



# **TIDE**

Transport  
Innovation  
Deployment  
for Europe



## ***GUIDELINES FOR IMPLEMENTERS***

### **Urban road user charges**

TIDE is a Coordination Action funded by the European Commission's DG Research and Innovation under the 7th Framework Programme for Research and Development.



## What is it about?

### Characteristics

Road user charging refers to direct charges levied for the use of urban roads. Depending on the main goals, charges can be designed in different ways. In general there are four different spatial designs:

- Point based charges: charges for using a specific road or other infrastructure.
- Distance-based charges: the vehicle is charged for the distance driven.
- Cordon tolls: these are boundary-based fees, usually surrounding a city centre. The charge is levied for crossing a cordon.
- Area licence-based pricing: a charge is levied for driving within an area during a period of time.

Congestion charges are best suited for cities with congestion problems, but can be used also to mitigate other problems related to high car volumes locally.

### Key benefits

- Road user charging can be used to generate revenue and/or to manage transport demand.
- By differentiating road charging by time, place, and vehicle type, some of the negative externalities of traffic (e.g. pollution) can be transferred to the user who causes them ('internalisation').
- Road user charging is often effective, and once introduced the levels of pricing can be modified to a level that corresponds to the efficient use of the road network.



Passing a cordon into the Stockholm congestion charging area

*Photo source: Holger Ellgaard*

### Congestion charges in Stockholm, Sweden

In Stockholm a cordon-based congestion charging system was introduced in 2007.

Before the permanent introduction, a trial period was carried out in 2006 (January to July). The main goals of the congestion charge were to reduce congestion, increase accessibility and improve environmental aspects.

The congestion charging trial was accompanied by an expansion of public transport and an increased number of parking facilities outside the Stockholm city center.

The trial period showed a decrease in traffic volume of 20–25 % in the charged area.

## Check list

City size	No restrictions
Costs	<ul style="list-style-type: none"> <li>• The capital costs of design, planning and implementation are high compared to other traffic and mobility management strategies.</li> <li>• Once in place, the running costs are similar to other traffic control systems and covered by revenue.</li> </ul>
Implementation time	It may be necessary to modify the law, and sometimes even the constitution, which may take significant time.
Stakeholders involved	<ul style="list-style-type: none"> <li>• Transport operators and authorities.</li> <li>• Public transport associations.</li> <li>• Local authorities and local political officials.</li> <li>• Local user groups.</li> <li>• Motorists, professional drivers (truck and taxi drivers).</li> <li>• Residents of areas that may be significantly impacted.</li> <li>• Retail sector, shop owners.</li> </ul>
Undesirable secondary effects	<ul style="list-style-type: none"> <li>• Unwanted distributional effects.</li> <li>• Privacy issues.</li> <li>• Uncertainty about revenue use.</li> </ul>

*“There are three dimensions that are necessary to consider for a successful congestion charging implementation. First, the charging structure needs to be well designed, in order to achieve large social benefits. Second, investment and operational costs must be kept low. Third, one must get public acceptance for the system.”*

**Jonas Eliasson,**  
**Professor Transport Systems Analysis,**  
**KTH Royal Institute of Technology,**  
**Stockholm, Sweden**

*“Milano road pricing scheme Area C is demonstrating that this kind of measure could strongly contribute to managing urban mobility, reducing irrational traffic and reducing correlated costs. Milano is very keen to share and to transfer this experience to other cities.”*

**Maria Berrini,**  
**CEO of AMAT — Milano Agency Mobility**  
**Environment Territory,**  
**Milan, Italy**



Photo: WSP Sweden

## Benefits & Costs

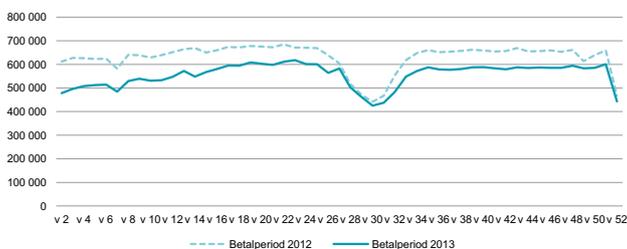
### Benefits and costs of the congestion charges in Gothenburg, Sweden

The Gothenburg congestion charging scheme was introduced on the first of January 2013. The main purpose of the Gothenburg scheme is to generate revenue for infrastructure.

The cost for implementation was around 80 million Euro. The running costs are around 25 million Euro per year initially, but are expected to decrease over time.

The system is expected to generate approx. 3 billion Euro over the next 25 years.

Even though the main purpose is generating revenue, the system also brings benefits by reducing traffic volumes, and thus problems caused by traffic are reduced. So far, the traffic volumes have decreased by around 10–20% in 2013 compared to 2012.



Traffic passing the cordons in Gothenburg before (2012) and after (2013) the implementation of congestion charges.

Source: City of Gothenburg

### Costs

The capital costs of designing, planning and implementing congestion charges are high compared to other traffic and mobility management strategies.

Once in place, operating the system often requires at least 10% of the generated revenues. On the other hand, operational costs are comparable to those of other traffic control systems and can be covered by the revenue created by the system.

#### Principal cost factors are:

- technical equipment: there are different kinds of technical solutions — some are more costly than others. However, no matter what solution is chosen, the initial cost will be high;
- back-office organisation;
- marketing and customer support: crucial to making users aware of the road user charges and how to pay.

### Benefits

Urban road user charging is often effective in the sense that it reduces traffic which in turn can give better accessibility and lower levels of air pollution.

By differentiating road charging levels by time, place, and vehicle type, the negative externalities of traffic can be transferred to the user who causes them ('internalisation'), and thereby be reduced in total.

Even after introduction, the prices can be adjusted to a level that corresponds to an efficient use of the road network.

The existing congestion charging schemes show a significant reduction of traffic volumes during peak hours. Studies show a decrease in congestion delay of about 30% (reference London and Stockholm).

Urban road user charges can be used as one part of a broader policy strategy towards sustainable urban mobility. The measure can then be combined with improved public transport in order to increase the attractiveness of alternative modes of transport and decrease car dependency.

## Users & Stakeholders

### Users and target groups

There are many user groups affected by the introduction of urban road user charges: both directly (car drivers) and indirectly (increased pressure on e.g. public transport when former car drivers adjust to the new situation).

Congestion charges can be an unpopular measure for large user groups since it means paying more for travelling by car. However, experience shows that once introduced, public opinion can change significantly from negative to positive. This is mainly due to the fact that reduced traffic also leads to less congestion delays for the people who continue to drive. Also, accessibility for public transport and goods transport increases as well as travel time reliability.

#### Important user groups are:

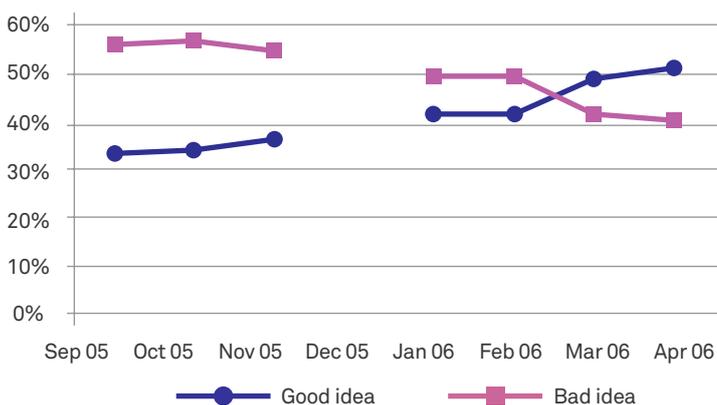
- car drivers;
- commercial traffic (taxi, goods transport etc.);
- users of public transport.

### Key stakeholders for implementation

When introducing road user charging, it is important to involve as many stakeholders as possible. This gives valuable input when designing the system and can also help to increase the acceptability of the scheme once introduced.

#### Important stakeholder groups are:

- user groups : car drivers, commercial traffic, etc.;
- different actors within the local administration/municipality/ government;
- shopkeepers in the city;
- larger companies in the city/region;
- inhabitants.



Share of inhabitants in Stockholm city that considered the trial to be a good/bad idea before and after the introduction of the trial period in January 2006.

### Change of public opinion in Stockholm, Sweden

Before the permanent introduction of the Stockholm congestion charges, a trial period was carried out between January and June 2006.

In the autumn of 2005, a majority of the people in Stockholm were against the introduction. However, public opinion changed significantly during the trial period. By the end of the trial, around 50% of inhabitants in the region were in favour of the scheme, and a majority of the City's inhabitants voted in favour of the scheme in a referendum in September 2006.

The majority support for the congestion charges in Stockholm has remained, and today around 70% have a positive view of the scheme.

## Assessing the potential for your city

### Is this something for us?

Congestion charges are best suited for cities with congestion problems but can be used also to mitigate other problems related to high car volumes locally. Successful implementation is more likely where there is an environmental awareness and supporting policies in place, e.g. policies that support public transport and other sustainable modes, and traffic management. It is important that the city can take on the up-front investment cost and is willing to engage in a public debate. The measure could be implemented in any city but has to be adapted to local conditions.

Barriers to public acceptance can be expectations concerning privacy, equity and a perceived requirement to improve public transport systems prior to introduction. However, experience shows that many of these issues can be overcome and do not need to be as problematic as politicians and members of the public might initially fear.

### Pre-assessing the costs and benefits

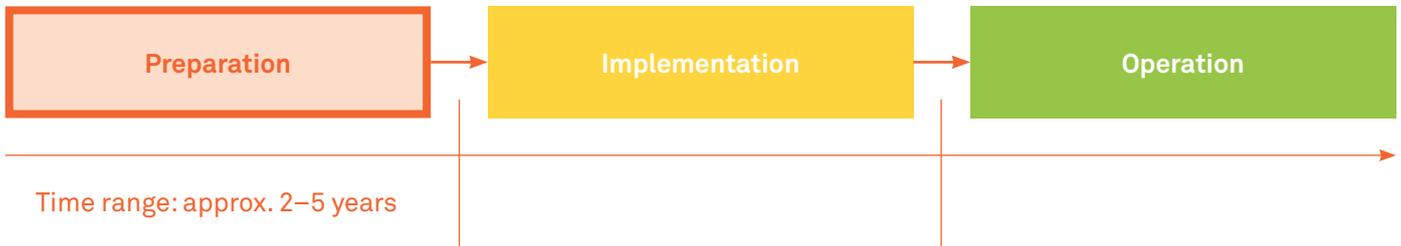
As mentioned earlier, the cost for implementing congestion charges are relatively large, but the benefits are significant. A comparison of four schemes across Europe shows that even though the following cities differ, some similar results can be observed in London, Stockholm, Milan and Rome:

- the level of congestion delay decreased by about 30% (reference London and Stockholm);
- CO<sub>2</sub> emissions within the charging zone decreased by between 10% and 20%;
- local air pollutants (NO<sub>x</sub> and PM<sub>10</sub>) decreased by 8% to 18%;
- the number of accidents decreased by 14% (reference only Milan).



# From plan to reality

## Preparation



In the preparation phase it is important to invest in activities that help to create the right pre-conditions and involve the necessary stakeholders for putting the measure successfully into practice.

This ranges from the analysis of given context conditions, building up stakeholder networks, integrating of the measure into existing structures, creating necessary infrastructures that the measure relies on, etc.

### Key aspects at this stage

The first step is to set the agenda: bring the question to the table by discussions at the local/regional (and in some cases national) level. The goals of the system need to be decided upon.

The next step is often to perform feasibility studies. These studies should clarify the city's context, conditions, and needs and provide helpful input for the design of the system. The design is a very complex process and would normally have to be carried out by using transport models and involving experts in the field.

Another key aspect in the implementation phase is to decide how to allocate the revenues of the system. Should the revenues be used for infrastructure or for something else? Achieving consensus is a key element of success.

It is important to map the legal framework as early as possible in the process in order to have a clear view of how a road charging system can fit into this context. Changes to the legal framework might be necessary and can take a considerable amount of time.

### Stakeholder involvement

- Regional and national decision makers: information about the plans, debates and discussions.
- Non-governmental organizations: involve these early for input and discussions. NGOs can be important for keeping the discussion alive.
- Legal administration: important to map the legal framework as early as possible.

### Success factors and barriers at this stage

One success factor is to achieve consensus within the city administration and the decision makers about the goals of the system. The design of the system can vary significantly depending of the main target; to increase accessibility, reduce pollutants or to generate revenues. The system can of course address several problems at once, but the goals should be clearly stated. Another issue to decide upon is how to allocate the revenues of the system, for example by financing road and/or public transport or by reducing taxes.

As soon as the issue of congestion charges is brought to the table, there will most likely be groups supporting the scheme but also groups opposing it. Preparation by having background material, expert support, analysis of the expected costs, benefits, revenues, etc.. of the system can help to convey accurate information about congestion charging and overcome some potential initial criticism.

Ready for implementation?	✓
Bring the question to the table	
Decide on the objectives	
Perform feasibility studies	
Check the legal framework	
Involve regional/national decision makers	
Involve NGO:s and other stakeholder groups	
Engage in public debate	

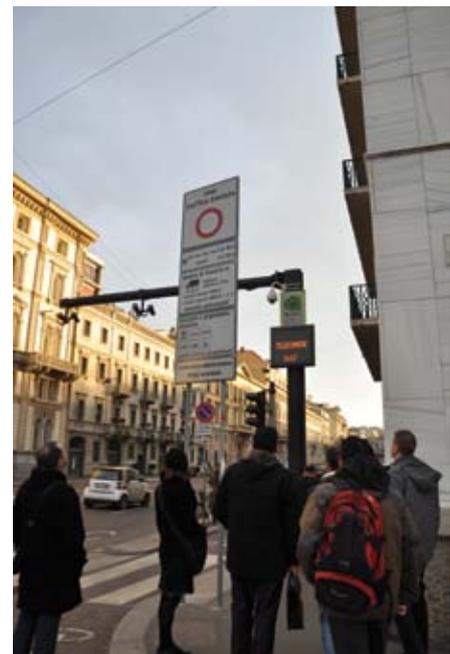


Photo: WSP Sweden

# From plan to reality

## Implementation



Important activities in the implementation phase include acquisition of equipment, establishment of necessary infrastructure, assignment of responsibilities, signing necessary contracts and agreements and launching a marketing campaign.



A toll station in Oslo, Norway  
Photo: Kjetil Ree

In order to allow for monitoring and evaluation of the effects of the system later, it would be wise to carry out baseline studies in this phase. These studies can include information about how people travel today, the share of different modes, levels of pollution in the city, etc..

### Key aspects at this stage

One key aspect is to assign roles and responsibilities. A clear division of tasks is necessary for the implementation to run as smoothly as possible. A back-office needs to be established for handling the financial transactions and other issues arising along the way.

Another key aspect is tendering for roadside equipment. This can be a difficult process as there are many aspects to consider. Costs can differ significantly depending on the requirements the city has on which type of technology to use, the reliability of the system, running costs, etc..

Before the scheme is introduced, adjustments to existing infrastructure might be needed. This could be both related to the choice of roadside equipment, and to the infrastructure for parking and public transport to prepare for the changes in travel patterns that might occur after the introduction.

### Success factors and barriers at this stage:

One main barrier at this point is the issue of acceptability. In the implementation phase, the general public becomes more aware of the scheme and the public debate might become intense. Information campaigns focusing on the benefits of the system as well as engaging in the public debate can improve the relationship with the public.

Fear of adverse impacts on retail is a common concern. There have been several attempts to track such effects, but the results show that the effects are small or non-existent. There may be effects on particular stores, especially if they lie close a cordon, but the average effect in an urban centre is usually small. Timely information campaigns can help disseminate the most accurate information so that the stakeholders are not misinformed about congestion pricing.

### Stakeholder involvement

In the implementation process, the same stakeholders as present in the preparation phase need to be involved again. In addition, there are other stakeholders that become more important in this stage. These could include:

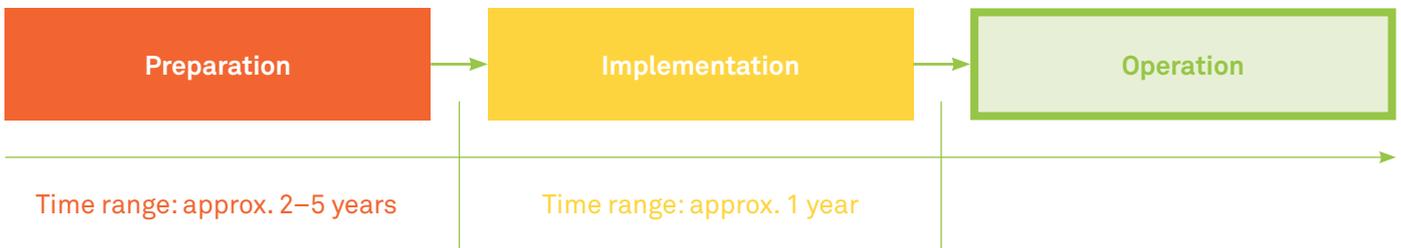
- user groups: information campaigns, public debates, etc.;
- non-governmental organizations: these can be used as a channel for information and can also help to increase acceptability of the scheme;
- car registry: discussions connected to license plate recognition;
- banks: which payment channels are possible within the scheme.



An illustration of the camera system in Stockholm.  
Source: Swedish Transport Administration

# From plan to reality

## Operation



In the operations' phase, the measure is fully implemented. In the beginning of this phase, several problems (both expected and unexpected) can arise and the administration costs can be large in the beginning.

In the longer term these obstacles will be overcome and the system will run more smoothly as all involved actors become more used to the system. Modifications of the system and adjustments of the charges might be necessary.

### Key aspects at this stage

Information is one of the most important aspects when the measure is moving into operational phase. The users must be aware of how the system works, how and when to pay, etc. Inhabitants of the city where the system is installed can be addressed directly, but information also needs to be disseminated to surrounding areas. Information signs when entering the city might also be necessary in order to inform drivers who are from other cities/countries.

Monitoring is another key aspect. In order to measure the effects and compare with the situation before the measure was implemented, detailed information gathering is necessary. Also, this information can be used to identify potential for further improvements and can give valuable input to future modifications of the system.

### Success factors and barriers at this stage

As in the implementation phase, addressing public opinion is central. Experience (from Stockholm) has shown that the public tends to become more positive on average towards congestion charges once they are introduced. However, the debate is likely to continue for quite a long time.

Finally, unexpected negative side effects could arise as a result of the scheme — for example increased traffic and associated problems in some areas due to rerouting traffic. To address these problems and try to find a solution can be important for the acceptability and, in the end, to the measure being viable and maintained in place.



Sign indicating entrance into the congestion charging zone in London

Photo: Mario Roberto Durán Ortiz

## Further information & contacts

### Further information

- **Information about the London congestion charges:**  
[www.tfl.gov.uk/roadusers/congestioncharging/](http://www.tfl.gov.uk/roadusers/congestioncharging/)
- **Information about the Stockholm and Gothenburg congestion charges:**  
[www.transportstyrelsen.se/en/road/Congestion-tax/](http://www.transportstyrelsen.se/en/road/Congestion-tax/)
- **Information about the Area C in Milan:**  
[www.comune.milano.it/portale/wps/portal/CDM?WCM\\_GLOBAL\\_CONTEXT=/wps/wcm/connect/contentlibrary/elenco+siti+tematici/elenco+siti+tematici/Area+C/English/](http://www.comune.milano.it/portale/wps/portal/CDM?WCM_GLOBAL_CONTEXT=/wps/wcm/connect/contentlibrary/elenco+siti+tematici/elenco+siti+tematici/Area+C/English/)
- **Jonas Eliasson, So you're considering introducing congestion charging? Here's what you need to know, discussion paper**, KTH Royal Institute of Technology, Stockholm

### Further TIDE training on this measure:

Webinars and e-learning courses

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Photo on title page: WSP Sweden

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## About TIDE — Transport Innovation Deployment for Europe

The European TIDE project aims to foster a more favourable climate for cities and regions to integrate innovations in their urban mobility policies. This should lead to increased acceptance and take-up of new urban transport solutions and technologies. TIDE will help cities and regions to address common challenges in a collaborative and integrated way.

### Why should you care about innovation?

On several occasions, European cities have indicated that innovation can help to tackle challenges resulting from the economic crisis. Innovation can save costs as well as contribute to reaching urban policy goals. Still, cities lack resources to conclude a full innovation cycle.

Innovative ideas usually start in one or just a few places before they reach wider coverage. TIDE will help cities and regions across Europe to shorten the path towards the implementation of innovative measures by showing that it is not necessary to re-invent the wheel and much more effective to exchange on innovation and transfer successful solutions from one European region to another. TIDE thus offers a cost-efficient way of spreading innovation throughout Europe

### Our mission — Guided by your needs!

TIDE will enhance the broad take-up of 15 innovative urban transport and mobility measures throughout Europe and will make a visible contribution to establishing them as mainstream measures. The TIDE partnership is making a range of new and feasible solutions more easily accessible, to address key challenges of urban transport such as energy efficiency, decarbonisation, demographic change, safety, access for all, and new economic and financial conditions.

TIDE focuses on fostering awareness, advancing expertise via tried and new tools, practical work with cities, and costs and benefits. The needs of practitioners in European cities are thereby a guiding principle. TIDE is actively supporting 15 committed cities to develop implementation scenarios for innovative urban transport measures, setting the example to an even wider group of take-up candidates. These measures cover the following five TIDE themes: new pricing measures, non-motorised transport, advanced network and traffic management to support traveller information, electric mobility, and public transport organisation.

## The TIDE innovative transport measures

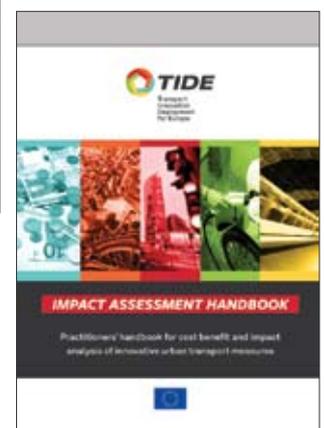
TIDE covers fifteen innovative measures across the five TIDE–themes.

<b>New pricing measures</b>	<ul style="list-style-type: none"> <li>• Road user charging in urban areas</li> <li>• Parking charge policies</li> <li>• Efficient and convenient pricing and charging for multimodal trips</li> </ul>
<b>Non–motorised transport</b>	<ul style="list-style-type: none"> <li>• Bicycle parking schemes</li> <li>• Creating people–friendly streets and public spaces</li> <li>• Fast cycling lanes</li> </ul>
<b>Advanced network and traffic management to support traveller information</b>	<ul style="list-style-type: none"> <li>• Open data server for applications–based traveller information</li> <li>• User–friendly human machine interface for traveller information</li> <li>• Advanced priority systems for public transport</li> </ul>
<b>Electric mobility</b>	<ul style="list-style-type: none"> <li>• Clean city logistics</li> <li>• Financing schemes for charging stations</li> <li>• Inductive charging for public transport</li> </ul>
<b>Public transport organisation</b>	<ul style="list-style-type: none"> <li>• Creation of public transport management bodies for metropolitan areas</li> <li>• Contracting of services focused on improving passenger satisfaction and efficiency</li> <li>• Marketing research as optimisation tool in public transport</li> </ul>

The **TIDE Innovation Toolbox** brochure highlights these fifteen inspiring transport measures and illustrates them with good practice examples, listing characteristics and benefits, key aspects for implementation, and useful references.

The **TIDE Practitioner Handbooks** on Transferability and Impact Assessment provide methods and examples to help understand the local potential for innovative measures in urban transport.

The **Guidelines for Implementers** are ten individual implementation guideline brochures addressing the full implementation process of ten of the fifteen TIDE innovative measures, as well as their costs and benefits, stakeholders to be involved, etc., illustrated with good practice examples.





## The mission of the TIDE project

is to enhance the broad transfer and take-up of 15 innovative urban transport and mobility measures throughout Europe and to make a visible contribution to establish them as mainstream measures.

TIDE focuses on 15 innovative measures in five thematic clusters: financing models and pricing measures, non-motorised transport, network and traffic management to support traveller information, electric vehicles and public transport organisation. Sustainable Urban Mobility Plans are a horizontal topic to integrate the cluster activities.

## The TIDE team

The TIDE consortium is composed of a variety of experts in the field of urban transport, bringing in the knowledge of the academic sector, the experience of cities, the expertise of consultants and the multiplier effect of European networks.



For more information on TIDE, contact the project coordinator at Polis:

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