

2 OBJECTIVES

2.1 INTRODUCTION

Cities are increasingly developing their transport strategies to reflect a wider range of policy objectives. The aim of this chapter is to present these objectives and to ensure that both well-known and newly-arising road pricing objectives are reviewed and understood.

2.2 WHY IS IT IMPORTANT TO SET OBJECTIVES?

Road pricing is a controversial policy instrument, and it is therefore important to demonstrate the purposes for which it is being introduced. Moreover, road pricing can serve a range of objectives, including congestion relief, environmental enhancement and revenue generation, each of which may be best served by a different type of road pricing scheme. For both these reasons it is important for a city considering road pricing to be clear as to its objectives.

When those objectives have been specified, they can be used as an input to scheme design (Chapter 3), as the basis for predicting the impact of (Chapter 6) and appraising (Chapter 7) alternative design options and evaluating the performance of implemented schemes. The objectives are thus a priority in the scheme's conception and have different functions, as shown in Figure 2-1.

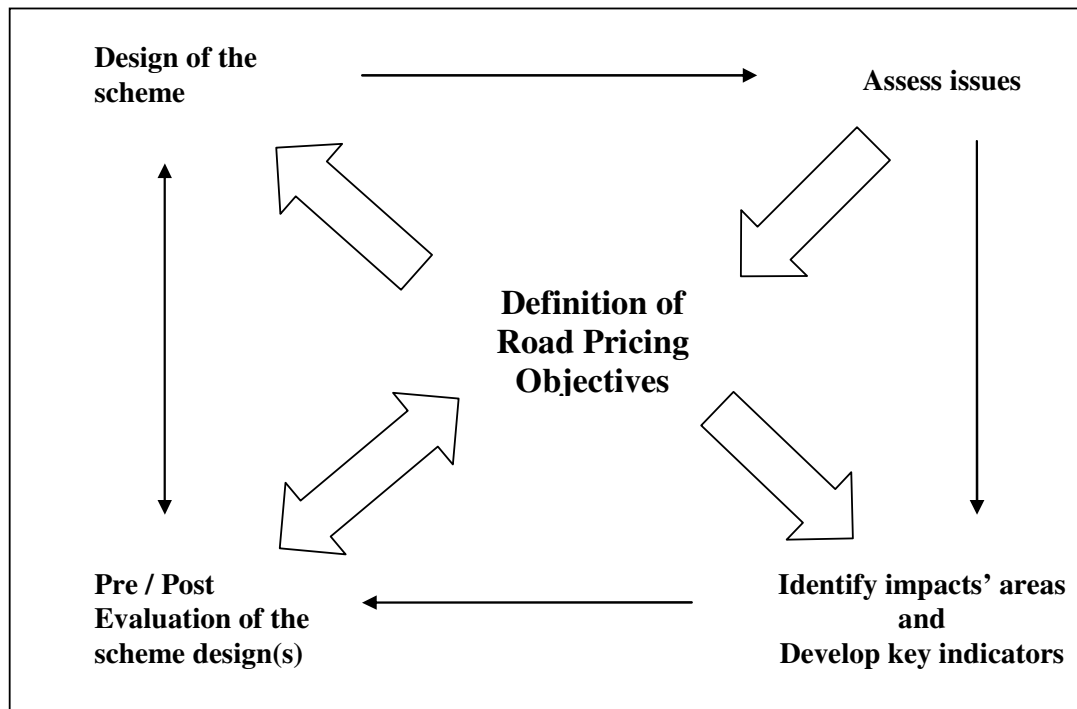


Figure 2-1 Place of Objectives in the Scheme Conception Path

There is a case, in the interest of increased acceptability (Chapter 11) for keeping the objectives simple and focused. The reference to the London scheme as a congestion charge is a case in point. However, this can prove a limitation if the scheme is subsequently modified to meet other objectives, as has been the case with the use of congestion charging in London to penalise high emission vehicles. Where more than one objective is being pursued, a given design may be more effective at meeting one objective (e.g. congestion relief) than another (e.g. revenue generation). In such situations trade-offs need to be made, and some sense is needed of the relative importance of the objectives.

Even where objectives are limited, there will be constraints on their achievement (for example seeking pollution reduction subject to not adversely affecting the economy, or achieving congestion relief subject to not causing undue inequities). These constraints can be treated as objectives in their own right, and need to be reflected in scheme design and appraisal. Thus the list of objectives considered in the design process may well be much longer than that used for public consultation.

2.3 WHICH OBJECTIVES ARE CURRENTLY CONSIDERED

2.3.1 What do we know from the European Road Pricing Experiences?

Figure 2-2 summarises the objectives specified for the urban road pricing schemes existing today. Efficiency, in the form of congestion relief, is always mentioned as an objective. Equity and environmental goals are considered in the Rome and Stockholm schemes. Revenue generation to support other strategy elements is important in London and Stockholm.

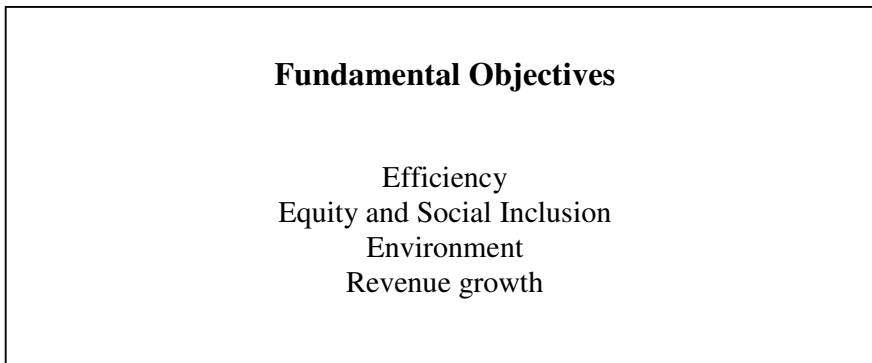


Figure 2-2 Fundamental objectives when implementing Road Pricing

2.3.2 What do we know from PROGRESS and CUPID?

PROGRESS¹ and CUPID² both investigated the main objectives of road pricing in great detail. Several fundamental objectives were clearly identified as in Figure 2-2. In addition PROGRESS and CUPID provided a body of knowledge on these objectives, in terms both of description and of ways to measure and to incorporate them in an overall evaluation process.

However, whilst the fundamental objectives of efficiency, environment and equity are well known, new considerations are emerging. As shown in Figure 2-3, these include support for economic growth (directly or through relief of congestion and environmental impacts), enhancement of health, through reductions in pollution and encouragement of non-motorised modes), improved safety and liveability, and protection of the needs of future generations.

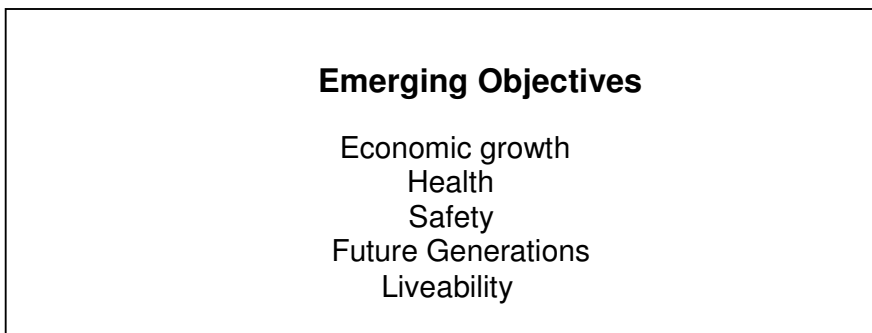


Figure 2-3 Emerging objectives when implementing Road Pricing

¹ For more information visit <http://www.progress-project.org/> .

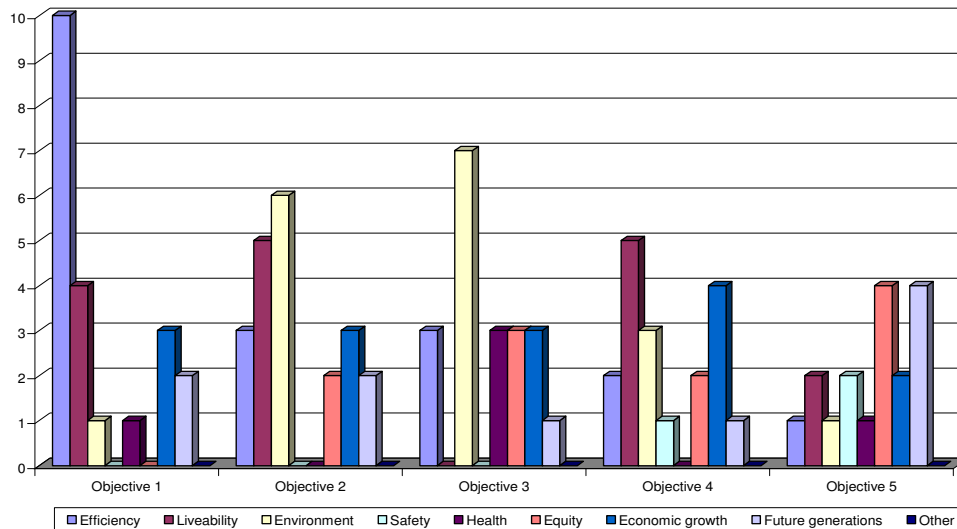
² For more information visit <http://www.transport-pricing.net/cupid.html> .

2.3.3 Which objectives are considered by the CURACAO City User Group?

Urban pricing policies are faced with opposition and a degree of reservation from both the public opinion and the industry. In response to this major issue, CUPID, PROGRESS and now CURACAO concentrate considerable resources on presenting road pricing as a concept. One of the main focuses of CURACAO is to consider how to promote road user charging schemes to decision-makers. In order to do so, CURACAO launched a new user needs assessment questionnaire (UNAQ). The user needs assessment was conducted in partnership with decision makers from 21 cities in Europe. The questionnaire placed great attention on the objectives of road pricing. Respondents had to indicate the five principal objectives their cities would aim to meet by implementing a road pricing scheme.

Figure 2-4 indicates the number of times that each objective was ranked first, second, third, fourth or fifth. Figure 2-5 rates the objectives by assigning a score to each position in the respondents' ranks (1st = 5). Efficiency, environment and liveability emerged as the most important objectives, with economic growth fourth. Unfortunately revenue generation was not included.

Figure 2-4 Objectives for Road User Charging (Results of UNAQ)



Note: *Objective 1,2 ,3... correspond to the cities' ranking of objectives for Road Pricing implementation.

Figure 2-5 Objectives Weighted According to Priority

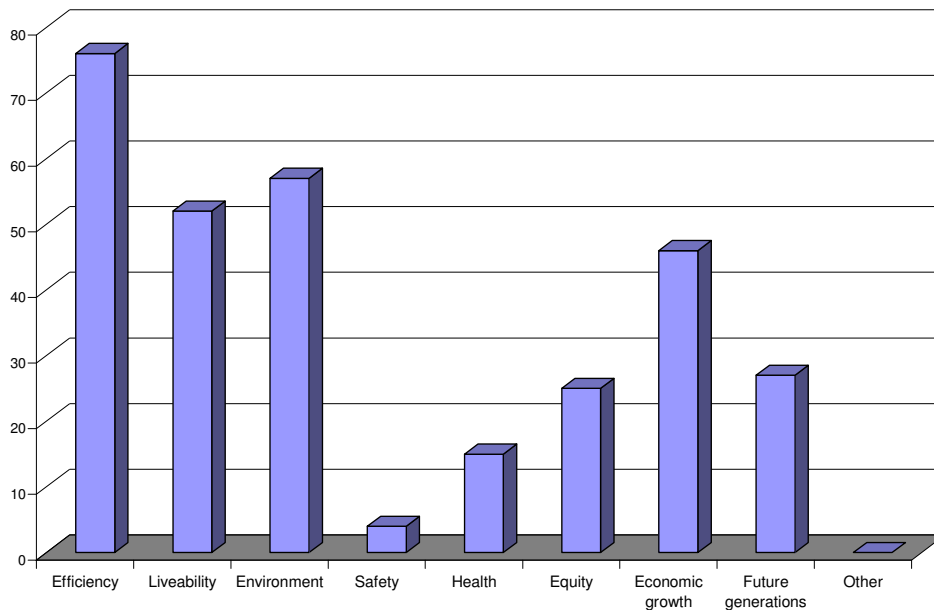


Table 2-1 summarises the results for these 21 cities and for those included in PROGRESS and in cities with existing schemes.

2.3.4 Lessons Learnt

- Weight given to objectives vary from one UNAQ respondent to another. Road pricing introduction will often serve jointly different objectives. This emphasises the need for a clear prioritisation of the objectives to facilitate decision making by highlighting trade-offs between individual objectives.
- Efficiency, liveability and environmental objectives are main primary objectives. This confirms the need for policy-makers to meet public expectations but also the need to work for observable and communicable effects.
- Economic growth always seems to be expected and considered, even if it is not the primary aim.
- The ever-present environmental, liveability, efficiency and economic growth aims are in accordance with the objectives of sustainable development.
- The achievement of equity through road pricing seems to have been given a much lower consideration by policy makers. Yet, equity had been identified as a fundamental objective in CUPID and PROGRESS. This demonstrates that efforts still need to be concentrated on presenting and promoting road pricing as an equity driver.
- Safety and health objectives are clearly identified as secondary concerns.
- No additional objectives have been mentioned, confirming that all objectives have been addressed by CURACAO, CUPID and PROGRESS.

Table 2-1 Summary of Objectives for RUC Considered

	PROGRESS' cities							Cities with scheme in operation						User Need Assessment	
	Bristol	Copenhagen	Edinburgh	Genoa	Gothenburg	Helsinki	Rome**	Trondheim*	London	Oslo	Bergen	Durham	Stockholm	Singapore	Sample of 21 European cities
Efficiency															
Liveability															
Health															
Equity															
Safety															
Environment															
Economic growth															
Future generation															
Rising Revenue															

* Trondheim was the only city with a scheme already in operation which participated in the PROGRESS project.

** Rome implemented a ZTL in 2001.

Dark Cells represent the primary objective. Grey cells indicate that the objective was secondary.

2.4 WHAT DO WE MEAN BY THESE OBJECTIVES?

The classification proposed in CURACAO presents a wide range of objectives that can be considered by cities while implementing a road pricing scheme. Among these different objectives, it is clear that some of them are considered as side-effects or constraints more than as primary aims of the schemes. However, all of these objectives can form part of the cities' policy plans and can be accomplished in part by road pricing schemes. We provide definitions for each below.

2.4.1 Efficiency

Economic efficiency relates to the maximisation of the welfare gains induced by a transport system. The costs and benefits of road pricing are diverse, and can be defined in financial or utility terms. From a welfare point of view, different dimensions such as time, money and convenience must be taken into account. Welfare also has effects on other markets (labour, real estate, retail) and impacts on the economic actors affected by the scheme: users, operators, and public institutions.

The main reason for transport economic inefficiency is congestion. What is the link between objectives and congestion? Delays suffered on the roads could be due to any one of the following reasons:

- planned incidents: e.g. road maintenance
- unplanned incidents e.g. accidents
- bottlenecks on the road network e.g. a deliberate policy to slow traffic down for safety reasons
- demand/supply conditions, where demand exceeds the capacity available.

The fundamental economic reason for congestion is the failure of drivers to be fully aware of the delay they cause when they enter an already crowded road. Hence the focus of road pricing is on dealing with congestion brought about by demand/supply conditions. Congestion is a key concept because it is the starting point of transport economic analysis and of engineering traffic studies. Engineers focus on the infrastructure capacity and the road use efficiency, while economists analyse cost transfers and user utility.

For traffic engineers, congestion starts when the supplied road network is not sufficient to provide a normal flow to drivers. Hence one possible definition of congestion is *"the impedance vehicles impose on each other, due to the speed-flow relationship, in conditions where the use of a transport system approaches its capacity"* (ECMT, 1998).

For economists, congestion arises when drivers create an external cost to others that is not borne by the drivers themselves; economists view this as a market failure. In the economics literature (e.g. Walters, 1961; Hau, 1992) each driver creates an externality, because he contributes to all drivers' time losses.

However, time lost is not the only external effects from congestion; the overuse of roads also leads to more pollutant emissions, to more noise and to more accidents. It can also reduce the attractiveness and vitality of city centres and have a knock on effect on business. Finally, it is noted that the public by and large see themselves as victims of congestion, but not as contributing to congestion. It is evident that congestion abatement/reduction is one of the primary objectives of implementing a pricing scheme.

2.4.2 Equity and Social inclusion

The concept of equity is frequently used to describe the fair distribution of impacts across the whole population, so that everyone takes home a share of both the benefits and the disadvantages. Equity in the transport market means affording reasonably comparable

mobility opportunities to all citizens. In other words, it means to ensure travel opportunities to citizens irrespective of where they live, access to mobility irrespective of what they earn, of their age, their gender and their journey purpose.

The way citizens are confronted with environmental, health and safety impacts caused by the transport system is also part of the equity objective. Transport externalities should be fairly borne by all inhabitants.

The objective of social inclusion entails the improvement of access to the full range of services available to society. Excluded individuals or groups must be addressed, such as people without a car and those with mobility impairments. However, social inclusion also refers to easy access to employment, hospitals, schools, leisure facilities and shops.

Addressing the equity objective translates into inducing benefits to groups of citizens who are currently disadvantaged. Because equal opportunities are not always guaranteed when road pricing is implemented (those who will not or cannot pay have less attractive alternatives such as changing times of journey, taking longer routes or switching to a public transport mode...), strong consideration must be given to the compensation of those having fewer opportunities or bearing greater costs, such as improvement of bus speeds, reliability and service provision.

Social acceptance was identified by PROGRESS and CUPID as a main barrier to road pricing implementation. That is why equity and social inclusion must always appear in any in road pricing agenda. This is discussed in Chapter 10.

2.4.3 Environment

Transport systems have negative impacts on the environment. Urban transport is responsible for 40% of CO₂ emissions and 70% of other produced pollutants from transport (CEC, 2006). The high concentration of cars and the resulting congestion contribute to this global trend.

The main objectives of environmental protection are to:

- reduce regional pollution responsible for today's poor air quality, including Particulate Matter (PM₁₀) particles, Nox and SO₂ emissions;
- reduce the global climate change and, in particular, CO₂ emissions;
- reduce Sulphur Dioxides, Oxides of Nitrogen and NH₃ emissions, which cause the depletion of the ozone layer;
- reduce noise and its impacts on health and communication;
- reduce bio-diversity severance and changes to local environment stability.

Even if few road pricing systems have been implemented as environmental measures, many are designed with this objective in mind. In some cases the objective is to reduce the impacts of traffic, but in others the intention is to protect certain areas such as city centres. A detail discussion of the environmental effects is discussed in Chapter 9.

2.4.4 Raising Revenue

Implementation of Road Pricing generates revenues and contributes to financing other projects and supporting other operational costs. In the case of Norwegian road pricing, revenues were set as the primary objective. The UNAQ's results and the current experiences show that raising revenue is generally deemed a secondary purpose.

Efficient use of revenue is also crucial from an equity point of view. If pricing schemes make someone better off, they also make others worse off. Studies like REVENUE have shown that if revenues are allocated properly then the negative effects of inequity can be mitigated (Chapter 11).

Whilst a pure “revenue maximisation” model would not be appealing on political grounds, an interrelated objective of the agency in charge is to minimise the cost of toll collection. As discussed in Chapter 7, keeping costs down will ensure that there is revenue for redistribution. This is a classical argument from the economics perspective recognising that in theory, through road pricing, the invisible hand of the collecting agency should be able to improve the welfare of society as a whole and hence efficiency, through the redistribution of revenues gained.

2.4.5 Economy

Efficiency of transport systems has effects on business conditions and on local economic development. Economic benefits from road pricing come principally through accessibility improvements. The traditional argument has been that congestion hampers business productivity and labour markets. However as Chapter 8 illustrates, our understanding of the linkages between economic development and congestion on one hand and economic development and road pricing is not sufficient at present to fully provide a verdict on the impact of road pricing on economic development.

2.4.6 Health

Urban transport creates considerable health hazards. The main generators are air pollutants, but noise and stress can also contribute. Increasingly, too, it is being recognised that lack of exercise through excessive car use can contribute to a range of health problems.

Pollution causes respiratory and cardio-vascular diseases. Long periods of exposure to pollutant emissions can reduce life expectancy (Bickel and Rainer, 2005). The main diseases caused are asthma, chronic acute bronchitis, pulmonary cancer, chronic obstructive pulmonary disease (COPD) and pneumonia. Many of the pollutants which contribute to these diseases are generated at higher levels when congestion occurs. In 2000, researchers estimated that in Austria, France and Switzerland, about 6% of the total number of deaths in those countries were due to atmospheric pollution and around half were directly due to motorised traffic (Künzli *et al*, 2000).

Urban transport health externalities have both direct and indirect economic impacts. Direct costs are hospitalisation, rehabilitation, medication and medical diagnostics. Indirect costs are due to lost productivity and premature death. The annual economic burden of respiratory diseases in Europe is estimated by the ELF³ to be approximately €102 billion or €118 per capita in 2000. The factors costing the most are lost work days, accounting for €48.3 billion or 47.4%, and inpatient care €17.8 billion or 17.5%. Outpatient care contributes a further €9.1 billion (8.9%) and prescription drugs add €6.7 billion (6.6%). Premature mortality and rehabilitation are estimated to contribute another €20.0 billion (19.6%). Once more, urban transport is not the only contributor to this problem but it does contribute substantially to it.

The estimated impacts on health from noise or stress are difficult to assess, but sleep deprivation and intense stress is medically known to have a negative influence on health. A German study suggests that some 2000 occur prematurely each year as a result of traffic noise (Schade, 2003).

2.4.7 Safety

Unsafe transport systems generate accidents. The objective of safety is to reduce the number of accidents for all modes, and initiate a decline in the severity level of traffic accidents.

Urban transport is responsible for 33% of all fatal accidents involving road transport in Europe. Even if the number of fatal accidents is on the decline in the EU, the European Commission highlights the need for an even greater decrease (CEC,2006). The importance given to safety issues comes from safety’s external costs valuation surveys, which confirm the high willingness to pay of citizens to reduce road casualties. Then, safety improvements have

³ European Lung Foundation, <http://www.european-lung-foundation.org> .

positive impacts on economic transport system efficiency. HEATCO confirms high economic values assigned to safety features all around Europe and the 2004 Highways Economic Note No. 1⁴ attest to the need for prevention and action.

2.4.8 Intergenerational Equity

The “*Intergenerational equity*” objective seeks to improve the opportunities for future generations, ensuring that the general life conditions are equal or better compared to those experienced by the current generation.

The entire range of conditions affected by the transport system is therefore considered:

- To guarantee at least the same welfare level;
- To ensure that next generations have the same ability to meet their needs in term of financial and energy resources;
- To reach the same level of liveability in terms of environment, ecosystem and cultural heritage.

Considerations about impacts for the future generations are particularly important when targeting sustainable development.

2.4.9 Liveability

Poor integration of the transport system with the rest of the city has negative impacts on street and outdoor liveability.

The objective of liveability entails a variety of transport impacts that have already been mentioned as responsible for the poor quality of our cities:

- Reduce local emissions responsible for poor air quality;
- Increase safety, because insecurity creates stress while walking, cycling and driving;
- Improve traffic patterns to ensure frequency and reliability of public transport services;
- Reduce noise emissions from traffic;
- Improve cleanliness of cities suffering from transport vandalism and damage.

Finally, increasing liveability translates into increasing comfort while enjoying a city. This is important for citizens (80% of Europeans live in urban environments), tourists and visitors. Higher liveability levels improve the image of a city.

2.4.10 What are the sub-objectives?

As indicated above, each objective is composed of different elements. These are presented in Table 2-2.

⁴ <http://www.dft.gov.uk/pgr/roadsafety/ea/highwayseconomicnoteno12004>

Table 2-2 Primary and Secondary RUC objectives

Primary Objectives	Sub-Objectives
Efficiency	To ensure integration with inter-urban transport systems
	To reduce time and fuel lost due to congestion
	To reduce conflict between modes
	To ensure easy access to urban freight terminal
	To improve integration between public transport services
	To achieve reduced transport costs through a reduction in journey times
	To ensure technological efficiency of the system
Liveability	To reduce the number of unnecessary trips
	To reduce noise emissions from traffic
	To improve city comfort and cleanliness
	To improve public service frequency and reliability
	To reduce stress from experiencing transport system
Health	To make walkers feel better
	To reduce feeling of threat to personal security
Equity	To reduce the health impacts from local transport emissions
	To reduce health impacts from noise and stress due to the transport system
	To improve access from home to school, hospitals, shops and leisure
	To improve transportation for disabled passengers
	To improve access to local public transport services
Safety	To increase choice of destinations by public transport
	To insure access to mobility for all citizens of each revenue class, age, gender, residence or journey purpose
Environment	To reduce number of fatal accidents
	To reduce severity of accidents
	To reduce all types of emissions and noise
	To preserve local green belt and land
Intergenerational Equity	To foster greater awareness of transport and environment issues
	To protect bio-diversity
	To preserve the environment
	To ensure same level of welfare to next generations
Raising Revenue	To preserve patrimony from traffic impacts
	To make sure that next generation will be able to meet their resource and energy needs
Economic growth	To raise revenue
	To improve economic prosperity via improved access and environment
	To improve accessibility
	To create cooperation between stakeholders

2.5 WHAT ARE THE IMPACT AREAS?

In order to understand how road pricing accomplishes the objectives and sub-objectives which it is designed to meet, it is necessary to look at the scheme's impacts. To do so, we need to explore the impacts arising through the causal process following road pricing implementation.

Impact areas can be reflected by key indicators for the measurement and prediction (Chapter 6) of road pricing effects. Indicators are ways of quantifying objectives and/or sub-objectives so as to measure the scheme's performance.

Road pricing impacts can occur as an immediate response to implementation or can arise as second order, longer term or longer distance effects.. Secondary environment impacts are good examples of this.

The selected indicators may also be adapted to the cities' context and to the purpose of the evaluation process. One of the challenges of CURACAO is therefore to develop and aggregate impact indicators which would warrant transferability of results between cities of the project but also to other interested cities. This has been the basis of the evaluation process included in Work Package 3 of CURACAO.

2.6 WHAT ARE THE IMPLICATIONS FOR OTHER THEMES?

The definition of objectives is the first step of the implementation path and has obvious implications for all other themes being considered in CURACAO. It is important to identify the influence of the objectives on the pricing scheme.

These are the implications for the other themes:

- **Scheme design:** The final design of the scheme is an essential element to ensure the attainment of the objectives, taking into account the different constraints.
- **Technology and Business Systems:** The selection of the appropriate technology and business model is a function of different variables. The objectives for which the scheme has been designed may constrain these choices.
- **Prediction:** Prediction is crucial to appraise the correspondence between scheme design and set objectives. Corrective actions may ensue.
- **Appraisal:** Appraisal needs to be based on the specified set of objectives and constraints, and may include the weighting of these objectives. The specific objectives of *economy, environment and equity* are treated in specific chapters, given the challenge of predicting and appraising impacts related to them.
- **Equity and Economy:** These could potentially serve as constraints on the objectives of the scheme.
- **Environment:** Environmental protection and promotion of liveability is one of the major objectives of road pricing schemes examined in Work Package 3 of CURACAO.
- **Acceptability:** Public and political acceptability are obviously influenced by the scheme and its impacts. These will be influenced by the choice of objectives. Acceptability can be enhanced by keeping the specification of objectives simple, and clearly related to identified problems.
- **Transferability:** A good departing point for any transferability exercise can be the identification of cities with similar objectives; the experience of cities with analogous road pricing aims are likely to be more appropriately transferred to other urban contexts. However, in the early stages of the development of road pricing, there is a case for evaluating schemes against the full set of objectives listed in this chapter, since this will enable other cities to identify the impacts relevant to them.

2.7 WHAT ARE THE RESEARCH GAPS?

The aim of this chapter was to review the objectives of Road Pricing and to confirm that the scope of the analysis of CURACAO takes into account both fundamental and newly-arising objectives. Results from the UNAQ confirm that all aspects are covered.

There is a case for continuing to monitor the objectives of concern to cities and their relative importance, so that all objectives are effectively addressed in the guidance given. However, the principal requirement is to obtain additional evidence on the problems associated with some of the less frequently addressed objectives such as health and the economy.