



## How urban transport projects are appraised: current practice in the EU

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## EXECUTIVE SUMMARY

The objective of the EVIDENCE project is to make the proven value-for-money of sustainable urban transport measures more visible and widely recognized. This common practice reader intends to convey to the reader a better understanding of: the challenge in determining a project's viability; the role of project appraisal (most commonly cost-benefit analyses, CBAs) in decision-making at urban level; and the role Sustainable Urban Mobility Plans (SUMP) play in project prioritisation.

Although not the only method available, CBA is often used by policy makers to justify substantial transport project investment in cities. However, it is often only used for major infrastructure projects and even then, it is a process that does not always provide a complete picture of true benefits, providing the monetary but not always the social and environmental impact or benefits.

How CBA is used varies from country to country. Which means that the robustness of CBA results can be questionable especially as the comparability of CBA results is limited, does not encapsulate the full range of externalities, and is rarely conducted for small scale sustainable transport initiatives. Conventional CBA often fails to appropriately incorporate wider social, environmental and economic costs and benefits such as real estate value, employment, and quality of life, and many effects, such as noise or air pollution associated with a transport project or measure, although highly valued, are difficult to gauge in precise economic terms. A reason for this lack of a broader picture of benefits can be that an accurate CBA requires a considerable amount of data and design information. This can mean that the effort to conduct a CBA will only be approved if the implementation of a measure is likely or has already been decided.

Sustainable transport measures may come with clear social, environmental and economic benefits, but these benefits can often be overlooked. Where attempts have been made to assess the benefit-cost ratios (BCRs) of sustainable transport measures, the results are frequently very impressive and some examples are highlighted in this report.

SUMPs provide the opportunity for an initial assessment of the potential cost and benefits in the measure selection process and thereby to test the performance of alternative measures at an early stage of decision making. SUMPs bundle together complementary and mutually reinforcing measures into an integrated package and thereby stimulate return on investment. Standard appraisal processes focus on defined (normally singular) projects and do not transfer easily to SUMPs.

## 1. BACKGROUND

Sustainable transport measures can affect a range of policy objectives. To guide policy decisions and implementation, thorough advice on the potential costs, benefits and overall impacts of urban transport measures can be vital. Project appraisal is usually supported by decision support tools such as cost-benefit analysis (CBA) or multi-criteria analysis (MCA). These can be used to measure (ex-ante and/or ex-post) the potential or observed impacts of different policy options; and/or to assist decision-makers in selecting appropriate policies.

The concept of evidence-based decision-making (selecting the most appropriate measure based on robust evidence of its potential effects) also plays an important role in developing a Sustainable Urban Mobility Plan (SUMP). Appraising individual measures or even the overall SUMP can highlight their potential benefits and value for money likely to be achieved. Indeed, the SUMP development guidelines recommend assessment of the potential cost and benefits in the measure selection process (Wefering et al., 2013). Some EU Member States have already stipulated certain legal requirements for preparation of SUMPs, including suggestions for impact assessments in the measure selection process (see ENDURANCE project). Robust assessments of the socio-economic benefits of sustainable transport investments can unlock investment funding, and in doing so facilitate implementation of sustainable urban mobility measures and the wider adoption of the SUMP concept.

Whereas sustainable urban transport appraisal is a complex process, appraisal of individual measures and initiatives is common practice. For instance, CBA is widely used to assess the economic viability of transport projects, especially infrastructure projects (Beukers et al., 2012). Cost-benefit analyses attempt to express the viability of a project by defining (as many as possible of) a measure's relevant direct and indirect impacts in monetary terms. CBAs assist policymakers in understanding the wider impacts of a project, including its external costs and benefits. In contrast, MCAs avoid the (time consuming) need for monetisation by allowing effects to be assessed in their own unit (e.g. noise in decibels, accidents in injuries), amongst other advantages (and disadvantages).

The objective of the EVIDENCE project is to make the proven value-for-money of sustainable urban transport measures more visible and widely recognised. To this end, this common practice reader highlights current transport project appraisal practice, and the problems with it. It also discusses how SUMPs may influence the measure selection process vis-à-vis appraisal of individual measures.

This common practice reader intends to convey to the reader a better understanding of:

- ◆ The challenge in determining a project's viability.
- ◆ The role of project appraisal (most commonly CBAs) in decision-making at urban level.
- ◆ The role SUMPs play in project prioritisation.

Chapter 2 highlights general challenges in transport project appraisal. Chapter 3 presents five cases of urban mobility plans that endorsed (bundles of) sustainable urban transport measures. The five examples account for different levels of SUMP maturities existing in Europe. They explain the role of project appraisal methods in the respective policy making processes. They also highlight the role of SUMPs in the respective local decision-making. Chapter 4 concludes the findings.

### Important terms for a CBA

**Discounting.** A technique to compare costs and benefits which occur at different times. Discounting allows the expression of the present value of future costs (and benefits). A fixed discounting rate is usually applied.

**Net Present Value (NPV).** The difference between the discounted value of benefits and costs [ $NPV = (PV \text{ Benefits}) - (PV \text{ Costs})$ ]. If the NPV is positive the project is considered economically viable. This indicator is often used to accept or reject a project.

**Benefit to Cost Ratio (BCR).** The ratio of the present value of total economic benefits from a measure to the present value of the total economic costs [ $BCR = PV (\text{Benefits}) / PV (\text{Costs})$ ]. It describes the value of the benefits produced relative to the money invested. A BCR of 2.5 means that for every Euro invested, benefits of €2.5 are obtained. As the values are normalised, the BCR allows comparisons across differently sized projects.

**Internal Rate of Return (IRR).** The discount rate for which the present value of the total benefits equals the present value of total costs. The IRR can be seen as theoretical average annual rate of return of a project in which costs and revenues vary over time. It is often used to compare various alternatives.

## 2. COMMON PRACTICE

### AND CHALLENGES IN TRANSPORT PROJECT APPRAISAL

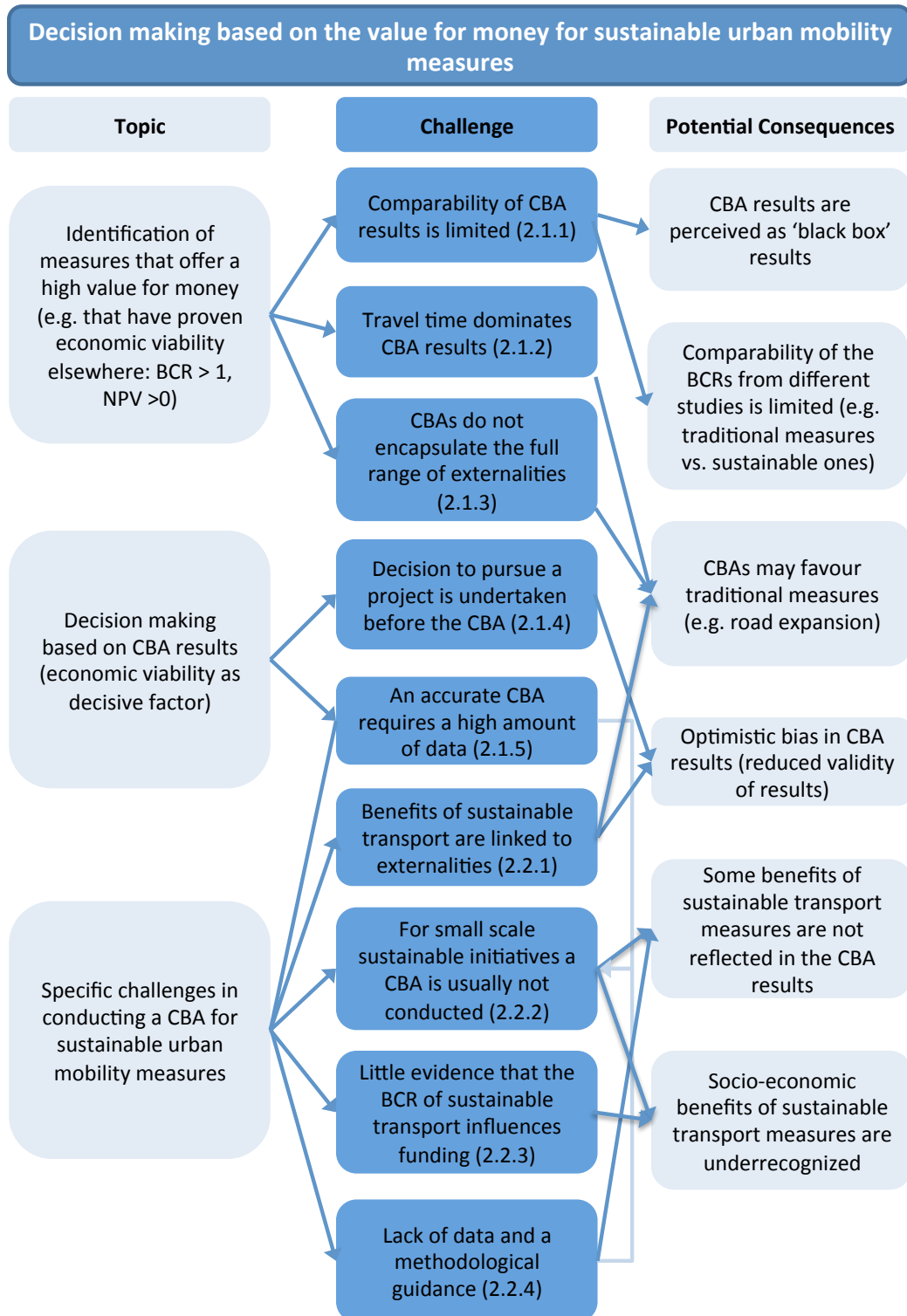
Cost-benefit analyses (CBAs) are widely used to assess transport projects or measures, especially large-scale infrastructure projects or other projects that are economically sensitive (e.g. congestion charges). Odgaard (2006) found, in a survey of 26 European countries, all use CBAs in road project appraisal. However, a CBA is sometimes complemented with a multi-criteria analysis (MCA) to allow appraisal of criteria that are not monetised (Bristow and Nellthorp, 2000; Odgaard et al., 2006), although the exact approaches used and the indicators assessed vary between the countries (ibid.).

Some countries have national appraisal guidelines, mandatory for major infrastructural investments eligible for public funding, such as the 'WebTAG tool' in the UK and the 'OEI-guide' in the Netherlands. The UK's and the Netherlands' guidelines for the appraisal of transport projects require CBAs for major transport projects, or non-CBA project assessment for smaller measures (Geurs et al., 2009). In the Netherlands, all local and regional spatial infrastructure plans that require national funding have to undergo a CBA (Beukers et al., 2012). In addition to being a requirement for funding, the UK WebTAG guidelines are also intended to serve as best-practice for the assessment of other transport projects. As they were primarily developed for nationally-relevant projects, the appraisal guidelines pay little attention to local effects, and thus may not properly reflect cities' objectives.

Due to their perceived accuracy, CBAs and benefit-cost ratios (BCRs) are a very powerful tool and are sometimes a requirement to obtain funding. Since 2000, the EU cohesion policy requires a CBA for projects in order to qualify for funding from various sources (e.g. Structural Funds, Cohesion Funds and Instruments for Pre-Accession Assistance). Article 40(e) of the Regulation 1083/2006 lays down the requirement to provide a CBA for major projects financed under the Operational Programmes for cohesion policy. The project can only receive EU grants, if it is desirable from a socio-economic point of view (EC DG Regional Policy, 2008). The EC Directorate-General *Regional Policy* has developed a common guideline to CBA, including a specific section on transport projects. However, this primarily focuses on larger transport projects: depending on the fund, a CBA is required only for projects with a volume of €10 million or more; multi-criteria analysis is recommended as a complementary tool where monetisation is difficult or impossible (EC DG Regional Policy, 2008).

Besides large infrastructure projects, there are a variety of urban transport measures which are not directly affected by national guidelines or funding guidelines. Insights into current assessment practice were obtained from survey of 14 European cities participating in an EC-funded project (see TIDE project). This revealed that the cities usually do not have a standard appraisal method for all transport projects, while some cities stated that they select or adopt a method depending on the measure being assessed. In line with the results from the literature, CBAs are often completed for larger infrastructure projects in the cities; several respondents referred to national regulations requiring them to do so. For example, in Italy a CBA is "the ordinary tool for projects above €10m and mandatory for projects above €50m" (TIDE survey - AMAT Milano). Several other cities referred to national guidelines on the CBA method and cases to which it must be applied. Additionally, some cities also use MCAs in their project appraisal (Hüging et al., 2014, see also QUEST and ADVANCE projects on SUMP assessment tools).

The diagram below outlines the key challenges, and their consequences, in the application of CBA in decision-making on sustainable urban mobility measures.



**FIGURE 1: OVERVIEW OF DECISION-MAKING BASED ON VALUE FOR MONEY FOR SUSTAINABLE URBAN MOBILITY MEASURES.**



## 2.1 Challenges to the robustness of CBA results

CBAs are used to test the economic viability of a project. Theoretically, a project could easily be accepted or rejected based on the net present value (NPV). Similarly, by comparing the BCR of two alternative projects, the project with higher benefits could easily be identified. However, the CBA concept is often criticised for:

- a) its extensive data requirements,
- b) the dominance of the value of travel time,
- c) difficulty of monetisation,<sup>1</sup> and
- d) neglecting wider socio-economic effects.

These factors are of even greater importance when assessing investments in traditional infrastructure projects versus investments in sustainable urban mobility measures. To address some aspects of this criticism, CBAs can be supplemented by a qualitative assessment (e.g. MCA) to ensure that all co-benefits, trade-offs or synergies are appraised (e.g. Beria et al., 2012).

### 2.1.1 Comparability of CBA results is limited

Project appraisal practices, such as CBAs, vary regarding the impacts assessed, the monetisation factors applied and the use of different indicators, limiting the comparability of CBA results. For example, health benefits can be estimated on the basis of the value of statistical life or based on actual health care costs. This is of particular relevance when different approaches are applied in different municipal departments, which might compete for funding budgets.

Furthermore, CBA results are highly dependent on the specific characteristics of a project and on the framework conditions in the city in which the project is planned. For example, reviewing 16 studies on the economic effects of investments in walking and/or cycling infrastructure in different cities, Cavill et al. (2008) found that a range of BCRs were used, based on very different assumptions and including different effects. Consequently, CBA results can provide an initial indication of a measure's economic viability, but BCRs are not (automatically) transferrable for a similar project in another city.

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<sup>1</sup> The limitations of the method arise mainly from the monetisation of non-monetary effects, as it is questionable if all impacts can be appropriately reflected in monetary terms. Also, there is uncertainty about the robustness of the results of non-market valuation techniques (Bickel et al., 2006), while monetisation factors can vary significantly from place to place, although some effort has been made to improve the robustness and comparability of monetisation factors (e.g. Bickel et al., 2006). Especially less-tangible impacts such as comfort or quality of life are difficult to monetise and thus often neglected or ignored in CBAs. Furthermore, ethical questions are raised by assigning monetary values to certain factors such as road fatalities (Beria et al., 2012).

The results of different CBAs on the same measure (in the same location) can vary. According to Mouter (2014), very few examples of CBAs exist that provide easy information for readers to verify the effect estimations. It is essential to communicate not only the final results (i.e. BCR, NPV) of best-practice examples, but also to consider the project's details and the assessment's assumptions to evaluate whether similar value for money can be achieved elsewhere.

CBA practices vary regarding the impacts assessed, the monetisation factors applied and the use of different indicators. This limits the comparability of results. For reference cases, the project details and assessment assumptions must be carefully considered.

### 2.1.2 Travel time dominates CBA results

The common dominance of travel time savings in CBAs is criticised (e.g. Van Wee et al. 2006, Metz 2008, Raux et al. 2012), frequently citing the following issues:

- ◆ time savings are usually an accumulation of small savings which are irrelevant to individual users,
- ◆ individuals' travel times remain constant in the long run (i.e. travel time saved encourages increased distances),
- ◆ values are assigned homogeneously, although travellers assign a range of values to their time. CBAs should instead reflect this by assigning a distribution of time values, and
- ◆ travel time reliability might be valued higher by individual users than average travel time-savings.

Travel time inappropriately dominates CBA results - there are many discrepancies in how time-savings are valued.

### 2.1.3 CBA does not encapsulate the full range of externalities

Conventional CBAs often fail to appropriately incorporate wider social, environmental and economic costs and benefits. Several non-monetary effects relevant to transport projects are rather difficult to quantify and monetise (see Table 1), for which reason these might not be properly reflected in a CBA (Browne and Ryan, 2011).

**TABLE 1: EXAMPLES OF INDICATORS OFTEN NOT APPROPRIATELY REPRESENTED IN A CBA (SOURCE: HÜGING ET AL., 2014)**

Effect	Reason for difficulty
Real estate value	Highly site-specific
Visual intrusion	Difficult to monetise and highly site specific
Employment	Extensive data requirements
Distributional effects	Lack of data
Vibration	Difficult to monetise and lack of data
Quality of life	
Sense of comfort	
Commercial attractiveness	Potential lack of data
Energy security	Values only available for the USA (IMPACT)
Image/user perception	Difficult monetisation; can be assessed with marketing research
Modal distribution	Potentially a key objective of local authorities but is often integrated in other criteria, not assessed in isolation within a CBA

Many effects, such as noise or air pollution, associated with a transport project or measure are difficult to measure in precise economic terms, but are nevertheless valued highly by individuals and society as a whole. Including these effects in a CBA requires the (often elaborate) monetisation of effects; this can be done by, for example, assessing citizens' 'willingness-to-pay' for the benefit. However, such effects may be simply excluded for reasons of excessive effort to do so.

Effects related to the kind of fuel used are only indirectly reflected in a CBA by assessing air pollution and CO<sub>2</sub>-emissions. Wider sustainability effects like energy security, environmental damages caused by fossil fuel extraction or land-use changes due to biofuel production are not reflected. Furthermore, there are different approaches to monetize CO<sub>2</sub>-emissions: The costs of greenhouse gas emissions can be either based on abatement costs or damage costs. Both can only be predicted with limited accuracy (Creutzig and He 2009). Many countries just adopt an official value per ton of CO<sub>2</sub> emitted; this approach neglects the fact that emissions in future years will have greater total impacts than emission today (Bickel et al. 2006). In France, guidelines on monetizing CO<sub>2</sub> emission include an annual increase of the monetization factor. Nonetheless, usually the CO<sub>2</sub> component weighs only a few per cent in the overall CBA results (Meunier and Quinet 2014). Less-tangible effects, such as comfort, quality of life

or vibration are not usually included at all, being too difficult to measure. Political goals, such as the EC Transport White Paper (EC 2011) goal “no more conventionally-fuelled cars in cities by 2050”, cannot be directly operationalized in a CBA.

Moreover, as CBAs aggregate the various costs and benefits, distributional effects are not visible; whilst some projects are beneficial to society as a whole, certain groups within this population might suffer from adverse effects from it (Beukers et al., 2014). For example, an ex-post CBA of the London congestion charge, using the UK Department of Transport’s methodology (as set out in the online transport analysis guidance document - WebTAG 3.5.4), includes revenues and costs, safety, CO<sub>2</sub>, pollutants, and travel time cost. The study however excludes impacts on pedestrians, cyclists and motorcyclists, coach passengers, underground and rail passengers and waiting time for taxi passengers.

Conventional CBAs often fail to appropriately incorporate wider social, environmental and economic costs and benefits, as several non-monetary effects relevant to transport projects are rather difficult to quantify and monetise.

#### 2.1.4 The decision to implement a project is independent from the CBA result

In some cities, CBAs are compulsory for projects or plans to qualify for the necessary financial resources. Beukers et al. (2012) found that if a CBA is perceived as necessary to obtain funding, often overly optimistic assumptions are used in the assessment to ensure that the BCR is favourable.

Similarly, Flyvbjerg (2012) points out that strategic misrepresentation is the chief reason for inaccuracy of ex-ante impact assessments, and differences between estimated and actual costs and benefits are “best explained by political and organizational pressures”. The author uses the example of an urban rail scheme, wherein cities compete for approval and for (scarce) national funds, and therefore “pressures are strong to present business cases as favourably as possible, that is, with low costs and high benefits, in order to beat the competition”. Project managers confirm that this is a common situation (Flyvbjerg & Cowi 2004).

Due to political and organisational pressures, CBAs suffer from optimism bias.

#### 2.1.5 An accurate CBA requires a considerable amount of data and design information

CBAs appear to provide the economic basis for rational decision-making, yet they only reflect parts of the potential impacts of a measure, as discussed earlier. Among the disadvantages of the CBA method are extensive data requirements and the method’s complexity - all impacts must be quantified and monetised to be reflected in the assessment (Browne and Ryan, 2011).

An accurate CBA requires a considerable amount of data. Most of this data is available only ex-post when interest in conducting a CBA may have waned. The efforts to conduct a CBA ex-ante are often only accepted if the implementation of a measure is likely. In this case, a CBA is sometimes used to ‘confirm’ the benefits of a measure to justify its implementation. As such, the CBA’s outcome might be preordained, increasing the risk

of bias (e.g. negative indicators are not included). Beukers et al. (2012) found there is a tendency for strategic behaviour in relation to CBA input and output.

As an accurate CBA requires a considerable amount of data, it is rarely undertaken to test the performance of multiple alternative measures. The effort to conduct a CBA are often only approved if the implementation of a measure is likely (or already decided).

## 2.2 Challenges to Demonstrate Benefits of Sustainable Transport Measures

Where attempts have been made to assess the BCRs of sustainable transport measures, the results are often positive. Prominent measures, where CBAs have been conducted, indicate their economic viability in most cases (see Table 2, below).<sup>2</sup> However, the assessment of sustainable transport measures using CBAs is not without difficulty.

**TABLE 2: OVERVIEW OF SELECTED STUDIES ON THE ECONOMIC VIABILITY OF SUSTAINABLE TRANSPORT MEASURES**

Study	BCR results
Congestion charging in London and Stockholm (Eliasson, 2009; Transek, 2006; TfL, 2007; Raux et al., 2012; Prud'homme and Bocarejo, 2005)	Stockholm: 1.2 - 7.9 London: 0.6 - 2.5
Expansion of the walking and cycling track network in Hokksund, Hamar and Trondheim (Norway) (Sælensminde, 2004)	Hokksund: 4.09 Hamer: 14.34 (up to 32.78 for a large increase in pedestrians and cyclists) Trondheim: 2.94
Review of 16 economic analyses of cycling and walking infrastructure improvements (Cavill et al., 2008)	The median BCR is 5, with a range from 0.4 to 32.5
Changes to the built environment in Dane County, Wisconsin (construction of sidewalks, Guo and Gandavarapu, 2010)	1.87
Cycling infrastructure in Portland, Oregon (Gotschi, 2011)	3.8 - 1.2

<sup>2</sup> Project appraisal may suffer from optimism bias, irrespective whether measures are sustainable or not. The BCRs listed in Table 2 have been discussed in scientific, peer-reviewed journal papers.

### 2.2.1 The benefits of sustainable transport measures are more-often associated with externalities

Sustainable transport measures are frequently justified because they provide the potential to reduce the externalities associated with motorised transport and thus provide social and environmental benefits. However, economic effects, either direct (investment or operational costs), or indirect (real estate value or health care costs) can be significant for sustainable transport projects, although many of these effects are not reflected in traditional CBAs (see 2.1.3).

Difficulties also arise in quantifying projects' effects (e.g. on the number of cyclists), especially for small-scale and soft measures and those involving new technologies. For example, because detailed data on pedestrians and cyclists is rarely widely available (see 2.2.4).

Some authors (e.g. Beria et al., 2012) suggest performing a CBA and evaluating soft effects with an MCA. However, the authors believe such an approach could lead to a separation of the environmental and social effects from the economic ones. Consequently, questions arise related to weighting the different results. It is questionable if environmental and social aspects will be prioritised above economic aspects. This is of particular relevance if infrastructure investments and sustainable transport schemes compete for funding and capacities, especially in times of constrained municipal budgets.

Sustainable transport measures address externalities of motorised traffic. Many effects of a sustainable transport measure are not reflected in a traditional CBA due to difficulties in their quantification and/or monetisation; often perceived as excessive in comparison with the costs of the measure itself.

### 2.2.2 For small scale, sustainable transport initiatives, CBAs are rarely conducted

Many sustainable transport measures are low-cost compared to large-scale infrastructure projects. Data and effort required to conduct a CBA – including a wide range of externalities – are excessive in comparison with the costs of the measure itself.

Existing standards for ex-ante evaluation of sustainable transport measures in European cities, such as the Strategic Environmental Assessments (SEAs) and Environmental Impact Assessments (EIAs) are not holistic, instead are limited to the impact on the environment – i.e. they consider only one dimension of sustainability. Other tools have been developed to assess the sustainability of the whole urban transport system such as benchmarking approaches, for which detailed sets of criteria have been developed (see Bongardt et al. 2011 for a worldwide review of approaches). Such tools are, however, rarely designed to assess single projects or measures.

Rarely is undertaking a CBA required by funding agencies. Instead, municipalities' justification for funding tends to respond to the funding agencies' requirements. For example, in the UK, applications for funding through the ring-fenced Local Sustainable Transport Fund (LSTF) must demonstrate value for money. There was however no standardised requirements how to do so. For these projects a simplified methodology that provides information on the potential costs and benefits based on available qualitative and quantitative data may be sufficient.

### **2.2.3 There is little evidence that the BCR of sustainable transport influences funding**

Although some funding may be contingent on BCRs, this may not always be the key factor in the decision-making process. Financiers will frequently consider non-monetary aspects, and might not necessarily allocate funding to projects with the highest BCR. However, little knowledge is available on whether BCRs of sustainable transport measures influenced their funding.

Cities are actively seeking to learn from one another and search for implementation experience from other cities. However, information available on websites, portals and good-practice guides is of mixed quality (Marsden et al., 2011). Cities primarily consider measures' specific impacts, such as congestion reduction or CO<sub>2</sub> mitigation or the general financial viability, rather than its BCR.

Sustainable transport projects are typically implemented to address specific problems (e.g. congestion, local air pollution) rather than because of a favourable BCR.

### **2.2.4 Assessment of sustainable transport measures suffers from a lack of data and a methodological guidance**

As shown in the European COST project 358, 'Pedestrian Quality Needs', little data on pedestrians is collected in European cities; where data is available, its usability is limited (Sauter and Tight, 2010). In general, assumptions usually have to be made regarding changes in demand associated with the policies and measures under investigation. Consequently, quantifying and monetising a project's real effects related to non-motorised transport is difficult and may be associated with inaccuracies.

Information about walking and cycling is less detailed than information about motorised and public transport. Consequently, assessment of such measures is challenging.

### 3. CASE STUDIES ABOUT PROJECT APPRAISAL IN DECISION MAKING PROCESSES

This chapter illustrates five examples of implementation of sustainable urban transport policies and measures within SUMP and the role of impact assessments in the respective policy making processes.

#### 3.1 Munich (Germany)

The German city of Munich and its outlying districts are experiencing a phase of rapid economic growth; resulting in more jobs and population growth. The Munich Transport Development Plan (TDP) was developed in this context.

##### 3.1.1 Background information about Munich's TDP

The seeds of Munich's TDP were sown in *Perspektive München* (Perspective Munich), the city's overall urban development concept, passed by the city council in 1998. *Perspektive München* was written with the guiding principles 'compact – urban – green' in mind, and as such proposed denser, mixed-use urban development clustered around public transport stations/stops (Interview, Koppen). Additionally, *Perspektive München* provided for five further key projects. One of which is the TDP (City of Munich 2001), whose development was led by the municipal Department of Urban Planning and Building Regulation, otherwise known as the 'Planning Department' (Referat Stadtplanung und Bauordnung, Kurztitel 'Planungsreferat', *ibid.*).

The TDP lays down the city's (major) policies and measures to shape local personal and goods transport, including specific commitments for each transport mode (City of Munich 2006). The plan is seen as an integral part of the urban planning process, and crucially, it is considered binding by the relevant public authorities.

A transport demand forecast for the year 2015 laid the groundwork for the TDP. This included a projection for trip numbers and their distribution based on forecasts of Munich's and the surrounding region's population, workplace distribution, urban development and considerations of socio-economic factors influencing mobility behaviour (Interview, Koppen). Moreover, the model incorporated the effect of a number of planned infrastructural measures which aim to shift traffic from private motorised and public transport to cycling and walking (such as bicycle parking).

The forecast was then complemented by three different "test scenarios". The first test scenario was based on the assumption of increased private motorised transport, the second assumed expanded public transport infrastructure and the third was based upon the promotion of "conscious" mobility, i.e. campaigns for pedestrian and bicycle traffic as well as mobility management.

Finally, the TDP stipulated a strategy which includes measures from the basic transport forecast, some measures to foster public transport (from test scenario 2) and additional measures to promote conscious mobility (from test scenario 3). In the following section, a selection of the policies stipulated for the various modes are listed.



#### Motorised private transport

- ◆ Completion of the road network, installation of junctions
- ◆ Expansion of the ring-road from 2 - 3 to 3 - 4 lanes in each direction
- ◆ Spatial and temporal variation of parking fees
- ◆ Expansion of urban areas with fee parking
- ◆ Car-park routing systems
- ◆ Resident-only parking areas
- ◆ Dynamic road traffic management.

#### Public transport

- ◆ Measures to increase commuter railway frequencies
- ◆ Construction of new and extension of existing lines
- ◆ Extension of underground lines
- ◆ Extension of existing and opening of new tramway lines
- ◆ Infrastructural measures to increase bus schedule speed
- ◆ Park-and-ride and bike-and-ride schemes, mostly at the city boundary in order to make commuting more convenient

#### Non-motorised traffic, soft and integrative measures

- ◆ Extension of bicycle route network (primarily radial and concentric), incorporating age and gender-adjusted measures
- ◆ Improvement of bicycle-public transport interchanges
- ◆ Cycling maps, marketing campaigns
- ◆ Designing attractive urban public spaces to stimulate walking
- ◆ Measures to increase social safety
- ◆ In-trip information for individual and public transport
- ◆ Mobility management, including: advisory measures, internet-based information dissemination, and a public transport failure contingency plan

The mobility management package includes classic measures to increase the whole transport system's efficiency, however, without explicit targets, as no political consensus could be found for them (Interview, Koppen).

### 3.1.2 The role of project appraisal in the policy making processes

In Germany, CBAs are obligatory for infrastructure schemes and part of the land use planning procedure. If a municipality aims to extend its public or motorised transport infrastructure, it may apply for funding by the federal state. If the CBA, which has to pursue a standardised appraisal procedure, resulted in a BCR below 1, the land use planning procedure would reject this infrastructure scheme.

Munich's Transport Development Plan includes a number of railbound infrastructure schemes and the results of the corresponding land use planning procedures became part of the TDP's project appraisal. According to city officials, local railbound transport infrastructure schemes have to cope with the BCR threshold, a phenomenon which they consider not to be specific for Munich. Whereas the standardised appraisal procedure resulted in BCRs greater than 1:1 for recent projects in case of overground solutions such as a tramway, underground appraisals failed to pass the CBA test, resulting in BCRs far below 1:1 even in the prosperous and growing city of Munich. City officials affirm that the standardised appraisal procedure had been developed to appraise the building

of new networks. As the city of Munich already provides a dense public transport network, additional benefits of network upgrading were marginal according to the standardised appraisal procedure (Interview, Koppen).

The decision making process within TDP development did not include CBAs beyond these obligatory assessments, as this would have been too expensive and time-consuming. However, the Munich's TDP would not endorse any policy or measure that has not undergone any kind of project appraisal. Most of the SUMP's soft policies and measures were appraised based on own estimates and qualitative impact assessments. Moreover, experience of previous projects and ongoing initiatives was an important part of the decision making process. For instance, over the last decades, the city has conducted CBAs for selective policies and measures, e.g. for commercial control over parking space, which generated a good BCR. Since then the city assumes these policies and measures to generally provide high value for money.

That said, project appraisal methods such as the CBA and their results are not the decisive factor for transport project endorsement. The overall concept for transport and mobility had been decided by the communal parliament and was worked out by city officials. The TDP's policies and measures had to follow the city's overall concept to avoid transportation needs and to shift away from motorised transport. Their implementation was discussed in public participation processes and reflected with politicians. Measures' budgets have to be passed by the municipal parliament anyway. Thus, sustainable transport is first of all a result of political commitment. In line with these guiding principles, policies and measures have to be worked out in a cost-effective way. If decisions were exclusively based on CBA results, infrastructure for motorised transport would have to be extended, as these schemes result in higher BCRs than many sustainable transport schemes (applying the standardised appraisal procedure).

### 3.2 Bristol (United Kingdom)

The 'West of England' brings together the Cities of Bristol and Bath and their immediate hinterland for the purposes of a range of plans and strategies – including the development and deployment of sustainable transport solutions. The area is the major city-region in the south west of England, home to over a million people and supporting half a million jobs. It represents around a quarter of the region's economy. It is a strategic location, serving as a transport gateway for the region, with key transport hubs around mainline railway stations, an airport and ports. It is economically successful and growing, but suffers from common urban transport issues, such as congestion, unreliable journey times (impacting on business), and environmental and health problems. It experiences particularly high levels of car-based commuting, (around two thirds of journeys to work).

Local government in England uses a planning approach known as Local Transport Plans (LTP) to respond to transport issues and needs. This can be seen to cover similar territory to a SUMP in Europe. Where it is appropriate, neighbouring authorities can come together to address shared transport goals, as in the case of the 'West of England'. Here four authorities (including Bristol) have cooperated on a Joint Local Transport Plan (JLTP), with the current implementation covering the period 2011-2026 (referred to as LTP3 as it is the third cycle of LTP planning since it came into being in 2001). The LTP underpins transport strategy, and gives direction to investment in transport resources. It has though been supplemented over recent years by a series of competitive funding streams from central government on specific (sustainable)

transport initiatives. These have included the 'Local Sustainable Transport Fund' (LSTF) 2013-2015 and the 'Cycle City Ambition Grants' (awarded 2013 for spending by 2015). Bristol and the West of England grouping have successfully bid to both of these latter funding schemes.

### 3.2.1 Background information about the JLTP

The West of England JLTP sets out five key transport goals, which are to:

- ◆ Support economic growth;
- ◆ Reduce carbon emissions;
- ◆ Promote accessibility;
- ◆ Contribute to better safety, security and health; and
- ◆ Improve quality of life and a healthy natural environment.

Measures in the JLTP include:

- ◆ Implementation of a 'high quality' bus network;
- ◆ A new 'rapid transit network' on key routes, using low-carbon vehicles;
- ◆ Expansion of park-and-ride network;
- ◆ Introduction of 'Smartcard' ticketing to the transport network;
- ◆ Better interchanges between bus, rail, cycling, walking and car trips;
- ◆ More suburban rail services with new lines and stations;
- ◆ Electrification of mainline routes into the area from London and Wales;
- ◆ Improvements to walking and cycling networks (safer, more convenient);
- ◆ 'Demand management' to encourage the use of lower carbon transport;
- ◆ Public realm enhancements in town, city centres and neighbourhoods;
- ◆ Freight consolidation centres to reduce city centre freight movements;
- ◆ Extension of nascent electric and hydrogen charging networks.

Specific goals in the LSTF funding bid were to:

- ◆ Increase accessibility, particularly to employment opportunities;
- ◆ Reduce congestion and improve travel options (tackling air quality and safety)
- ◆ Create opportunities for physical activity through walking and cycling.

Measures proposed in the LSTF programme included:

- ◆ 'Area Travel Plans' focussed on employers in major areas of business growth.
- ◆ Provision of low-carbon vehicles for travel during the course of work.
- ◆ Personal travel planning for people moving into new residential developments.
- ◆ Measures to reduce car trips to school, and travel planning for school leavers
- ◆ Measures to offer alternatives to the car for over 65,000 students in area;
- ◆ More sustainable travel options for rural residents (especially the young).

The bid for Cycle City Ambition Fund monies looked to build on the 'cycling culture' developing from earlier cycling programmes, contributing to existing goals of increasing cycling by 78 per cent (over the period 2008-2016). The bid identified benefits in health and wellbeing, reduced carbon emissions and more sustainable mobility across the area. Measures focused on (strategic) cycle routes connecting commuters with employment areas in Bristol city centre and on the urban fringe to the north of the city, whilst in the neighbouring city of Bath the investment was at the heart of the urban

cycle network - where multiple routes converged. The bid included physical infrastructure such as new bridges, and segregated cycle routes.

As noted, both the LSTF and Cycle City bids were successful in winning government funding.

### 3.2.2 The role of project appraisal in the policy making processes

The appraisal process underlying transport investment in England considers five 'cases' that make up the overall 'Business Case'. These are:

- ◆ Strategic case – the fit with wider public policy objectives
- ◆ Economic case – is it value for money
- ◆ Commercial case - is it commercially viable
- ◆ Financial case - is it financially affordable
- ◆ Management case - is it achievable

The assessment process needs to comply with Department of Transport (DfT) guidance (available online through WebTAG) and use an 'approved' transport model to provide outputs on expected outcomes from interventions. WebTAG applies to all transport measures for which funding is sought from the DfT. The WebTAG process includes a CBA assessment and a table of non-monetised factors. The final decision is therefore a qualitative one, although the BCR carries considerable weight and must always be greater than 1:1.

#### ASSESSMENT IN THE LTP (3) PROCESS

The LTP is primarily seen as a strategy document, incorporating a range of proposed and desired interventions that will aid more sustainable mobility in the plan area. Some of these interventions may be more likely to be implemented than others, which may be more aspirational. As a consequence, it is not a requirement to submit a cost benefit analysis with the LTP itself, although the subsequent funding requests to implement measures will follow the approach described above. This will include CBA as well as 'non-monetised' factors, and results will be presented in a combined format in a one page Appraisal Summary Table.

#### ASSESSMENT IN THE LSTF BID PROCESS

The projects included in the LSTF bid by the West of England were first 'health checked' and refined using the Early Assessment and Sifting Tool (EAST<sup>3</sup>) also developed by the DfT. This spreadsheet-based tool looks to provide a uniform format for assessing the costs and impacts of all transport-related options. It provides a mechanism aimed to identify - at a high level, the nature and extent of all the economic, environmental and social impacts of options, and in addition the distributional effects of many of them. Economic factors considered by the tool include: will journeys get shorter, quicker

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<sup>3</sup> EAST is a DfT approved decision support tool that has been developed to quickly summarise and present evidence on options in a clear and consistent format. It provides relevant, high level, information to help decision-makers form an early view of how options perform and compare. For example options may be compared within modes or across modes, geographical areas and networks.

and/or cheaper, and will the measure impact on the day to day variability in journey times or the average minutes of lateness? The EAST process includes CBA using WebTAG methods. In the case of the LSTF, the assessments required by EAST were further developed as supporting justification for the proposed projects in the Business Case of the bid.

In addition, the Health Economic Assessment Tool (HEAT) developed by the WHO was used to assess the physical activity impact of measures. Cycle measures were also appraised based on an approach modelling a 'mode shift' to cycling against traffic levels and public transport use. The final 'Economic Case' supporting the overall LSTF bid suggested that it would deliver 'high value for money' with a Benefit to Cost Ratio (BCR) of 6.21:1 (Halcrow 2011). The most significant (monetised) benefits in the economic case were travel time savings and reductions in 'vehicle operating costs'. Health benefits from increased walking and cycling were appraised, with respective BCRs of 5.71 and 2.95, although these were not monetised in the Appraisal Summary Table.

### ASSESSMENT IN THE CYCLE CITY AMBITION FUND BID PROCESS

A similar approach was taken for this bid as was used for the LSTF. The 'value for money' assessment of the scheme used a combination of data and transport models (including evidence from previous schemes in the West of England area) to estimate demand and a wide range of benefits covering time savings, health, ambience, decongestion and air quality. The HEAT tool was used to assess physical fitness benefits. The main benefits of the proposals following this appraisal were seen to be in respect of decongestion (travel time, journey reliability) and health (physical fitness) was monetised in this bid. In the economic case submitted with the bid it was suggested that the interventions would result in a BCR of 12.56:1 (Halcrow 2013).

In conclusion, the JLTP prepares decision making by introducing the key transport goals and connecting it to potential (bundles of) measures. Project appraisal is part of the implementation procedure and as such does not influence political decision making. However, authorities may use some form of BCR as a way of ranking proposals to be included in the JLTP, or they may have already put together plans for an intervention (with economic costing and BCR) in preparation for funding bids, and then include these projects as potential deliverables under the JLTP.

## 3.3 Utrecht (Netherlands)

Utrecht is one of the four largest cities of the Netherlands and due to its central geographic location it is a crucial national transport node. Besides the residents (approximately 330,000) a substantial number of commuters, leisure travelers and students make use of the public transportation network, the cycling -, pedestrian - and car infrastructure every day. For example, Utrecht central station is the main train station in The Netherlands and handles about 285.000 passengers each day (Website Prorail). Therefore a properly balanced urban mobility planning for the city of Utrecht is crucial to manage these transport flows.

### 3.3.1 Background information about Utrecht Bereikbaar

In 2008, major road construction works were initiated on the A2, which is the biggest motorway in the Utrecht region. To prevent significant nuisance, different mobility management initiatives were implemented, most of them within the framework of Utrecht Bereikbaar (Utrecht Accessible). Though the main aim of Utrecht Bereikbaar is

to keep the city accessible during road construction, the measures applied have a much broader scope and objective. An important element of the Utrecht Bereikbaar is the Utrecht Bereikbaar Pass, a card that provides access to bus, tram, train, public bicycles, internet hotspots, express coaches and Park and Ride facilities. The Utrecht Bereikbaar Pass is implemented in close cooperation with large companies located in the metropolitan area.



**FIGURE 2: THE UTRECHT BEREIKBAAR PASS.**

#### Objectives

- ◆ The main objective of Utrecht Bereikbaar was to ensure accessibility during the road works.
- ◆ This main objective however fitted very well in the general objective of Utrecht to develop more sustainable transport and stimulate other modes of transport than cars.
- ◆ The target was 2,000-4,000 fewer cars on the road during peak hours during the road construction, with 40% of the passholders using the pass three or more days a week. Results show that 40% of the passholders had previously travelled by car, leading to a reduction in car traffic of approximately 5,000 cars a day (EPOMM 2013).
- ◆ A central station that is ready for future transport flows (+/- 360,000 passengers per day)
- ◆ Cycling as primary mode of transport in the city (Utrecht 2012).

#### Measures

- ◆ Utrecht Bereikbaar pas. The business sector has recognized this project as a business-led initiative, rather than a governmental project. Some 20,000 employees received the Utrecht Bereikbaar Pass, which provided access to bus, tram, train, public bikes, internet hotspots, express coaches and Park and Ride facilities. After the financial support of the governments ended, the private sector did continue with the Utrecht Bereikbaar Pas (Interview, Degenaar). The 'Rijkswaterstaat' (Ministry of Transport) and the province and city of Utrecht coordinated their transport communication efforts, including real-time traffic information.

- ◆ Central station. The entire station and the entire area surrounding the central station are redesigned and reconstructed as part of the station redevelopment.
- ◆ Tram/bus line improvement. One of the measures was the construction of the 'Uithoflijn', between the city centre and the Utrecht university campus. This measure is however not specifically part of the SUMP (construction started 2012), though it contributes to the overall green transport policy of Utrecht and to the stimulation of sustainable transport in Utrecht.
- ◆ Cycling promotion. Construction/improvement of complete bicycle lane network in, through and surrounding the city center. Stimulate cycling via promotional campaigns.

### 3.3.2 The role of project appraisal in the policy making processes

All (large) infrastructural projects, whether it is road infrastructure or public transport infrastructure require a cost-benefit analysis according to the 'OEI-guide'. The decision to either construct or not construct for example a new highway or a new train track needs to consider the societal cost benefit analysis (SCBA). The results of the SCBAs are taken into account in the political debate on the decision making process. It might be that the results of the CBAs are leading and binding within the decision making process, though that is not always the case in the Netherlands.

In the Utrecht case, CBAs have been carried out for various parts of the infrastructural developments. The CBA, carried out by 'Rijkswaterstaat', analysed in this case study was not carried out before the project like the normal procedure is, but was carried out afterwards. The CBA was used to provide insights and contribute to the discussion whether or not to continue with the pas (Interview, Degenaar). Based on the fact that the CBA showed high costs compared to the benefits of the Utrecht Bereikbaar Pas, the governmental institutions decided to stop funding the Utrecht Bereikbaar Pas. The principle of the pas did however continue on a private base. The CBA did focus on the number of 'spitsmijdingen' (less cars on the road during peak hours) on the main highways. These 'spitsmijdingen' are considered the main benefit by 'Rijkswaterstaat', who is responsible for the highway network (Interview, Degenaar). The benefits are compared to different cost levels. Basic level is the direct costs of the Pas, which are the payments to the transport companies, the marketing and communication and overhead costs. Next to that, also indirect costs were added to various cost scenarios such as investments in park & ride and part of highway infrastructure (Interview, Degenaar).

Other cost benefit analyses that have been carried out are the CBA for the Uithof tramline, which has been analysed with a societal cost benefit analysis. For the highway expansions surrounding Utrecht CBAs have been carried out and for various, separate parts of the central station developments cost benefit analyses have been carried out.

## 3.4 Kaunas (Lithuania)

Kaunas is the second largest city in Lithuania with a population of approx. 307,000 covering 157 km<sup>2</sup> and with a population density of 1,955 inhabitants per km<sup>2</sup>. With its geographical location at the centre of Lithuania, the largest cargo airport in the Baltic States and the country's main station for the planned TEN-T Rail Baltica project, Kaunas is a main logistics hub for the region. The city faces some challenging issues relating to city development, traffic congestion, and public transport improvements.

### 3.4.1 Background information about transport policy in Kaunas

Implementation of a SUMP in the city has yet to start. All Lithuanian cities are waiting for SUMP guidelines to be issued by the Ministry of Transport and Communications which should be ready and finalised before the end of 2014. The Lithuanian SUMP requirements and guidelines will be based on the main provisions of the EU's Green Paper, White Paper, and Action plan on urban mobility which will be integrated into existing strategic transport documents. SUMP development will be based around already established city planning processes and closely linked to a city's Master-Plan. Kaunas has a new city master plan for the period 2013-2023.

However, urban transport and mobility issues have to be solved at city administration level, which means that decision makers at national level can only provide guidelines and directives but ultimately cannot enforce it in cities. They provide some incentive to encourage SUMP implementation by providing funding. Cities can prepare a budget and apply for funds that have been set aside for sustainable transport activities; all allocation of such funding is carefully managed and evaluated to make sure that SUMP development will actually happen.

At local level public transport operators (PTO) play an important role in campaigning for sustainable transport. PTO form local public transport policy in Kaunas. They have participated in international projects such as CIVITAS VIVALDI, and continue to transfer good practise among PTO in other countries. They also implement innovative systems (route maps, electronic ticket system etc.), and try to make public transport convenient, attract more public transport users and encourage more commuting trips by public transport.

### 3.4.2 The role of project appraisal in the policy making processes

Actors in Kaunas have been actively contributing to EU transport and mobility projects since 2002. Many of these projects have helped the city to develop a strong participatory process and contributed to the availability of information. The development of the Master Plan (which will help to form the main priority areas for future SUMP development) included public presentations of the schemes and ideas that went into the final City Master Plan (2013-2023).

The main themes of this will be to reduce private car usage, to increase quality and quantity of public transport journeys, substantial increase and improvement to the city's cycling infrastructure, and a revival of the historic old town. It is expected that all of these themes will provide the city with a higher quality of life along with a reduction in CO<sub>2</sub> emissions (in line with EU and national targets). A revival of the historic old town is also expected to include a rethink on city parking. This is in line with a newly approved city Special Plan on car parking, which aims to reduce congestion and decrease noise and NO<sub>x</sub> particulates.



Many of the transport initiatives are based on EU regulations governing clean air and clean vehicles. Some periodical surveys related to public transport and travel patterns in the city contribute to PTO's decision making. Also Kaunas Technical University (one of the biggest in the Baltic States) has recently produced Lithuania's first University Mobility Plan. It is expected that this will play a role in determining specific area parking demands as well as determining where to improve pedestrian and cycling routes.

In September 2014, Kaunas signed a declaration as part of a United Nations' initiative (UNECE THE PEP), to change its parking policy to ensure that income received for parking charges is spent on sustainable transport improvements in the city such as cycling infrastructure and pedestrian routes. It expects to report back to the UNECE on the impact of this initiative by 2019.

The local transport policy is mainly based on political "wisdom" together with rough impact assessments on what are considered to be the most important transport and mobility measures in the city. The development of a city SUMP as a prerequisite for national funding, may help to foster a greater set of complementary sustainable transport initiatives, which in turn will provide the city with a clear focus for a sustainable future.

## 3.5 Piran (Slovenia)

Municipality of Piran is one of three coastal municipalities in the Republic of Slovenia. It has around 17,000 inhabitants and covers almost 45 km<sup>2</sup>. It has long been active in the field of sustainable mobility; as a tourist town with very specific geography of the historic centre it has had to react to a worsening transport and accessibility situation. The city of Piran is unique in Slovenia and wider. It has a dense historic structure, is situated on a peninsula, has many spatial limitations for access, very concentrated population and a strong influence from tourism. All of these elements are a great challenge for transport planning in the area.

### 3.5.1 Background information about the SUMP

SUMP for the Municipality of Piran was prepared in 2012 within the Adria.MOVE IT! project within the IPA Adriatic Cross-Border Cooperation Programme. Some of the measures defined in the SUMP were financed already through the Adria.MOVE-IT! project - that is some of the measures stipulated in the SUMP were also Adria-MOVE-IT measures, as the project was their source of financing. As described on the project website: "it joins together Adriatic coastal cities which face similar issues when it comes to mobility due to specific spatial and historical circumstances. Congested traffic is the result of the historical heritage of compact cities at unique spatial location which were not designed for car use, and tremendous increase of population in peak tourist season. With transfer of best practices and joint solutions on sustainable mobility transfer of good practice among similar cities will be ensured and money will be more effectively spent" (Website Adria.MOVE IT!).

Development of the SUMP was based on a number of previous transport studies such as Transport demand forecast prepared as an input for Strategic spatial plan (2008), Expert basis for development of parking and public transport policies (2008) and Parking strategy for the Municipality (2009). The SUMP is also well coordinated with the Strategic spatial plan (2010).

Objectives of SUMP have been set for the next 5 years:

1. To reduce the share of personal motorized traffic within the city of Piran by 40%.
2. To reduce the share of personal motorized traffic on the city entrances by 5%.
3. To reduce the average time of vehicles staying within the city of Piran by 30%.
4. To reduce the occupancy of parking spaces by 50%.
5. To improve accessibility to intermodal nodes: 70% of inhabitants within 10 minutes radius.
6. To reduce the level of motorization to not more than 1 car per housing unit.

SUMP measures in Piran are planned to be implemented in several steps. First phase of implementation includes the measures developed within project Adria.MOVE IT! These measures have started to be implemented in 2012 and were finished in 2013. In the second phase new organizational and other measures are planned. Implementation of measures in this group will start after the formal approval of SUMP. It was recommended that measures in this phase were implemented parallel with the first phase. Measures in the third phase are investment measures to assure appropriate number of parking spaces for inhabitants and visitors of Piran. Implementation of these measures depends on assuring the needed funding (public or private) and spatial planning procedures.

#### 1. Phase – Measures of the project Adria.MOVE IT!

- ◆ Improvements of accessibility and competitiveness of bus connection Piran-Fornače
- ◆ Bike sharing scheme
- ◆ Logistic platform with electric vehicle for goods delivery

#### 2. Phase – SUMP measures

- ◆ Establishment of the Board for sustainable mobility
- ◆ Development of system for transparent implementation and financing of measures
- ◆ Improvements of accessibility of the bus system
- ◆ Network of bike lanes in Piran
- ◆ Network of fast bicycle connections
- ◆ Leaflet with a map of connections, mobile and web application
- ◆ Covered bike parking facilities at important bus stations and stops
- ◆ Organization of Pedibus service
- ◆ New urban furniture in public spaces
- ◆ Additional connections for pedestrians
- ◆ Evaluation of existing public spaces with focus on people with disabilities
- ◆ Measures of payment policy for decrease of motorization
- ◆ Gradual decrease of parking space usage (decrease of long term parking) with pricing

#### 3. Phase – Investment measures

- ◆ New parking garages and other facilities in Piran and complete elimination of long term parking in the city
- ◆ Relocation of parking facility Fornače

### 3.5.2 The role of project appraisal in the policy making processes

SUMP is a new topic in Slovenia and its preparation process doesn't normally include CBA. National guidelines on SUMP suggest use of simple appraisal of possible measures against the objectives as part of measure selection process. However, CBA is used later in the implementation process on the measure level and it is formally requested for bigger infrastructural projects.

SUMP for Piran is an exception among such documents developed so far in Slovenia, as CBA has been implemented for the measures in the first phase. CBA was conducted for appraisal of the following projects:

1. Improvements of accessibility and Competitiveness of bus connection
2. Bike sharing scheme
3. Logistic platform with electric vehicle for goods delivery.

CBA was conducted after the selection of measures (Občina Piran 2012). Its purpose was primarily to show the predicted effects of the measures and thereby support implementation of the measures. Measures in the following two phases of SUMP were not subject to the CBA. Reasons for this approach are not known.

In conclusion, the development of the SUMP was one of the main outputs promised in Adria.MOVE IT! project application. It was reckoned that SUMP's add value to the application's evaluation. The need to implement the measures was deemed obvious and CBA or any other project appraisal did not influence the decision making.

## 4. CONCLUSIONS

Ex-ante transport-project appraisal always involves a substantial amount of uncertainty. This is true for large-scale infrastructure projects as well as for smaller smart measures. Moreover, as the pressure to present business cases as favourably as possible is great, ex-ante predictions may often differ considerably from reality.

Both literature and case studies suggest the conclusion that CBAs are rarely undertaken to test completely objectively the performance of significantly alternative measures, but rather to support a policy 'path' that has already been taken implicitly or in principle, if not by decision and statute. In part this is because the effort required to conduct a CBA may only be accepted if the implementation of a measure is likely (or already approved). By the time a local authority commissions a CBA, they have already invested considerable financial and political capital in developing a scheme to which CBA can be applied.

These assumptions apply equally to both 'traditional' and sustainable transport schemes. However, the authors posit and the case studies confirm that CBA appraisal procedures may favour traditional transport investments (e.g. road expansion) over small-scale sustainable projects, or discourage the inclusion of complementary sustainable transport measures within traditional transport projects.

The case studies illustrate current decision-making. SUMPs provide the opportunity for an initial assessment of the potential cost and benefits in the measure-selection process and thereby to test the performance of alternative measures. In so doing, SUMPs can stimulate the consideration of small and complementary measures. For instance, in the cases of Munich and Bristol, political decisions and the local SUMP initiated a measure selection process focusing on bundles of complementary measures with the potential to promote genuinely-sustainable mobility. CBAs were in these cases reduced to a means to apply for funding for public transport infrastructure. But equally, SUMPs could be used to provide a 'green cloak' to what might otherwise be considered an (unsustainable) infrastructure investment programme.

Wider socio-economic and environmental benefits are more difficult to quantify than direct economic benefits, for which reason CBAs rarely encapsulate the full range of externalities. Sustainable transport initiatives are often small-scale and focus on reducing external costs. For these potentially highly cost-effective small-scale projects, CBAs might be too expensive e.g. due to the quantification and monetisation of externalities.

However, bundling of sustainable transport measures/initiatives (e.g. in the SUMP process) can be used to increase overall socio-economic benefits. It is essentially a way of achieving funding to deliver policy objectives whilst working within an appraisal system originally set up for other purposes. It provides a way forward whilst institutionalised funding processes and appraisal approaches struggle to adopt a more contemporary response to current requirements.

1. Current appraisal practices can fail to deliver the most sustainable responses to mobility needs, because they fail in their attempts to calculate and therefore deliver 'best value for money' over the long-run.
2. Sustainable transport measures may deliver significant benefits for society and high value for money, but their implementation is often inhibited by difficulties in assessing their socio-economic value.
3. SUMP focus on the realisation of crucial qualitative outputs. It is therefore necessary to recognise the limitations of appraisal and the need to adopt a more appropriate (i.e. less complex) initial assessment of the potential costs and benefits during the measure selection process.
4. SUMP bundle together complementary and mutually reinforcing measures into an integrated package. Standard appraisal processes focus on defined (normally singular) projects and do not transfer easily to SUMP.

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