



CUPID
Co-ordinating
Urban Pricing
Integrated
Demonstrations

CUPID
DELIVERABLE 5
SYNTHESIS REPORT

**EUROPEAN COMMISSION
COMPETITIVE AND SUSTAINABLE GROWTH
(GROWTH) PROGRAMME**



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Co-ordinating Urban Pricing
Integrated Demonstrations

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SYNTHESIS REPORT**
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1. INTRODUCTION

1.1 Background

In recent years, considerable research has been undertaken into the implementation of urban pricing projects. In reality however many uncertainties remain concerning the terms and conditions for successful implementation. It now seems clear that large demonstrations are necessary to provide basic empirical evidence on how best to balance some of the critical issues, thereby aiding the identification of appropriate urban pricing policies and the effective design and implementation of schemes.

The main aim for CUPID is to provide and advance state of the art knowledge on urban transport pricing schemes through a European cross-level site assessment of city demonstration project results, to produce robust policy recommendations and to widely disseminate the results. An important part of the assessment will be the liaison with the demonstration cities as part of the PROGRESS-project and the provision of guidance for other cities interested and willing to take another step towards the introduction of pricing schemes.

1.2 The CUPID Thematic Network

CUPID is a Thematic Network supported by DG TREN of the European Commission. The network comprises experts from 6 European organisations:

- Transport & Travel Research Ltd (UK).
- ISIS (Italy).
- ITS Leeds (UK).
- SINTEF (Norway).
- TIS (Portugal).
- Technical University of Dresden (Germany).

The Network will undertake a variety of activities from 2000 until 2004. Key Deliverables will be made available on www.transport-pricing.net.

A key objective of CUPID will be to provide support to the cities in the PROGRESS project, which is also supported by DG TREN. The project comprises the following cities:

- Bristol.
- Copenhagen.
- Edinburgh.
- Genoa.
- Gothenburg.
- Helsinki.
- Rome.
- Trondheim.

1.3 Purpose of the Deliverable

The purpose of this Deliverable is to provide a synthesis of the work undertaken in the Progress cities, and in connection with wider urban transport pricing schemes. In order to do this, reports have been prepared on work undertaken in a range of EC and non-EC states.

The Deliverable is not intended to be a definitive statement, but the second in a series of evolving documents to be produced over the next 3 years.

This update to the Deliverable highlights considerable progress in the United Kingdom where the London Congestion Charging scheme has recently been implemented and appears to be operating satisfactorily. A further, smaller scheme has also been implemented in Durham. Elsewhere, there have been some developments in Italy and Sweden, but wider take-up of urban road user charging remains unlikely in many Member States. In the Netherlands, in particular, political change has set back the anticipated move towards distance-based pricing, whilst the emphasis at European level appears to be focused on the pricing of inter-urban commercial vehicles.

1.4 Contents of the Deliverable

Following this introduction, Section 2 provides a brief summary of the key features of the PROGRESS cities, whilst Section 3 summarises the work undertaken across the EC and elsewhere.

Section 4 provides an overview of the document, whilst Section 5 summarises the way forward.

Appendices A and B provide more in-depth summaries of the work of the PROGRESS cities and the current situation elsewhere in the EC and further afield.

2. UPDATE ON PROGRESS CITIES

Tables 2.1 to 2.5 summarise the status of transport pricing in each partner city. In most cities there are still no firm commitments to any implementation of transport pricing, although in Trondheim there is an existing scheme, and in Rome the comprehensive access control scheme, incorporating elements of an access charge, is now well established.

These tables draw upon the more extensive summaries included as Appendix A, which in turn draw upon PROGRESS Deliverables. The tables address the following issues:

- Summary.
- Policy Issues.
- Proposed Demonstration.
- **Consultation.**
- **Improvement to Transport Infrastructure.**

Table 2.1: Summary Table

	Bristol	Copenhagen	Edinburgh	Genoa	Gothenburg	Helsinki	Rome	Trondheim
Existing problems (Key: ✓ = Growing problem ✓✓ = Problem ✓✓✓ = Major problem)								
decentralisation		✓	✓			×		
inadequate public transport services	✓		✓				✓	
congestion	✓✓✓	✓	✓✓	✓✓	✓✓	✓	✓✓	✓
high car ownership	✓✓✓	×	✓✓	✓✓			✓✓	
inadequate road infrastructure		✓✓ (no ring road)		✓✓ (no ring road)		✓	✓✓ (poor ring road)	
inadequate parking				✓✓				
pollution	✓✓	✓	✓✓	✓✓	✓			✓
Modal Split for trips to work								
			1991 Figures	Am peak		Average day		
Car	59%	33%	48%	40%	62%	49%	59%	60%
Bus				42%				
Train	15%	27%	34%	5%	20%	33%	20%	9%
Metro				2%				
Tram								
Bicycle	3%	34%	2%	11% (scooters)	8%	18%	21%	31%
Pedestrian	15%	6%	16%		9%			

Table 2.2: Policy Issues

	Bristol	Copenhagen	Edinburgh	Genoa	Gothenburg	Helsinki	Rome	Trondheim
Policy Issues								
National Legislation	The Transport Act 2000 gives powers to local authorities to introduce charging schemes. Net charging revenue to be ring fenced for local transport measures for a minimum period of 10 years. The London and Durham schemes demonstrate that these powers are effective.	No legal framework for introduction of road pricing. Gov't Research into road pricing to result in proposal by 2004	The Transport (Scotland) Act 2001 gives Local Authorities powers to introduce road user congestion charging only. Revenue to be ring fenced for local transport measures, with no time limit.	No specific laws but other laws to protect cities and to create restricted areas can be used; Codice della strada – protects historical areas Decreto Bassanini – enforces traffic restrictions	Pricing commission established to determine future path. Policy Decision required by 2003. Wider interest nationally suggest a move towards road user charging.	Presently the legislation in Finland does not allow for road pricing Increased the awareness of "the user pays" principle favouring road pricing	See Genoa	Institutional and legal structure for pricing in Trondheim is well established. Decreased opposition experienced after implementation. However debate may be re-opened as initial operating period expires
Local policy targets	To ensure that transport contributes to a successful economy in Bristol. To provide integrated transport system. To improve transport to lessen dependency on cars especially at peak periods. To reduce air and noise pollution.	To halt growth in car traffic To improve the use of bicycles. To improve the use of public transport.	The Local Transport Strategy has an overall objective of reducing car dependency and improving alternatives to car travel	Relieve city centre congestion by influencing modal choice towards collective transport modes, decreasing the use of private, individual vehicles.	Improving the environment and accessibility and creating improved conditions for the development of the region.	Increase density of the city structure to increase possibilities for public transport, walking and cycling Improve public transport efficiency To reduce pollution from traffic To improve conditions for commercial traffic	To define a planning tool which gives coherence to all private as well as public urban mobility issues	To control the transport demand in the peak periods

Table 2.3: Proposed Demonstration

	Bristol	Copenhagen	Edinburgh	Genoa	Gothenburg	Helsinki	Rome	Trondheim
Proposed Demonstration								
Type of system	Single cordon with electronic tag/transponder (current favourite)	Trial on multiple charging and kilometre charging	Vehicle number plate recognition technology	Vehicle number plate recognition technology	Congestion charging and environmental charging to be trialled by volunteers in 2002	Two scenarios tested; cordon and trajectory based pricing	Automatic access control system for existing restricted central area using smart cards and video cameras at 29 gates Plans for trial of charging for access outside access control period	Study of the cordon implemented 1991 and the zones in 1998.
Implementation by	Under review	-	Under review	To be confirmed	-	-	Activated October 2001	ongoing
Charge for entry to central area	(£1-2 or 1.6-3.2 Euro).	3 charging schemes with different levels and periods of charging to be tested the demonstration	Unsure. Considering a £1 - £3 once a day charge, no matter what the configuration of the scheme – charging may not be restricted to central area, as also considering a double cordon.	1 EURO for each passage	Various	Tariffs vary from 0.8 to 2.5 Euro for a passage based system and 0.03 to 0.25 Euro per kilometre for trajectory based	Reduction of permit cost for authorised non-residents from 311.47 € to 103.82 €per year.	15 NOK
Charging period	AM peak inbound traffic		Mon-Fri – once per day	0700-2000 weekdays	Various	0600-1800 weekdays higher fee 0700-0900	24hr	Monday-Friday for inbound crossings 0600 - 1800

Table 2.4: Consultation

	Bristol	Copenhagen	Edinburgh	Genoa	Gothenburg	Helsinki	Rome	Trondheim
Consultation								
Prior to PROGRESS	700 Stated Preference surveys in the city centre on road user charging.	None	Considerable earlier consultation work used to develop the recently adopted Local Transport Strategy				Interviews, SP exercises and traffic count results.	Majority of road users (63%) accepted the concept of travelling at increased cost in peak periods, though half of all road users were negative to road pricing
Ongoing/complete	700 Stated Preference surveys in the city centre on road user charging.	None	Major public and stakeholder exercise completed in 2002, with residents from Edinburgh and Edinburgh's travel to work area to clarify location, extent of cordons, times of operation and level of charge.	Developing an effective communications campaign in an effort to achieve political approval			Interviews, SP exercises and traffic count results.	Majority of road users (63%) accepted the concept of travelling at increased cost in peak periods, though half of all road users were negative to road pricing
Planned	Formal consultation planned to take place prior to commitment to scheme implementation.		A referendum is planned.					

Table 2.5: Improvement to Transport Infrastructure

	Bristol	Copenhagen	Edinburgh	Genoa	Gothenburg	Helsinki	Rome	Trondheim
Improvements to transport infrastructure								
Bus	✓ Quality partnership with showcase routes	No complementary measures are included in the project. Metro and rail improvements seen as "up-front-investments" prior to introduction of a road pricing scheme in Copenhagen	✓ more frequent evening / weekend services, reduced fares, easier interchange, bus priority					
LRT	✓	✓ (driver-less Metro)	✓				✓ Extended metro & new lines & tram, trolleys and electric vehicles on radial routes	
Park and Ride	✓ on major arteries		✓ linked to bus & LRT	✓ 4 buses/hr to RP zone	✓ with hi-tech payment	✓	✓	
Pedestrian	✓		✓ network of routes					
Cycle	✓		✓ better routes & parking				12,000 free parking places (for mopeds also)	
Parking	Controlled parking zones			✓ reduced fee for 1 st hour	✓ Hi tech payment and location system using GPS		High city centre parking charges to encourage P&R	

	Bristol	Copenhagen	Edinburgh	Genoa	Gothenburg	Helsinki	Rome	Trondheim
Rail	✓ Higher frequency and improved stations	✓ Circular rail line	✓ new lines and stations, increasing frequency and capacity				✓ Redesign and Integration with other modes	
Other			Integrated Transport Information Centre with RTI at kiosks by phone & web	Dial-a-Ride with gas buses			Priority measures for public transport including reserved lanes, traffic lights.	
Previous experience	✓ Road user charging trial in May 1998	✓ (bridges)	✗	✗	✗		RP zone is currently restricted area with residents permits.	✓ (20 charging points operating 0600-1800 + 24 hr road tolls on airport- centre link
Modelling	The 1999 Road User Charging Definition Study developed an economic model (CREAM) to assess the potential costs and revenues to be derived from a scheme	Modelled kilometre based charging system and zone system	Later stage of modelling completed.	MTCP (Macroscale Transport Chain Planner) multimodal tool found that RP reduces traffic in central area by about 40%	“SAMPERS” model found that both zonal and trajectory pricing can bring v. high traffic reductions	New multimodal model has been developed starting from the existing MTCP information and modelling has been completed.	TransCAD demand modelling based on 530 traffic analysis zones	Greater modelling or simulation tasks in Trondheim are not planned.

3. REVIEW OF EUROPE-WIDE PRICING ISSUES

In Appendix B the current situation regarding road pricing in the majority of European countries is described. The information is given for each country:

- Tax structure for private cars.
- Tax structure for goods vehicles.
- Previous examples of urban road pricing.
- Ongoing examples of urban road pricing.
- Future commitments to urban road pricing.
- Details of Relevant ongoing Projects.
- Current legal situation regarding urban road pricing.
- Institutional structure for road pricing.
- Other Key Documents.
- WWW links.
- Any upcoming events of relevance.
- Any other relevant issues

Sections 3.1 – 3.12 summarise the main taxes, current road pricing developments and legal / policy issues in 11 countries.

For the purposes of information and comparison, this section has been augmented to include a range of non-European experience.

This section of the report will continue to be developed as CUPID progresses in order to provide an updated view on pricing issues worldwide.

3.1 Belgium

3.1.1 Taxes

- VAT (21%).
- Taxes on the insurance policy: 27%.
- Taxes depend on the fuel used and the HP of the car.
- Excise on fuel.

3.1.2 Current Road Pricing Developments

There is a road toll for tunnel connection under the river Scheldt (*Liefkenshoektunnel*). The Eurovignette system operates for HGVs. All other pricing issues are the responsibility of the federal government.

3.1.3 Legal/Policy issues

There was a discussion about *Road User Charging (RUC)* for the *region of Brussels- Capital*, but it is thought to be socially unacceptable, and there is not a reasonable alternative for travelling against a reasonable price (the public transport infrastructure is saturated), the government abandoned the idea.

3.2 Denmark

3.2.1 Taxes

Taxes for private cars are as follows:

- VAT.
- Registration fee - accounts for 50% of total car tax revenue.
- Owner duty - calculated on basis of fuel consumption to encourage purchase of “greener” engines.
- Ecological tax – on fuel.
- Sulphur tax – depending on level of sulphur content in fuel.

For HGVS:

- Eurovignette - joint taxing regime for vehicles over 12tonnes between Denmark, Germany, Sweden and the Benelux countries.
- Registration fees.

3.2.2 Current Road Pricing Developments

There are road tolls on bridges connecting Sealand with Funen and Sealand with Malmö, Sweden. These are not behavioural measures and are merely to pay for the maintenance of the bridges. The government has committed itself by the political agreement to explore whether the introduction of road pricing will reduce the traffic in the major cities in Denmark by autumn 2003.

Copenhagen is part of the PROGRESS project. 500 motorists have been given a device which records the costs of driving in order to determine how this affects driver behaviour.

3.2.3 Legal / Policy Issues

There is currently no legal framework for urban road pricing, and it does not currently look likely that Denmark will move towards road pricing in the immediate future.

3.3 Finland

3.3.1 Taxes

Initial vehicle taxation is the responsibility of the Customs.

Automobile tax - The tax is equal to the so called taxation value, which is the import price including toll, if relevant, minus 760 euros + some additional minor reductions. This means as an example that the vehicle tax for an ordinary passenger car is some 85 % of the import price.

Vehicle tax - The vehicle tax is 84 euros for vehicles registered prior to 1994, and 117 euros for vehicles registered in or after 1994. The vehicle tax taxation period is one calendar year.

Diesel tax - The diesel tax is determined based on the total vehicle mass (vehicle mass + capacity) and other technical specifications (vehicle type, axle structure, hitch facilities), which are or should

have been noted in the vehicle registration. Examples of the tax are: passenger car 25,20 euro/ each 100 kg vehicle mass, vans correspondingly 4,56 and for other vehicles like lorries ranging from 4,56 to 10,56.

Fuel tax - There is a tax on all liquid fuels ranging from 46 to 54 eurocents for gasoline and 28 to 30 eurocents for diesel fuel.

VAT is 22 %

Taxes for HGVS - all goods vehicles are subject to diesel tax and may, depending on the actual fuel they use, be subject for fuel fee and surtax. All goods vehicles pay fuel tax.

3.3.2 Current Road Pricing Developments

In Finland urban road pricing has not been applied. Proposals for urban pricing have been made and alternatives studied and analysed with a few years intervals since the early 1990'ies for the whole Metropolitan Area of Helsinki or the Helsinki City Centre only. However, the proposals were doomed by many political parties, the media and motorist organisations and thus withdrawn. Since then the issue has been discussed more or less on an academic level only, as the lack of political acceptance has been very obvious.

The main goal of Helsinki being partner in PRoGRESS is to produce and disseminate knowledge on the issues and the effects of a potential pricing scheme in order to build up acceptance.

Finland is also participating in the following projects relating to road pricing;

- *VIKING in the MIP / Domain 6*:- Euroregional project 2001-2006 supporting the development of interoperable Electronic Fee Collection.
- *CARDME* – European Discussion forum on interoperable in Electronic Fee Collection
- *CESARE 2* - EU-project aiming at a complete MoU including technical specification for interoperable motorway tolling in Europe.

3.3.3 Legal / Policy Issues

According to existing laws, no charges can be applied for the use of the road network. The Ministry of Finance has consequently stated, that any fee charged for the use of road infrastructure is to be considered as a tax. Currently, there is no institutional structure for road pricing. If road urban pricing were implemented, it is likely, that a special law for each pricing scheme would have to be in place.

3.4 France

3.4.1 Taxes

19.6 % VAT is levied on the purchase of new vehicles. The yearly Tax disc (the cost of which was dependent on engine power) was dropped in 2000 except for professional vehicles. National taxes represent 79 % of the sale price of euro super petrol, 72 % of gasoline and 30 % GPL of the sell price including VAT. HGVS pay a yearly vignette depending on the engine power (nearly 500 euros).

3.4.2 Current Road Pricing Developments

Public opposition to road tolls in Lyon and Toulouse was so strong that the schemes were abandoned. However, there are successful road tolling schemes in Paris, Marseille and tunnels in Lyon, although these are not congestion charging schemes. An outer ring road being built in Paris is to be tolled. Lyon, Grenoble, and St Etienne are working together on transport and considering road pricing as an option.

3.4.3 Legal / Policy Issues

Since 1985, local authorities can implement road pricing, but only for bridges and tunnels, and only for infrastructure financing. New forms of road pricing, such as cordon or distance pricing are not possible yet. Roads are managed at 3 levels - at municipality, département (county) and national level and public/private partnerships are also very common.

3.5 Germany

3.5.1 Taxes

There are car taxes on acquisitions, on ownership and on motoring (e.g. on fuel, bridge tolls). Charges have to be paid for the use of all federal motorways by all heavy good vehicles with a maximum permissible gross laden weight of not less than 12 tonnes. To tax according to environmental damage, the vehicle tax reform 1997 has fixed tax rates for passenger cars according to their emissions.

3.5.2 Current Road Pricing Developments

The MobilPASS field trial in Stuttgart established a cordon line around the southern entrance to the city centre, with three charging points controlling access. Results showed that drivers reacted on different prices on various ways. According to the test drivers some 10% to 28% of trips were influenced by road pricing. Despite positive results of MobilPASS field trial, it was not implemented mainly because of political problems.

3.5.3 Legal / Policy Issues

At the moment it is legally not possible to introduce urban road pricing. From the point of tax law (e.g. dimension of charges/taxes; revenue use) and also human rights (non-restriction of basic rights; privacy issues) road pricing could be implemented but the responsibility of different institutions for different categories of roads proves to be a hindrance for the introduction.

At the moment it is legally not possible to introduce urban road pricing.

3.6 Greece

3.6.1 Taxes

Private car taxation in Greece involves: (i) the fuel taxation, and (ii) a special fee paid for renewing the vehicle circulation licence. The Greek legislation for fuel taxation was harmonised with the European Commission Legislation. The tax on special categories of consumers like such as farmers

is lower. Based on the frequency of the regulations identified since 1992 it can be derived that almost every year the taxes on all categories of consumers are reconsidered.

3.6.2 Current Road Pricing Developments

In Greece there are no comprehensive parking policies for the Metropolitan Areas of Athens and Thessaloniki which constitute the major urban conurbation of the country, and thus there is no homogeneous or rational parking pricing in these areas. There is no urban road pricing.

3.7 Ireland

3.7.1 Taxes

Rates of motor taxation in Ireland are based on cubic engine capacity – the greater the capacity, the higher the rate. Tolls are payable at two points in the Dublin area – on the ring road and on the East Link bridge.

3.7.2 Current Road Pricing Developments

A study in to road pricing has been undertaken which concluded that congestion charge in central Dublin could reduce congestion but that the success of the scheme would be highly dependent on accompanying public transport enhancement.

A second demand management study for Dublin was commissioned in late 2002. This will review a wide range of measures to reduce car traffic demand, including road pricing.

3.7.3 Legal / Policy Issues

Section 57 of the Roads Act, as amended by the Planning and Development Act, 2000, allows the NRA to prepare a scheme for the establishment of a system of tolls in respect of the use of a public road. A Public Private Partnership (PPP) approach for the provision of road projects has been established.

3.8 Italy

3.8.1 Taxes

There are several different types of road tax in Italy:

- Entry – e.g. Drivers Licence tax.
- 4 types of Registration tax.
- Property e.g. Regional Vehicle tax.
- Operation e.g. Excise duty and VAT on fuels and oils.
- Vehicle Transferral tax.

3.8.2 Current Road Pricing Developments

Rome

Automated access control has been in force in Rome since August 2001 using a system which automatically recognises car licence plates. The scheme includes aspects of road user charging since users pay for access permits. The implementation of road pricing in Rome has involved the following:

- Solving technical and regulatory obstacles to allow a high performance of the system.
- Ensuring safety of smartcard payments.
- Limiting the visual impact of the automatic gates.
- Defining clearly the roles of local authorities and agencies.
- Regulation of remote control traffic systems at the national level.

Genoa

Within PROGRESS Genoa will demonstrate a cordon pricing scheme aimed to protect the city central area, using video plate detection technology. The proposed demonstration scheme discourages the use of central streets for crossing East-West (and viceversa) and also for accessing inner destinations. Parking facilities will enable people to leave their cars outside the centre. The design has been specified and the location of the six gates confirmed; the supplier has been chosen and the installation of the gates is due to begin in October once the scheme is formally approved by the Town Council.

Milan

Milan is considering the implementation of a pricing scheme for a limited urban area enclosed within the historical centre. However, the plan is still at a very early stage.

3.8.3 Legal / Policy Issues

At the national level, road pricing is currently lacking a specific legislation. However, some laws relating to the protection of urban areas from excessive pollution and congestion exist. For example, there are laws to restrict car parking and regulate access restriction areas. Today, the only act explicitly addressing access limitation/pricing is section 7 of the Vehicle Circulation Code which gives municipalities the power to regulate private vehicles circulation “for checked and motivated preservation and preventive measures”, defined only in very general terms. The Municipalities are directly responsible for urban road pricing policies through the PUT (Urban Traffic Plan) and PUP (Urban Parking Plan) and in compliance with the PGT (National Transport Plan).

3.9 Luxembourg

VAT of 15% is levied on the purchase of new cars, HGVS must pay the Eurovignette fees. No urban road pricing has been introduced or is planned.

3.10 Netherlands

3.10.1 Taxes

For cars:

- 19% VAT.
- Direct taxation on the purchase of cars and on the possession of cars.
- Registration tax on all new passenger cars and motor cycles.
- Annual Circulation tax – depends on weight of car and type of fuel used – lower tax for “greener” cars.
- Indirect tax - excise duty, tax on stock (COVA-levy) and environmental tax.

HGVS in Netherlands pay the Eurovignette.

3.10.2 Current Road Pricing Developments

Procurement of a comprehensive distance-based charging scheme for the Netherlands was initiated prior to elections in spring 2002, but was cancelled following the change in government.

Congestion charging has become a controversial political issue after tollgates installed in the Randstad area received significant opposition and the newly elected government in 2002 put plans for road pricing on hold.

3.10.3 Legal / Policy Issues

In 2000, the National Plan for Traffic (NVVP) was presented but on 24-04-2002 the newly elected Dutch Parliament rejected the NVVP. Now that the NVVP has been rejected, the Structure scheme for Traffic and Transport (SVV2) issued in 1990 will form the basis for planning traffic and transport policy.

3.11 Norway

3.11.1 Taxes

The tax system is progressive with respect to vehicle weight, engine volume and engine power.

3.11.2 Current Road Pricing Developments

Norway has more than half a century long history of financing sections of road infrastructure, especially bridges and tunnels in inter-urban areas, by combining road user tolls and public funds. This tradition was for the first time introduced to urban areas by the launching of the Bergen cordon-pricing scheme in 1986. The other two large Norwegian cities subsequently followed the example set by Bergen, and introduced urban pricing schemes, Oslo in 1990 and Trondheim in 1991.

Several cities in Norway have discussed road pricing, and some have decided on specific local systems: Tromsø implemented a local petrol fee in 1990, and in Kristiansand an “amputated” toll

ring with only two toll stations was started in 1992. This was expanded to a complete ring in 2000, when three more stations were added.

Since 2001 Stavanger, the fourth largest city in Norway, has been part of a regional road-pricing scheme including the neighbouring city Sandnes and surrounding local municipalities. The system includes 21 payment stations, and charges are differentiated by time of day. It is worth noting that this happened after a planning period of 15 years. In the accepted investment package, only 37% of the revenues are to be allocated to road investments.

The contents of the city investment packages and the design of the schemes have changed in line with local political preferences and developments in technology. The sole emphasis on highway investments in the Bergen package widened to include infrastructure investments for public transport, cyclists and pedestrians in the Oslo and Trondheim schemes.

The Stavanger scheme, and new plans for Bergen and Oslo, may indicate a new era of packages in the larger cities, characterised by public transport predominance. However, the idea of transport investment packages, part financed by urban tolls, is seriously contemplated even by smaller cities and towns in Norway. As a curiosity, the next urban toll ring to be implemented (January 2003) is in Namsos, a town with only 12 000 inhabitants.

3.11.3 Legal / Policy Issues

In Norway, all road user charging require approval from local and regional bodies, and sanctioning by the Parliament. The implementation has to be initialised by local political bodies. Revenues from road user charging can be used for investments in the transport sector only. All existing tolling schemes are parts of special local investment plans, and agreements are always limited to a certain number of years.

In June 2001, a new section (7) of the Road Traffic Act was passed by the Parliament. This opened for the introduction of congestion charging (CC), and is a significant change, since demand management can now be the main rationale for implementation or design of road user charging projects.

It is a condition in the new law that tolling is not mixed with CC in the same area. CC is being discussed as an option for the future in the larger cities, but no decisions has yet been reached. The current urban toll systems are due to end in 2003 for Bergen, 2005 for Trondheim and 2007 for Oslo.

3.12 Portugal

3.12.1 Taxes

Tax is based on the following factors:

- Motor vehicles: fuel used, cylinder capacity, voltage (for electrically propelled vehicles), age;
- Motorcycles: cylinder capacity and age.

Exemptions from the road licence include vehicles belonging to the government, local authorities and federations, bodies of public interest and public utilities, the autonomous regions.

Motor vehicle tax is payable by Manufacturers or importers of cars. The tax is levied once and varies according to the vehicle's cylinder capacity. The amount of tax due is reduced by 80 % when the vehicles are adapted to carry disabled persons.

There is no significant development of urban road pricing schemes in Portugal.

3.13 Sweden

3.13.1 Taxes

There are 3 main kinds of road tax - Annual Vehicle tax, VAT on used cars and Tax on the benefit of a vehicle (if access to vehicle is free or benefits include free fuel) There is also a road user fee for heavy vehicles.

3.13.2 Current Road Pricing Developments

The Stockholm toll system opened in September 1996.

In 1997, the national investigation for a new transport policy (KomKom) proposed a distance based road user fee for the larger cities as an alternative to the traditional toll schemes proposed. A draft proposal for legislation to allow for the introduction of road pricing in Sweden has been produced.

The cities require a guarantee on governmental support, before they are willing to commit to any local pricing scheme. However, public officials in the cities of Stockholm and Gothenburg are convinced about the advantages of road pricing, and positive that it will be introduced. The responsible ministries and authorities in Sweden, Finland, Denmark and Norway are working on a global interoperability agreement covering all aspects of road user charging.

A new study of the pricing options has been prepared, and it is clear that there is increased interest in the principle of road user charging in Sweden.

3.13.3 Legal / Policy Issues

As previous legislation has become obsolete due to changes in the approach towards pricing, every implementation (i.e. every site) of road pricing has to be subject to a specific law following a decision in the parliament. In theory, every change of fee has also to be subject to a decision in the parliament.

3.14 Switzerland

3.14.1 Taxes

A large variety of fees, charges and taxes can be found throughout Switzerland

Vehicles up to a total weight of 3.5 tonnes are obliged to buy a motorway-vignette if they use the Swiss motorway network. The distance-dependent Heavy Vehicle Fee (HVF) applies to all vehicles

with a permitted total weight of more than 3.5 tons – income derived from this goes towards large infrastructure projects.

3.14.2 Current Road Pricing Developments

A comprehensive study on road pricing is being carried out. Road pricing is under consideration in;

- **Zurich** - A toll tunnel under the lake as part of the Southern Ring Road and;
- **Bern** - A phased introduction of road pricing, beginning with simple area licensing, and followed by zone pricing has been suggested. Area licensing would be suitable for the inner city – particularly through traffic.

In the long term, the introduction of kilometre-based road pricing should be investigated with charges being orientated towards marginal social costs as far as possible. Institutional and administrative issues need to be settled before any schemes are introduced. Public opposition has caused the abandonment of tolling schemes in Geneva, Bern and Rapperswil.

A proposed change in the financing of public transport infrastructure would mean that road pricing would generate all funds for public transport needs.

3.14.3 Legal / Policy Issues

A Federal Law could be introduced so that the Cantons could develop their own rules and regulations. A law exists which aims to protect against nuisances, especially noise and air pollution which technically could be used to justify a road pricing scheme.

3.15 UK

3.15.1 Taxes

The rate of car tax is based on level of vehicle emissions. Lower emission HGVS also pay lower taxes than more polluting vehicles.

3.15.2 Current Road Pricing Developments

Directs

The UK is now trialling the equipment needed for distance-based pricing in the DIRECTS project in Leeds. This equipment will be used in the Bristol PROGRESS trial. It is anticipated that the UK will use this trial as the basis for a distance-based charge for goods vehicles. Such a scheme would be intended not to deter goods vehicles, but to remove the perceived market distortions resulting from fiscal inconsistencies between the UK and other Member States.

London

After two public consultations, London introduced a congestion charging scheme on 17th February 2003 based upon an area licensing approach. The details of the scheme are:

- The cordon is 21 square kilometres and is based around a series of roads forming an inner ring road on which there will be no charge.

- Upon entry into the zone the charge is £5 (€7) per vehicle per day so more than one trip by the same vehicle is allowed. Period passes can be purchased or up to a year but no discounts are applicable.
- The charging period is from 7am - 6:30pm Monday to Friday and enforcement will be by using cameras placed within the congestion charging zone and not on the cordon as there are 174 entry points. The penalty for non payment is £80 (€120) reduced to £40 (€60) if paid within two weeks, but increasing to £120 (€180) if not paid within four weeks.
- Exemptions to the scheme are emergency vehicles, scheduled bus services and taxis.

The scheme is expected to raise at least £130m (€90m) in annual revenues which legally must be spent on transport improvements for ten years from the start of the scheme. The set up costs of the scheme should have been paid back within 18 months of starting.

The scheme was launched during school half-term to enable it to operate for a first week when there would be a reduced number of vehicles on the road. Initial indications are that the scheme has not encountered any serious administrative problems. A total of 190,000 vehicles entered the charging zone on the first day, 60,000 fewer than on a normal day. Figures indicated that vehicles on some routes travelled 80% faster than the corresponding half-term Monday last year but the reduction in traffic was not matched with an increase in London Underground patronage, possibly due to operating problems on the Central Line which serves Oxford Street. The initial 20-25% reduction achieved during the school half-term holiday was only slightly eroded to around 20% in the following week, demonstrating the scheme's ability to achieve the 15% reduction in traffic which was intended. Initial reports from the bus and taxi sectors suggest that the reduction is yielding considerable operational benefits for travellers. Although the scheme has only recently been introduced, it would initially appear to be a success. A comprehensive appraisal will be undertaken in due course.

Durham Congestion Charging.

The city of Durham was the first UK city to make use of the government's new legislation which allows the introduction of road pricing schemes in town centres. The scheme started on the 1st October 2002 and has reduced the average traffic flow from over 2000 to 200 vehicles a day – a reduction of 90%. The substantial reduction is due to a considerable degree to the small scale of the controlled area which does not serve through traffic.

Durham charges £2 (€3) for access to the marketplace and the road leading to the City centre Peninsula on which there is the World Heritage Site of Durham Castle and Cathedral. This is an area which currently suffers from congestion largely due to shoppers seeking parking. An exit charge is levied using rising bollards activated automatically on payment using cash or permits. The charge sites are unmanned but subject to CCTV observation. Income from the scheme will help finance a new high quality shuttle bus service linking the towns main car parks, bus and railway station with the Peninsula.

West Midlands

The M6TOLL (formerly Birmingham Northern Relief Road) which is being built using private finance will be Britain's first tolled motorway when it opens in 2004. This is a relief road and not an urban road, but will demonstrate the financial models needed to use tolling in the UK to lever private investment.

Charging Development Partnership

Together with 24 interested local authorities, the Government set up a Charging Development Partnership (CDP). Schemes are identified in the following areas¹;

Table 3.1: Schemes Proposed by the UK Charging Development Partnership

Area	Proposed Pricing Scheme
Leeds	An electronic user charging scheme is proposed to pay for major improvements in public transport. Participating in the DIRECTS study.
Bristol	Proposed is an electronic cordon with 14 entry gates only charging vehicles on inbound journeys in the morning peak
Greater Manchester	The ten Greater Manchester authorities are keen to explore what contribution road user charging and the workplace parking levy might make to the Greater Manchester transport strategy
Hampshire	To reduce congestion and pay for improved public transport, Hampshire are investigating all types of potential RUC.

Table 3.2: Other Road Pricing Schemes in the UK

Edinburgh	As participants of PROGRESS, Edinburgh is building support before implementing a cordon based congestion charging scheme. It has recently completed a public consultation based on three options, of which two are cordon based charging schemes.
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3.15.3 Legal / Policy Issues

The 2000 Transport Act, in England and Wales and Northern Ireland gives Local Authorities, outside Greater London, new powers to introduce Road User Charging (RUC) or Workplace Parking Levy (WPPL) schemes where they believe these will be effective in tackling congestion and pollution in their areas. Funds raised from urban road pricing schemes must be retained by the Local Authority for spending on improved local transport. In Scotland the Transport (Scotland) Act 2001 allows local authorities to introduce Road User Charging, but no powers exist for the introduction of Workplace Parking Levies nor for charging on either motorways or trunk roads.

3.16 Current Road Pricing Developments Worldwide

3.16.1 Australia

The Melbourne City Link motorway system:

- Includes free-flow multi-lane electronic tolling (DSRC-based) and the concept of a 'day-pass' for unequipped vehicles.
- 550,000 tags issued and average weekday transactions have grown to about 350,000.
- A DSRC system is used with windscreen placed tags (IVUs) and users are required to set up pre-paid accounts or buy a day pass. EFC deducts the appropriate toll (for the class of vehicle) from central account and the tag gives an audio signal when this occurs and when account levels are running low.

¹ The Charging Development Partnership is continuing to extend its range of activities. This information is based upon the most recent publicly available data.

The Sydney Harbour Bridge system has been installed with the “dual protocol” in place to serve the customers of other roads and other states. Eastern Distributor tollway is also trialling the “dual protocol”. The systems will be interoperable.

Interoperation between the Sydney tollways and also between Sydney, Melbourne and Brisbane tollways is a key outcome.

3.16.2 Canada

Toronto Highway 407

The 407 ETR runs east-west across the north of Toronto - Canada's largest city - from Highway 403 in the west to Highway 48 in the east for a total of 69 kilometres. The system monitors the entry and exit point of all vehicles from the 29 interchanges on the highway. Fully automatic tolling is possible using windscreen transponders that provide audio and visual feedback to drivers that their account is being debited.

3.16.3 Hong Kong

There are 12 road tunnels, including three immersed-tube cross-harbour tunnels for which there are tolls. The Government owns seven road tunnels and the other five are private tunnels.

Tsing Ma Control Area (TMCA)

The *TMCA* covers a key section of the highway route to the Hong Kong International Airport at Chek Lap Kok. It comprises a 17- kilometre expressway network. With the opening of Ting Kau Bridge in May 1998, the whole road network in *TMCA* was fully opened to traffic. It is used by 37,000 vehicles daily. Equipped with the most extensive traffic control and surveillance system ever introduced in Hong Kong, *TMCA* is managed, operated and maintained by the Tsing Ma Management Limited. With a one-way toll collection arrangement, vehicles travelling on Lantau Link will be charged twice the single journey toll when they are heading east leaving the airport. The double tolls range from \$20 to \$80.

A major feasibility study was commissioned in Hong Kong which began in March 1997, with the objective of examining the practicability of implementing an Electronic Road Pricing (ERP) system in Hong Kong and assessing the need for such a system to meet transport objectives. The study evaluated possible ERP systems, their cost effectiveness and consequences, giving due consideration to transport planning, systems technology and public acceptance.

Field trials were conducted at both off-street and on-street test sites for a period of two months in late 1998 under a range of conditions to determine the robustness and reliability of the systems. The results showed that both DSRC and VPS technologies could be adopted for an ERP system in Hong Kong and the privacy of individuals could be protected.

It was estimated that 40% of car trips in the morning peak would be diverted to public transport and 10% would change time of travel. The remaining 50% would stay and pay the road user charges but would benefit from higher travel speeds and less congestion.

3.16.4 New Zealand

The Government has been examining the way in which it prices, funds and manages its transport systems including economic analysis and technical solutions such as ERP. Where the public has become aware of Government's proposals, however, there has been general opposition and a strong unwillingness to pay. Auckland City commissioned research to determine: the public's understanding of the issues, their preferences towards what transport services should be provided, how the services should be paid for, and how they should be managed. The data obtained, demonstrated that public acceptability was indeed a key gap in the process of developing and introducing ERP.

3.16.5 Singapore

Singapore implemented a road user charging scheme known as the Area Licensing Scheme (ALS) in 1975 which required motorists to purchase and display on their windscreen a monthly or daily paper licence in order to enter a Restricted Zone (RZ) covering the central business district. In 1998, the ALS was replaced by an electronic road pricing (ERP) scheme. The ERP scheme was the first fully operational urban electronic road user charging scheme introduced for demand management purposes anywhere in the world. The Singapore system uses Dedicated short-range Communication (DSRC) with double overhead gantries at each charge point, providing genuine free-flow multi-lane operation including full enforcement at each charge point. Every vehicle (including foreign vehicles, almost exclusively from Malaysia, which can have temporary units) is required to be equipped with an In-vehicle Unit (IVU) which uses a smart card for payment.

Road user charging undoubtedly had a major effect in changing behaviour and keeping city centre congestion under control.

3.16.6 USA

Minneapolis and St Paul. - A research study was undertaken into the options for congestion charging in the twin cities of in the mid 1990s. A total of 25 congestion pricing alternatives were identified, thirteen of which underwent further detailed analysis (based on the scenario for the year 2015).

Overall conclusions from the public outreach exercises were:

To increase public acceptance of congestion charging, authorities should:

- Provide transport alternatives to the tolled roadways.
- Improve and promote more flexible work hours.
- Reduce the impacts of pricing on lower income and disadvantaged persons.
- Mitigate potential traffic diversion.
- Address a publicly identified congestion problem, and clearly stipulating how revenues collected from user fees will be used to alleviate that problem.
- Apply congestion charging region-wide rather than have spot, facility or corridor pricing.
- Apply Congestion pricing on congested facilities during congested periods, not during uncongested periods.

San Diego, California - 13km reversible HOV on the I-15 highway, open to a limited number of solo paying drivers. Vehicles with 2 or more passengers travel for free. Charges vary with the levels of congestion and an express bus service has been introduced supported with revenues generated.

Houston, Texas - A 21km stretch of I-10 Katy Freeway equipped with a single lane reversible HOV lane (for vehicles with 3 or more people) began permitting vehicles with only two occupants to purchase entrance at \$2 per trip. The facility uses fully automated windshield-mounted transponders.

Lee County, Florida - Variable pricing on two toll bridges. Tolls either side of peak periods were reduced to encourage journey time shifts. Electronic toll collection facilities have been installed. It has a discount price in the peak shoulder hours, creating an incentive to shift peak traffic.

Orange County, California - The SR-91 "Express Lanes" (or HOT Lanes) represents a private sector congestion pricing program. The lanes have variable pricing and automated tolling. Tolls range from \$0.60 to \$3.20 depending on the time of day and levels of congestion. Vehicles carrying 3 persons or more receive a 50% discount. Tolls are automatically deducted from customers' pre-paid accounts.

Portland (Oregon) - Metro conducted a peak period pricing study. It was a regional study looking at all types of pricing, including single spot locations, partial facilities, whole facilities on existing roads, corridor pricing, area pricing and parking pricing. The study contained included an extensive public outreach process.

Media coverage was not negative –and there was some public support. In June 1999, the task force recommended peak pricing as an appropriate tool to be considered on every major new highway project, but not on existing lanes and a regional a pilot within two years.

California State Route 91 HOT Lane and I-15 Variable Pricing - The State Route 91 high occupancy tolling lane (HOT) was opened in December 1995 and is America's first toll road to employ variable congestion pricing. It is a privately financed, fully automated 10-mile (15 km) group of four toll lanes, located on the median of an existing eight-lane highway in Orange County, California.

Tolls vary during the day according to traffic volumes, direction and other factors so as to maintain free-flow conditions at all times. Currently, tolls follow a published schedule although the technology could permit tolls to vary dynamically. Cars with one or two people pay a toll while vehicles with three or more occupants travel free. The toll lane uses Electronic Fee Collection (EFC) and Dedicated Short-Range Communication (DSRC) Initial indications are that the SR91 Toll lanes have successfully created a market of commuters willing to pay premium tolls in order to bypass recurrent congestion on an urban freeway. Toll lane traffic is currently at 26,000 vehicles per day. Surveys show that 65-70% of the travellers approved the idea of adding new tolled capacity to bypass congestion

Houston, TX - The Katy HOV lane. Has proved to be overly popular with 2+ requirements, but under-utilised after it changed to 3+ occupancy during peak hours, and per person throughput dropped somewhat. QuickRide allowed a 2+ buy-in scenario and has been in operation for 2 ½ years now. It has experienced a 25% increase per year and has 500 active accounts. Users pay \$2 each way during peak hours. An AVI system uses antenna to read transponders and debit the

associated account. Users with 3+ occupancy have a pocket pouch for the transponders, but this creates a problem with enforcement.

CDOT, Denver, Colorado - The Boulder Congestion Pricing Study. Value pricing proved to be quite difficult in Boulder. The public and politicians were opposed to pricing. The Denver study focuses exclusively on HOT lanes. The study, under discussion since 1996-97, started last summer and will be completed this winter. Focus groups were initially sceptical but quickly switched, with 90% supporting the idea.

Current Legal Situation Regarding Urban Road Pricing

The legislation regarding urban road pricing (which in the USA is called “Value Pricing” is contained in the TEA-21 (Transportation Equity Act for the 21st Century). The objective of this program, formerly the Congestion Pricing Pilot program, is to encourage implementation and evaluation of value pricing pilot projects in order to promote economic efficiency in the use of highways and support congestion reduction, air quality, energy conservation, and transit productivity goals. [1216(a)]

The interstate system is ageing, is congested, and at capacity at many locations. Americans are moving further from the nation's metropolitan centres, which is lengthening traffic jams. The cost of delay per year is estimated to be \$1 trillion and the user costs of the system is estimated to be \$1 trillion.

4. OVERVIEW AND CONCLUSIONS

4.1 Summary

Recent developments in London and Durham in the United Kingdom have demonstrated that road user charges can be implemented in Europe, and that they can achieve policy goals without causing public outcry. In London it was particularly noticeable that a major media campaign against the congestion charge disappeared almost immediately the scheme was implemented and became another facet of urban life.

The importance of transport pricing as a mechanism is now, therefore, not only recognised across much of Europe but proven as a valid solution. The London and Durham schemes, however, are very simple in their application of a fixed charge for access to a defined area, the complexity of the London operation being largely a product of the physical scale of the scheme rather than the technical approach adopted.

The cities in the PROGRESS project, together with a number of others, are leading the way in establishing and demonstrating the means to introduce transport pricing through more innovative and responsive mechanisms, potentially providing a roadmap to the introduction of distance-based or variable-charge schemes which will offer more efficient tools to control traffic growth.

The motivations for these demonstrations are various. In some cases they may be intended to improve the environment, whilst in others the intention is to relieve vehicular congestion. A further motivation is to raise revenues to fund future transport investment.

Current EC Policy, as set out in the White Paper "European Transport Policy for 2010: time to decide" is intended to promote the fundamental principle of infrastructure charging that "the charge for using infrastructure must cover not only infrastructure costs, but also external costs, ie costs connected with accidents, air pollution, noise and congestion". The emphasis of EC Policy, however, is focussed on inter-urban traffic, and heavy goods vehicles, with urban pricing regarded as an issue for subsidiarity. A consultation document which may lead to a Framework Directive on is awaited in 2003, but early indications suggest that this may not address issues of urban road pricing.

In general, the motivation of the PROGRESS cities, and many EC member state national and local governments is not related directly to the EC recommendations on fair payment for infrastructure use, but indirectly, the various demonstrations represent the key to achieving these wider goals.

CUPID and PROGRESS will engage with the IMPRINT-EUROPE network on Implementing Pricing Reform in Transport – Effective Use of Research on Pricing in Europe² in order to seek to overcome the barriers between the work of economics researchers, and the real-life expertise of the cities.

² www.imprint-eu.org

5. FUTURE WORK

This Deliverable will be re-issued annually as PROGRESS proceeds. It will be updated and added to in order to provide an ongoing record of the development of transport pricing policy in Europe.

As such, it is not intended to be a definitive and permanent record of the subject, but an update of an evolving document. In particular, the Member State Reports will be extended to encompass additional states and to document additional information as it becomes available.

The components of the Deliverable will also be made available on the CUPID WWW³ in order to provide a useful resource to transport planners and others.

³ www.transport-pricing.net