system in the region of Berlin-Brandenburg. The VBB (Verkehrsverbund Berlin-Brandenburg GmbH) covers an area of 30000 km². That includes two countries Berlin and Brandenburg and 18 local authorities, communities. This area has around 5.8 million inhabitants.

The public transport system is fully integrated. The customer needs only one ticket for all companies involved. This means one ticket for rail, light rail, underground and

buses. The tickets can be bought all over the region to every destination in the region.

VBB is organised as a private company but owned by the public hand. It took 14 months to set up the company with a customer focus. Now for three years the network is constantly improved. But the major problems to overcome have been political and not the concept or of economic nature.

One aspect of the system is the integrated planning. That is very important because of the diverse financial responsibilities for the regional traffic system. The annual service needs to be coordinated and integrated when the timetables are designed, the connections need to be optimised with the timetables and the connection points have to be improved by building bus stops or modernising railway stations.

The management needs to be harmonized concerning service standards and tendering. At the local level there is nearly no competition so quality control and management are very important. To gain quality certification the employees e.g. the bus and train drivers have to proof their skills in standardized tests. The technical equipment as well as the content and design of timetables must be harmonized.

Information on ticket sales is stored in a central database that also allows controlling the efficiency of the system by monitoring for instance monthly sales. For VBB there is an integrated marketing. The system is running for three years now, and the number of passengers and the income of the operators are increasing.

7.5. Conclusions from the entrepreneurs session

Even though the contributions from entrepreneurs were heterogeneous some conclusions can be drawn. Naturally profit-oriented companies to not aim with priority to reach national economic goals. They start there activities in the transport pricing market if legislation has been changed or changes are discussed. The private business approaches should be integrated in the public design of transport pricing measures where they have usually there competencies, in the field of development of technical equipment, booking procedures, business models and marketing. Summed up companies talk about customers and not citizens. This can lead to problems when they attempt to sell additional services to the users of transport pricing, trying to take advantage out of their position as monopoly supplier of the transport pricing services. But if the competition is guaranteed the efficiency benefits of private participation in the implemented transport pricing can be evident.

The results are as follows:

- A mobile network operator has an indirect interest in road pricing systems because his profits result from the traffic generated. This could be a conflicting aim with low system running costs and thereby acceptance of the users of the road pricing system.
- An efficient cooperation between mobile operator and road pricing is possible when his role in the road pricing system is planned from an early stage.

- Technical and systematical improvement of parking fee enforcement has to face a different legal framework from one EU member to the other which makes legislative changes necessary before introduction.
- Parking fees should be considered from the municipalities in the light of improving the quality of service for citizens and on a profit and loss base with useful revenue spending.
- In Copenhagen a field test for road pricing has resulted that the citizens oppose road pricing especially if the revenues are spent for public transport and not road infrastructure.
- The Berlin-Brandenburg integrated public transport system had to face mostly political set up problems resulting from overlapping responsibilities of the involved institutions.
- The integrated public transport system consists of various operators but needs to look to the customer as one what is reached through harmonization of technical equipment, design, timetables and a superior booking system.

8. Overall conclusions and outlook to the next seminars

The main objective of seminar three of the IMPRINT-EUROPE project was to identify what we can learn from constraints and solutions in best practice when pricing reforms in transport are implemented. To this end, a wide range of experiences were presented and discussed during the course of the seminar and an attempt made to draw conclusions from these experiences.

Another important element of the seminar, looking ahead to the proposed EU directive on charging for infrastructure use, was the identification of where consensus exists regarding infrastructure cost calculation. The main conclusions regarding cost calcuation are:

- Rail
  - Most evidence is based on the measurement of wear and tear costs and it is important to include renewals within this; studies which leave that out come to very low cost estimates.
  - the data should be related to a relatively steady state condition. Otherwise a railway could be stimulated to allow its assets to run down.
  - several studies come to more or less the same estimate of the elasticity of maintenance and renewal costs with respect to gross tonne kilometres, namely 0.3, though the absolute cost levels vary a lot.
  - Finally, it was agreed that there was a need to do more research on the treatment of scarcity in marginal cost estimation.
- Road
  - Different degrees of consensus exist regarding the measurement of different cost categories. For congestion and environmental costs there appears to be a broad consensus. For infrastructure, the surprising answer seems to be that there is not really a consensus, though it is felt that infrastructure is the most studied element of costs of all. For accidents costs partly consensus can be found. For noise costs no consensus is found; there does not even seem to be a consensus about whether the marginal cost of noise increases or decreases as traffic increases. The costs of CO_2 emissions, due to the uncertainty of the impact of the greenhouse effect, are unclear in terms of monetary costs and measurement options and no consensus is found.
  - For the coming years in the research field attention should be given towards more case studies to enhance the basis on which the cost estimates are made.
  - The participants underlined the need for simple policy guidelines.
  - Since the Commission focuses particularly on interurban (or long distance) traffic, the exact definition of what is included in this and what is not needs still some refinement.
- Air transport
  - Specific for airports is the issue that there exists a difference of cost information between public and privately owned airports. Private airports generally have good cost information in terms of business

accounts whereas publicly owned airports do not always present the cost information in a transparent way.
    - Fuel taxes for air transport do not exist. This leads, compared to other modes, to a severe distortion.
    - Scarcity is a big issue. Creating a market for slots could be the appropriate way forward. But this leads to the property rights issue, it remains unclear who is the actual owner of these slots. An ongoing study, commissioned by DG TREN, could be helpful in the economics of allocation of slots at airports.
- Ports and inter modal
    - This area seems to be the most difficult. Port charges cover lots of different activities. And it is difficult to disentangle them, it is not just a problem of loading and unloading ships, there are all sorts of other activities of surrounding ports, navigation, lots of services which may be entirely provided by private operators within a port even if the port is publicly owned. This all requires more research.
    - There was more agreement on the measurement of environmental costs than of infrastructure costs. Examples can be found in which the environmental costs are included in the charges (Scandinavia). A complicating factor for the measurement of infrastructure costs is, like it is the case in the air sector, ports are competing and sometimes privately owned and sometimes publicly owned.
    - Future research should focus more on the whole logistic supply chain and not only on port activities.

Despite the agreed need to do more research, the shared opinion was that we already know what the big distortions within the transport sector are. Hence, there is no need to wait for perfection; it is possible to start with simple pricing reforms which can then be refined later.

The second day of the seminar focussed on what can be **learned from successful examples of pricing reforms in the transport sector**. A number of lessons were presented, namely:

- Urban road pricing: the Singapore case:
    - Acute traffic problems are largely resolved and it is possible to overcome the opposition.
    - A price reform can not be implemented overnight. There is a clear need for phasing and packaging. In the case of Singapore this meant: a simple area charge, park and ride facilities and stimulating car pooling. In a later phase the Electronic Road Pricing (ERP) scheme was implemented, specially stimulated with reduced vehicle taxes.
    - The ERP scheme is in comparison with the old systems more effective. It is possible to charge each trip separately. However it is expensive to maintain: 6 million euros per annum.
    - A particular impact on freight transport was that much larger vehicles are now in use.
- Public transport Pricing

- Based on the experiences of a large amount of public transport operators success factors for pricing reforms are: simplicity, good and regular information to the customer and a clear authority.
- But also a number of barriers can be distinguished: the lack of integration of road pricing with public transport fares, conservative institutions and technological problems.
- Marginal social cost pricing is not seen as practical by the public transport companies. In real life pricing is always a compromise.

- Urban pricing: Parking
  - Success factors: offering alternatives (Park and Ride facilities, more public transport), phasing by starting at a small regional scale, integration with transport and planning policy and the concentration of expenditures and revenues in one body.
  - Barriers are the (increasing) supply of private and /or company parking and the possible negative economic impact on business, retail and/or tourism.
  - With the implementation of paid parking different stakeholders (residents, business and visitors) must be identified and appropriately handled.
  - Determination of the price level is not based explicitly on social marginal cost pricing, but on willingness to pay. Given capacity constraints, however, the two may amount to the same thing.

The overall conclusion of the second day was that pricing reforms are highly dependent on a supportive external environment, adequate resources and a project champion able and capable to organize support for the idea of pricing reform.

Hence, there are several tension fields when pricing reforms are designed. The research community has developed perfect theoretical schemes which are permanently refined, but politicians and ordinary people speak a different language and have value systems that depart from a strict national economics view. A clear result from this seminar is that politicians have a certain goal, e.g. an amount of revenues needed for new infrastructure or to reduce congestion in a certain area or on highways, when they think about the implementation of transport pricing. Policy makers need the support of the population which means that someone must feel that he profits of the measures. An exception are less democratic states like Singapore where public acceptance is of less importance, therefore the transferability of those examples is limited.

Based on the seminar the main recommendation for the EU-member states is to approach transport pricing very pragmatically on the side of policy makers, users and companies offering technical solutions coping with it. The charging schemes must be simple or transparent, the use of the revenues clear, and the group of people who benefits quite large. So the public debate and with it the scientific debate must focus on the advantages and benefits of transport pricing and not on the costs. If only a mathematic model is fulfilled with a measure the number of supporters will be small. The cost-benefit-paradigm of the implementation of transport pricing seems to be the base on which policy recommendations and later on models on phasing and

packaging can be developed. This is the task for one of the next IMPRINT-EUROPE seminars.

A third aspect that this seminar has made obvious again, is that the experiences with transport pricing are extremely varying depending on the mode and country. Biggest progress can be seen in the field of inter-urban road transport (Germany and Switzerland) and here the challenge for the near future lies surely in the technical and booking compatibility of the enforcement systems in Europe. From an EU perspective aspects of competition and standardization are opposing. Proprietary standards are pushed into the market by several companies to gain big market shares in the future. The role of the EU needs to be to ensure that no new entry barriers are created.

The research community on transport pricing has to face a big challenge, to develop policy advice on a pragmatic level without neglecting the economic theory. Especially the NAS-countries will need good arguments to sell transport pricing to the people. They might have the additional problem of developing countries, that they want fast economic growth and no debate about the external effects of transport. On the other hand the limited budgets of the public bodies will make it interesting to finance new infrastructure through tolling and to attract private money with public-private-partnerships. This topic will be deepened at one of the next IMPRINT-EUROPE seminars which is dedicated to transport pricing in the NAS. Transport pricing research has to face the problem that is well known in the industry, the gap between fundamental research and marketable product. The message of seminar three is that there is no urgent need for fundamental research. Additional case studies policy acceptance analysis must be intensified to give material to willing politicians to convince a sceptical public of the advantages and equity of transport pricing measures.

The window of opportunity for the implementation of transport pricing was already identified in the last seminars. It is still open, and now it seems reasonable to make some pragmatic steps towards implementation. Transport pricing needs to be marketed as something useful to the people. In the first step an imperfect system can be introduced, but then researchers again need to be consulted to refine the system in accordance with theoretical models and always with an eye on the public hunger to benefit from a measure.

9. References

Baumol, W. J. & Bradford D. F. (1970), "Optimal Departures from Marginal Cost Pricing", American Economic Review.

Institute for Transport Studies (2000), CAPRI Final report, Funded by the EC 4th Framework Programme, University of Leeds.

Commission of the European Communities (1995), "Towards Fair and Efficient Pricing in Transport", Brussels.

Commission of the European Communities (1996), "White Paper. A Strategy for Revitalising the Community's Railways". COM (96)421 FINAL, Brussels.

Commission of the European Communities (1997a), "Green paper on seaports and maritime infrastructure", COM(97) 678 final, Brussels.

Commission of the European Communities (1997b), "Proposal for a Council directive on airport charges", COM(97) 154 final, Brussels.

Commission of the European Communities (1998), "Fair Payment for Infrastructure Use: A Phased Approach to a common transport infrastructure charging framework in the EU", COM(98) 466, Brussels.

Commission of the European Communities (1999a), "Final Report on Estimating Transport Costs", High Level Group on Infrastructure Charging

Commission of the European Communities (1999b): "Options for charging users directly for transport infrastructure costs", High Level Group on Infrastructure Charging

Commission of the European Communities (2001a), "Directive on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure and safety certification", Brussels.

Commission of the European Communities (2001b) "European Transport Policy for 2010: time to decide", COM 2001 (370), Brussels.

Department of the Environment, Transport and the Regions, 1998a. *A New deal for*

Transport: Better for Everyone, The Government's White Paper on the Future of Transport, Cm 3950, London: The Stationery Office.

Eliasson, J. (1998), "Mathematical models for analysing land-use and transport policies". KTH, Stockholm

Friedrich R, Bickel P. & Krewitt W., eds. (1998), "External Costs of Transport", Institute of Energy Economics and the Rational Use of Energy (IER), Stuttgart.

German Scientific Advisory Council on Transport (2000) "Fair Payment for Infrastructure Use: Outline of an Alternative Approach to the European Commission's White Paper",

Gunn, L. A., 1978. "Why is Implementation So Difficult?", *Management Services in*

Government, **33**: 169-76.

Harrington, W., Krupnick, A. J. & Alerini, A. (2001), "Overcoming public aversion to congestion pricing" in *Transport Research* Part A 35, pp. 93-111. Elsevier Science Ltd

Harsman & Wijkmark (2000), "Pricing Measures Acceptance", PRIMA - Final report for publication, Brussels.

Institute for Transport Studies (2000), PETS - Pricing European Transport Systems, Final report for publication, Brussels.

ISIS et al (1998), "QUITS – Final Report", Funded by the EC 4th Framework Programme, Brussels.

Ison, S. (2000), "Local authority and academic attitudes to urban road pricing: a UK perspective in Transport Policy", pp. 269-277, Elsevier Science Ltd.

Johansson, B. & Forslund U.M. (2000), "Road pricing as a traffic management tool" in Bång, Karl-Lennart (ed) *Traffic in major cities: Problems and prospects*, KTH, Stockholm

Jones, P. (1998), "Urban road pricing: public acceptability and barriers to implementation" in Button, Kenneth J. and Verhoef Erik T. (eds) *Road Pricing, Traffic Congestion and the Environment*. Edward Elgar, Cheltenham, UK - Northampton, MA, USA

Langmyhr, T. (1997), "Managing equity: The case of road pricing", in *Transport Policy*, Vol. 4, No. 1, pp. 25-39. Elsevier Science Ltd.

Lindblom, C. E. (1977), "Politics and markets: The world's political economic systems", Basic Books, Inc. New York

Lindsey, C. R. & E. T. Verhoef (2001) "Traffic congestion and congestion pricing", in D. A. Hensher & K. J. Button (eds.) (2001) *Handbook of Transport Systems and Traffic Control*, Handbooks in Transport 3 Elsevier / Pergamon, Amsterdam, forthcoming.

Matthews, B. & Nash C.A. (2002), IMPRINT-EUROPE Implementing Pricing

Reform in Transport – Effective Use of Research on Pricing in Europe, Deliverable One, Identifying Key Requirements for Pricing Reform, Institute for Transport Studies, Leeds

Niskanen, E. et al. (2001) "AFFORD, Final Report", Funded by the EC 4th Framework Programme, VATT Finland

Proost S., van Dender K., et al. (1998), "TRENEN - Final Report", Funded by the EC 4th Framework Programme, Leuven.

Quinet E, (2001), "European pricing doctrines and the EU reform", Paper presented at first IMPRINT-EUROPE seminar, 21-22 November 2002, Brussels

Ricci A. & Fagiani P. (ISIS) (2002), *IMPRINT-EUROPE Deliverable 2*. Funded by the 5th Framework Programme. University of Leeds, August 2002

Rietveld, P. & Verhoef, E. T. (1998), "Social feasibility of policies to reduce externalities in transport" in Button, Kenneth J. and Verhoef Erik T. (eds) *Road Pricing, Traffic Congestion and the Environment*, Edward Elgar, Cheltenham, UK - Northampton, MA, USA

Roy, R. (1998), Infrastructure Cost Recovery under Allocatively Efficient Pricing, UIC/CER Economic Expert Study: Final study report, London, March 1998, published by the UIC, Paris, 1998

Roy, R. (2000), "Revenues from Efficient Pricing: Evidence from the Member States", UIC/CER/European Commission DG-TREN Study: Final study report, edited by Rana Roy, London, November 2000, published by the UIC, Paris, 2001

Viegas et al. (2000), "Socio-economic principles for price acceptability", PATS deliverable D2, Funded by the EC 4th Framework Programme, TIS.PT Lisbon