MINISTRY OF TRANSPORT
AND COMMUNICATIONS FINLAND

Helsinki Region Congestion Charging Study

Summary

SUMMARY

The Helsinki Region Congestion Charging Study has examined and evaluated the range of different impacts expected if congestion charging were to be introduced in the region

The Ministry of Transport and Communications has conducted a study to examine the social, economic, environmental, safety and other impacts expected if congestion charging were to be introduced in the Helsinki region. The study, undertaken between spring 2008 and summer 2009, involved extensive cooperation with the different parties concerned in the region. Forming the backdrop to the study are the goals set out in the Government Programme and in the Government Transport Policy Report, and the expectations of society at large regarding the transport system in the region.

The study considered whether congestion charging could help achieve the transport policy objectives (e.g. improved traffic flow, enhanced competitiveness of public transport, reduced greenhouse gas emissions and improvements in road safety) and be beneficial to society at large, and whether it could do this in a cost-effective manner. In addition, the study looked at whether the objectives set for the region could be achieved in a better and more cost-effective manner using other means than congestion charging.

The study produced an abundant and diverse array of information on the use of congestion charging as a transport policy tool. This information provides the basis for debate and decision-making on whether to go ahead with preparations for congestion charging in the Helsinki region.

Congestion will increase on the ring roads and especially on Helsinki's inbound routes despite implementation of development measures already planned

Congestion in the Helsinki region has so far been relatively minor by international standards, and has occurred principally within the Helsinki metropolitan area. Regular and occasional congestion currently occurs on the ring roads and the radial inbound routes. Congestion has long been a phenomenon within the inner city area, but there has been no marked deterioration in this during recent decades, which is attributable to factors such as effective parking policy, the good level of service from public transport, and improvements in the radial rail traffic system (including the metro).

If traffic growth over the next ten years is in line with forecasts, the number of congested routes will increase, even with the full implementation of all the transport system development measures already decided for the region. The amount of time spent in traffic will increase in comparison with the current situation. Travel times will also become less predictable in the future. Worsening congestion will have an adverse impact on the region's development and on its attractiveness, and will present problems for the region's inhabitants and businesses. The current economic downturn may, however, reduce the rate of increase in traffic and congestion to a certain extent.

Congestion charging influences choices made by drivers

The purpose of congestion charging is not to restrict travel but to improve the flow of traffic by reducing sufficiently the number of vehicles on congested stretches of road. By imposing a charge on vehicles travelling at certain times of day and in a certain locations, the aim is to influence the choices made by drivers. Drivers would thus

reconsider their travel decisions, some then altering their travel behaviour by deciding not to make certain trips, combining trips, transferring to public transport, walking or cycling, or changing the timing or location of their trip.

Impacts of congestion charging evaluated using three different models

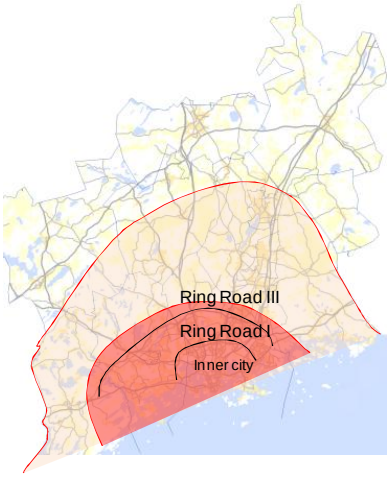
The aim was to study, describe and evaluate the typical impacts of congestion charging. The aim was not to select or propose any particular congestion charging system for use in the Helsinki region. The impacts were illustrated using three different congestion charging models: the single-cordon model, the multiple-cordon model and the zone model. The size of area covered by each model differs, as does the charging basis, the level of charges and the technology employed.

SINGLE-CORDON MODEL

- Gantries at crossing points
- Crossing the cordon in either direction incurs a charge
- Microwave technology and fixed surveillance cameras
- Charge EUR 2/crossing at peak periods, EUR 1/crossing outside peak periods
- No charge in evening, at night or weekends

MULTIPLE-CORDON MODEL

- Gantries at crossing points
- Crossing the charging cordons in either direction incurs a charge
- Microwave technology and fixed surveillance cameras
- Charge EUR 1/crossing at peak periods, EUR 0.5/crossing outside peak periods
- No charge in evening, at night or weekends



ZONE MODEL

- Every kilometre travelled within the zone incurs a charge
- Satellite positioning, long-range data transfer, fixed and mobile camera surveillance
- Inner zone charge EUR 0.10/km at peak periods, EUR 0.05/km outside peak periods
- Outer zone charge EUR 0.05/km at peak periods, no charge outside peak periods
- No charge in evening, at night or weekends

Extensive evaluation of the impacts of congestion charging

The study examined a range of different impacts associated with congestion charging and evaluated them extensively. These include impacts on:

- the functioning of the transport system
- the environment
- road safety
- the business operating environment and financial position of businesses
- land use and urban structure
- the mobility of different groups of transport system users
- people's everyday lives
- transport funding
- socio-economic costs and public sector finances.

Evaluation of the impacts of congestion charging was based on the year 2017, and the changes brought about by congestion charging are compared against the situation without congestion charging.

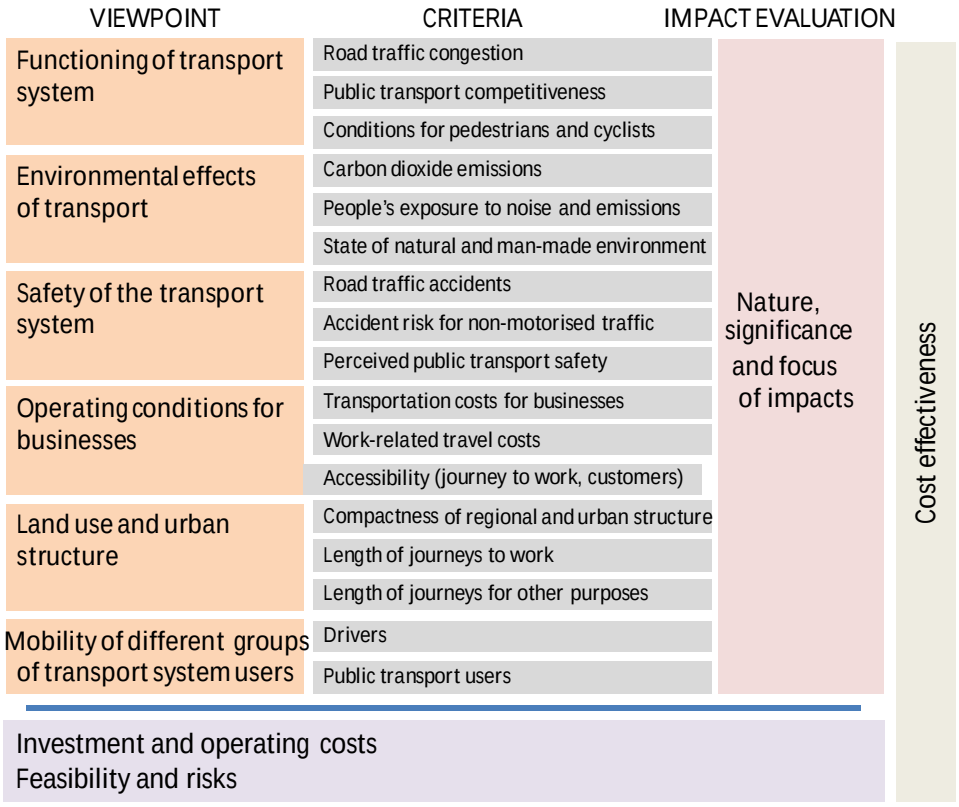


Figure 1. Impact evaluation framework.

Congestion charging would be an effective tool for reducing congestion

The study results show that congestion charging would reduce private car usage in the Helsinki region during peak periods. This would reduce the extent and seriousness of congestion. The congestion charging schemes studied would reduce peak-period traffic volumes on the principle routes in the Helsinki metropolitan area by an

estimated total of about 10-30%. Traffic volumes in the central area of Helsinki would also be reduced significantly.

The reduction in congestion would cut travel times and also make travel times more predictable. Calculations show that delays caused by congestion would be reduced. The congestion charges and time savings would primarily apply to the same area, i.e. those who pay would generally also be those who benefit.

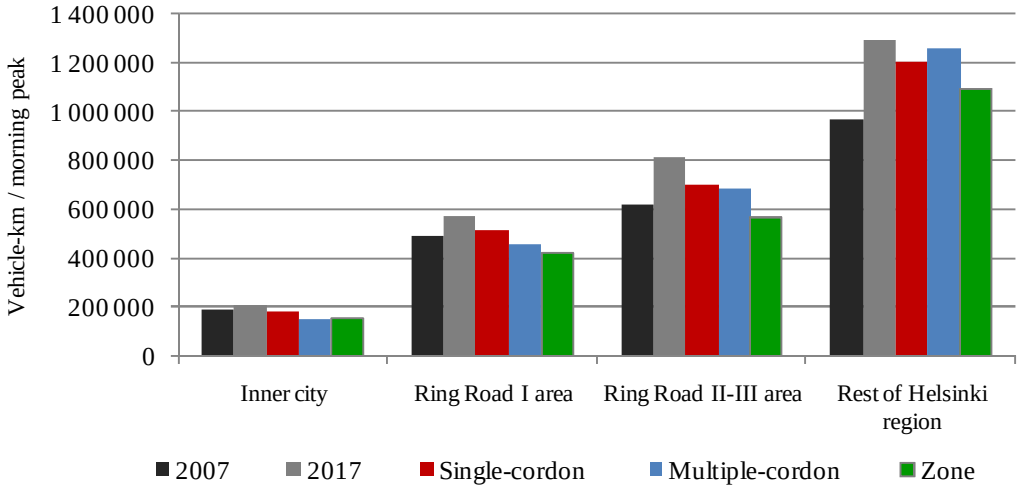


Figure 2. Vehicle-kilometres in morning peak in different areas, 2007 and 2017.

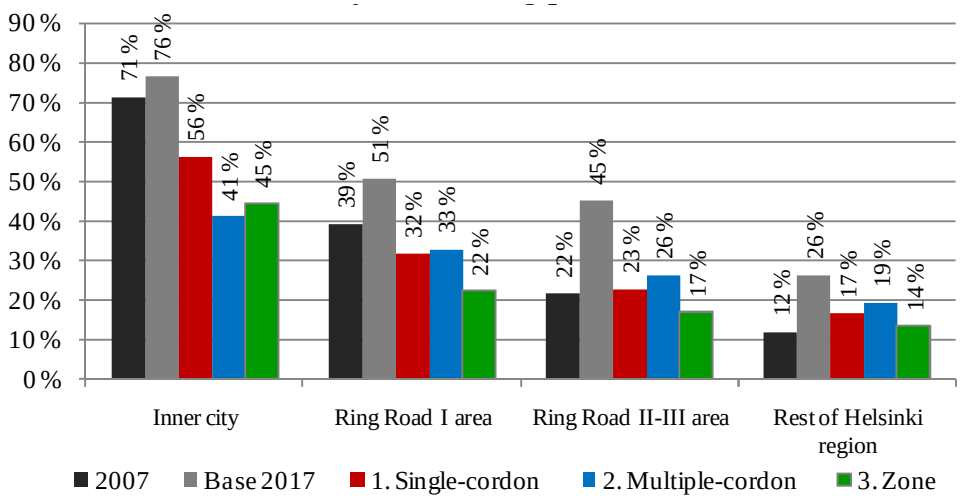


Figure 3. Delays in morning peak in different areas, 2007 and 2017.

Congestion charging would increase the use of public transport

Congestion charging would lead to some drivers transferring to public transport. The number of passengers using public transport at peak periods would be about 5-12% greater than without congestion charging. The biggest increases would be in metro and commuter train traffic. Public transport would be a more popular travel option, its capacity utilisation would increase and it would be more competitive. The modal share of public transport among all motorised trips would grow by 3-7 percentage points. A modal shift of this magnitude would be extremely significant.

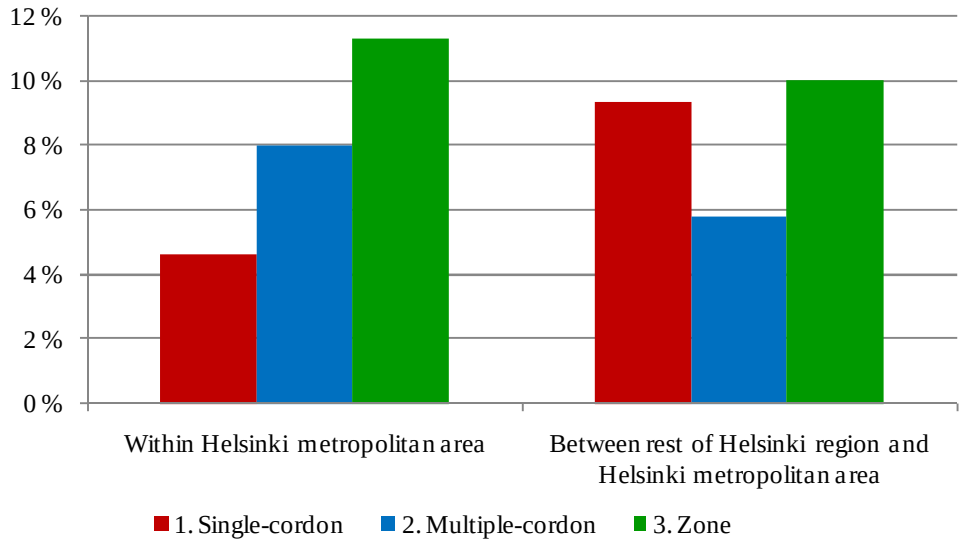


Figure 4. Impact of each congestion charging model on the number of public transport trips (all day), 2017 (i.e. compared with no congestion charging).

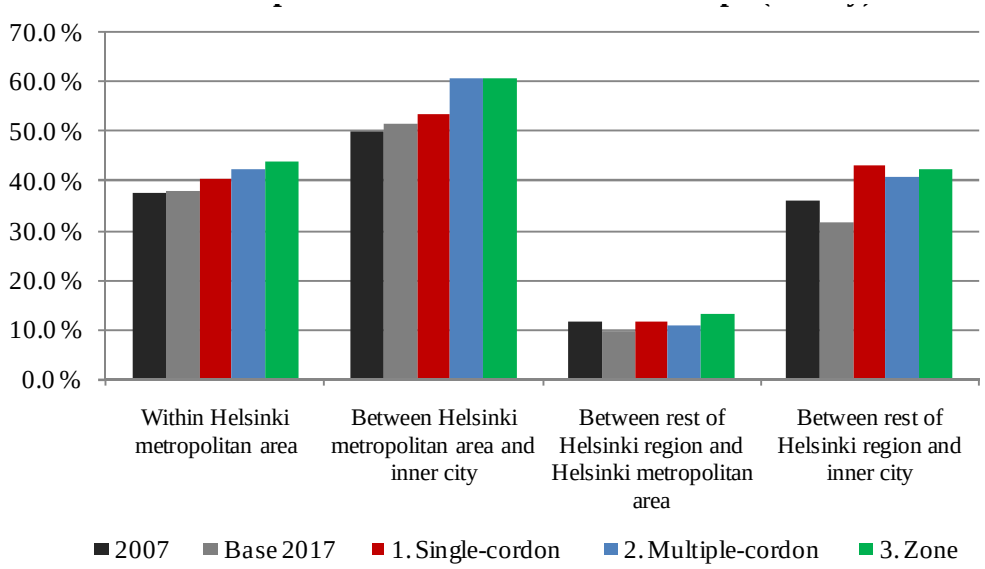


Figure 5. Public transport modal share of all motor-vehicle trips (all day), 2007 and 2017.

Congestion charging would cut CO_2 emissions and improve air quality in the Helsinki region

Even with the transport system improvements already planned, carbon dioxide emissions from traffic in the Helsinki region are forecast to increase by about 16% in the period to 2017 in spite of the positive effects of renewing the vehicle stock and improvements in engine and emissions technologies. With congestion charging, the reduction in private car traffic and improved traffic flow would mean improved air quality and fewer emissions from traffic. It is estimated that in 2017, congestion charging would mean that carbon dioxide emissions would be about 11-21% lower than without congestion charging; other emissions harmful to health (particles, NOx, CO, HC) would be about 8-18% lower. The reduction in these concentrations would

be greatest in the vicinity of the main routes and in the inner city area. The number of people exposed to emissions would fall, and the health effects would be positive for the area's inhabitants. Traffic noise would be lower, but only by a small margin.

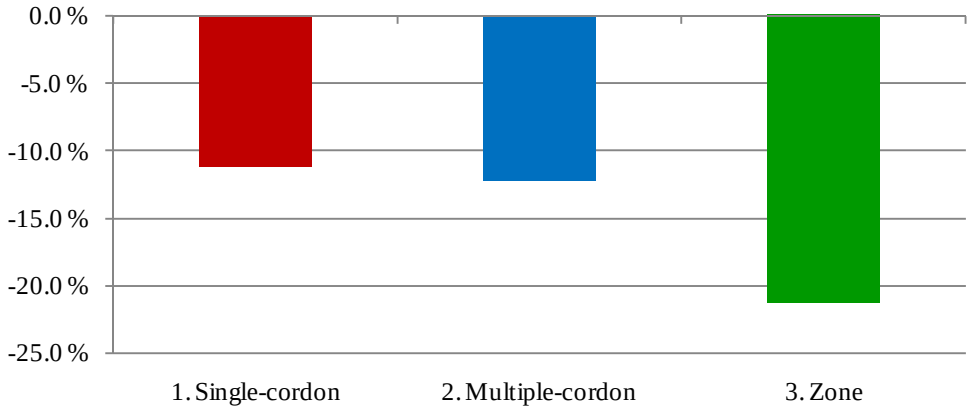


Figure 6. Impacts of congestion charging models on overall level of CO_2 emissions from traffic, 2017 (i.e. compared with no congestion charging).

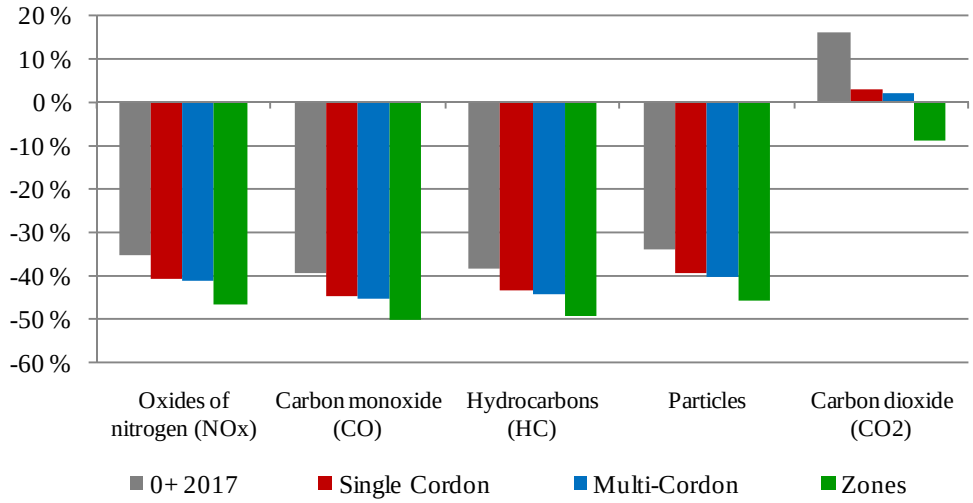


Figure 7. Changes in emissions from traffic (2017 compared with 2007) with and without the different congestion charging models.

Congestion charging would improve road safety

Congestion charging would have a favourable impact on road safety, due to the reduced volume of traffic. The number of road traffic accidents in 2017 would be about 10-14% lower than the situation without congestion charging. This would be attributable to the reduction in the number of vehicles on the road and the reduced frequency of stationary traffic on the principal routes. The risk of accidents involving non-motorised traffic would fall due to the lower volume of motor vehicles, but, counter to this, the increase in speeds would increase the accident risk slightly.

Table 1. Road traffic accident injuries and fatalities in the Helsinki region, 2007 and 2017.

	2007	2017	Congestion charging models, 2017 Single cordon 2017	Multiple cordon 2017	Zone 2017
Road traffic accidents (persons/yr)					
Fatalities	34	42	38	38	36
Injuries	1256	1562	1409	1413	1346

Congestion charging would have both positive and negative impacts on businesses in the region

The attractiveness and competitiveness of the region as a location for companies is affected by the extent of traffic congestion, the degree of accessibility and the level of transport costs incurred. A well-functioning transport system will enhance the attractiveness and competitiveness of the region as a location for companies. Growing traffic congestion in the region will reduce its competitiveness in relation to other regions, assuming that the level of congestion is less severe elsewhere.

For businesses, their goods traffic, work-related travel and customer movements would all benefit from congestion charging at peak periods, due to the freer flow of traffic. Transportation times would be shorter and the uncertainty over travel times would be reduced. However, between peak periods the congestion charges paid would mean that the scheme's costs to companies would exceed the benefits they would gain in the inter-peak period.

A business survey conducted in March 2009 revealed that companies' views of the adverse effects of congestion today and of congestion charging as a means for improving traffic flow vary considerably. According to the results, 23% of companies considered that congestion has a "significant" adverse effect on their operations, 59% considered it has an adverse effect "to a certain extent", and 18% that it is of "no significance" for any mode of transport. The companies polled felt that the greatest adverse impacts of congestion were on employees' journeys to work, goods traffic and work-related travel. A majority of the companies did not believe that congestion would increase significantly by the year 2017. Eighteen per cent of the companies regarded congestion charges as an effective means of reducing congestion. Support for other measures to reduce congestion instead of congestion charging focused on greater investment in the road and street network and various steps to improve public transport.

Congestion charging would lead to more concentrated land use in the longer term

Traffic growth and congestion generally lead to a more dispersed urban structure. By contrast, congestion charging is expected to lead to a more concentrated urban structure. Congestion charging would encourage development in areas located near good public transport links, especially railway and metro services. This would nevertheless occur only after an extended period.

Congestion charging would lead to more concentrated land use near to good public transport links. Such areas would become more attractive as places to live and work,

and use of the concentrations of services in these areas by residents would increase. Helsinki city centre's appeal as a centre for jobs and commerce would also be enhanced. At the same time, the attractiveness of distant shopping centres reliant on private car traffic would weaken.

There is a specific land-use related risk associated with congestion charging, and this is known as the 'boundary effect'. The charge boundaries could create an 'avoidance zone', with the result that location decisions start to be made on the basis of avoiding the need to cross the charge boundary. In the long term, this could lead to more concentrated land use on each side of the charge boundary but not near the boundary itself. Such development could lead to a division of land uses and functions between areas inside and outside the charge boundary. The risk of this 'boundary effect' would be greatest in the single-cordon model.

The socio-economic benefits of congestion charging would exceed the costs

The investment costs of the congestion charging schemes studied would be EUR 40-180 million, depending on the detailed technical design, and the annual maintenance costs would be EUR 10-50 million. The increase in public transport services in connection with the congestion charging models would mean higher public transport costs, but it would also boost income from public transport. Public transport net costs would increase in the different models by about EUR 10-20 million annually. The estimated annual revenue under the different congestion charging models would be approximately EUR 140-270 million. The congestion charging models examined in the study would cover their costs with the revenue obtained from the congestion charges and would be cost-effective in socio-economic terms.

Congestion charging would lead to changes in travel costs and time savings for those travelling by car and public transport, and changes in accident and environmental costs. The socio-economic net benefits of the congestion charging models studied would be approximately EUR 140–160 million annually.

Other tools and measures could achieve a similar impact, but not alone and not as effectively as congestion charging

Transport policy objectives can also be achieved using means other than congestion charging. However, further examination of this revealed that no other measure (additional road capacity, more or cheaper public transport, transport demand management, more park-and-ride, etc.) would alone be sufficient to achieve impacts of the same magnitude as congestion charging. Only a sharp increase in fuel tax would have a similar impact, though this would not be restricted to the Helsinki region but would be nationwide. Congestion charging would need to be accompanied by supporting measures such as an increase in public transport provision and in park-and-ride. Congestion charging would function most effectively as part of a larger package of measures.

Uncertainties in the study

A number of uncertainties are inherent in this study, one example being the traffic forecasts used, which were based on the now rather old forecasting models of the Helsinki Metropolitan Area Council (YTV). Another example is the slowing of traffic growth as a result of the current economic recession. However, a risk analysis was conducted, and this indicated that the risks pertaining to the study results are not

inordinately large. Moreover, the risks identified would not alter the scale or nature of the impact evaluation results. The greatest uncertainty concerns the scheme that is most demanding in terms of technology, i.e. the zone model, and the least uncertainty is associated with the single-cordon model.

Outstanding issues

The study examined the social, economic, environmental, safety and other impacts expected if congestion charging were to be introduced in the Helsinki region. The aim of the study was not to propose the introduction of congestion charging, which is why it did not present an exhaustive discussion of all the key practical issues associated with the implementation and acceptance of such a scheme. These key issues include the precise objectives of congestion charging, the use of the revenues from congestion charging, and the issue of whether the payment takes the form of a tax or a fee. These issues must be dealt with if the decision is taken to proceed with preparations for a congestion charging scheme for the Helsinki region.