



EUROPEAN COMMISSION

DIRECTORATE-GENERAL

REGIONAL POLICY

Thematic development , impact, evaluation and innovative actions

Evaluation and additionality

The New Programming Period 2007-2013

**GUIDANCE ON THE METHODOLOGY FOR CARRYING OUT
COST-BENEFIT ANALYSIS**

Working Document No. 4

August 2006

Table of contents

1. SCOPE OF THE GUIDELINES.....	3
2. GENERAL PRINCIPLES OF COST-BENEFIT ANALYSIS.....	4
2.1 Cost-benefit analysis and major projects.....	5
2.2 Elements to be included in the cost-benefit analysis.....	5
2.2.1 Definition of objectives, project identification and results of feasibility studies	5
2.2.2 Financial analysis.....	6
2.2.3 Economic analysis	9
2.2.4 Sensitivity and risk analysis.....	11
3. DETERMINATION OF THE EU GRANT	12
3.1 Regulatory framework.....	12
3.2 Scope	12
3.3 Rationale of the funding gap method	12
4. SPECIFIC ISSUES.....	13
4.1 Normally expected profitability	13
4.2 Polluter Pays Principle	15
4.3 Equity (affordability).....	15
4.4 Public Private Partnership (PPP).....	16
5. CONCLUDING REMARKS.....	17
6. GLOSSARY	18
7. REFERENCES	19
ANNEX I: PUBLIC PRIVATE PARTNERSHIP (PPP)	20
ANNEX II: EQUITY (AFFORDABILITY)	21
ANNEX III: DETERMINATION OF THE EU GRANT: A NUMERICAL EXAMPLE	22

1. SCOPE OF THE GUIDELINES

The objective of this document is to present a set of working rules which will lead to more consistency and rigour in future cost benefit analyses (CBA) for ERDF and Cohesion Fund applications and hence to better informed decision making.

It is intended for use by managing authorities who commission cost-benefit analyses or undertake them internally. However, it is not intended as a guide or a manual on the conduct of cost-benefit analysis¹.

The working document clarifies some general principles of CBA for major projects and the process of determining the EU grant for all projects. It builds on the practice gained in project appraisal during the previous programming periods, while taking into account the new regulatory context for the 2007-2013 period.

Article 40(e) of Regulation 1083/2006 stipulates that the presentation to the Commission of major projects for financial support under the Structural Funds or the Cohesion Fund (hereinafter, “the Funds”) **must be accompanied by information concerning the cost-benefit analysis**. The Commission is required to provide indicative guidance on the methodology for the cost benefit analysis.

With regard to revenue-generating projects, the Commission has proposed to simplify and realign the method (the so-called “funding-gap method”) for determining the rate of assistance from the Funds for revenue-generating projects. In this regard, it responds to criticisms of inconsistency raised by the European Court of Auditors. Also, standardised application forms for infrastructure and productive investment are annexed to the Commission implementing Regulation [NNNN/2006].

In order to ensure consistency within a Member State, it is proposed that Member States develop their own guidance frameworks taking account of specific institutional settings, particularly for the transport and environment sectors.

The first part of the working document refers to the general principles of cost-benefit analysis and outlines the elements to be considered as part of the project application submitted to the Commission services for approval. The second part of the document provides guidance on determining the basis on which the EU grant will be established. The third part deals with particular issues relating to the profitability that would normally be expected, the polluter pays principle, affordability and public private partnerships.

¹ In 2002, DG REGIO updated “Guide to cost-benefit analysis of investment projects” for ERDF, ISPA and the Cohesion Fund. It is available on Inforegio.

2. GENERAL PRINCIPLES OF COST-BENEFIT ANALYSIS

The purpose for requiring CBA for major projects is twofold. First, it must be shown that the project is desirable from an economic point of view and contributes to the goals of EU regional policy. Second, evidence should be provided that the contribution of the Funds is needed for the project to be financially viable. The appropriate level of assistance should be determined on this basis.

CBA is an essential tool for estimating the economic benefits of projects. In principle, all impacts should be assessed: financial, economic, social, environmental, etc. The objective of CBA is to identify and monetise (i.e. attach a monetary value to) all possible impacts in order to determine the project costs and benefits; then the results are aggregated (net benefits) and conclusions are drawn on whether the project is desirable and worth implementing. Costs and benefits should be evaluated on an incremental basis, by considering the difference between the project scenario and an alternative scenario without the project.

The impact must be assessed against predetermined objectives. By evaluating a project against microeconomic indicators, CBA can assess its consistency with and relevance to specific macroeconomic objectives. In the regional policy context, CBA is applied to assess the relevance of a given investment project to EU regional policy objectives.

The level of analysis used in CBA must be defined with reference to the society in which the project has a relevant impact. Costs and benefits may be borne and accrue at different geographical levels, so a decision has to be taken on which costs and benefits should be considered. This typically depends on the size and scope of the project. Municipal, regional, national and even EU level impacts can be considered.

When estimating the potential impacts of a project, analysts always face uncertainty. This must be properly taken into account and dealt with in CBA. A risk assessment exercise is an essential part of a comprehensive analysis, as it enables the project promoter to better understand the way the estimated impacts are likely to change should some key project variables turn out to be different from those expected. A thorough risk analysis constitutes the basis for a sound risk-management strategy, which in turn feeds back into the project design.

2.1 Cost-benefit analysis and major projects

Article 40(e) of Reg. 1083/2006 requires the Member State (or the managing authority) to provide the Commission with a CBA for major projects. There are two main reasons why CBA is required for major projects:

1) To assess whether the project *is worth* co-financing

Does the project contribute to the goals of EU regional policy? Does it foster growth and boost employment? In order to check this, it is necessary to carry out an economic analysis and look at the effect on economic indices estimated by the CBA. A simple rule is: if the project's economic net present value (ENPV) is positive, then the society (region/country) is better off with the project because its benefits exceed its costs. Therefore, the project should receive the assistance of the Funds and be co-financed if needed (see below).

2) To assess whether the project *needs* co-financing

The fact that a project contributes positively to EU regional policy objectives does not necessarily mean that it has to be co-financed by the Funds. Besides being desirable from an economic standpoint a project may also be financially profitable, in which case it should not be co-financed by the Funds. To check whether a project needs co-financing requires a financial analysis: if the financial net present value of the investment without the contribution of the Funds (FNPV/C) is negative then the project can be co-financed; the EU grant should not exceed the amount of money that makes the project break even, so that no over-financing occurs.

Basically, the Member States are required to submit a CBA to the Commission services for major projects to provide evidence that, in the framework of EU regional policy objectives, the project is both desirable from an economic point of view ($ENPV > 0$) and needs the contribution of the Funds in order to be financially feasible ($FNPV/C < 0$).

2.2 Elements to be included in the cost-benefit analysis

The European Commission's "Guide to cost-benefit analysis of investment projects" should be considered as the main reference and can provide the reader with a thorough treatment of the subject. The aim of this section is to provide a brief overview of the main elements that should be included in the CBA reports to be submitted to the Commission.

2.2.1 Definition of objectives, project identification and results of feasibility studies

Once a need has been identified, the next step must be to define clear objectives. Different project options should then be put forward and assessed according to how well they meet these objectives.

A project can be defined as an operation comprising a series of works, activities or services intended in itself to accomplish an indivisible task of a precise economic or technical nature, which has clearly identified goals. The project needs to be clearly

identified as a *self-sufficient unit of analysis*. This entails that in some cases certain sub-projects should be considered as one large project for the purpose of CBA, particularly when a given construction phase for which the assistance of the Funds is requested cannot be regarded as being operational in its own right. If appropriate, network effects may be included in the analysis.

Evidence should be provided that the selected project is the most suitable alternative between the options considered. This information should typically be found in the results of the feasibility studies that have to be presented to the Commission under Art. 40(c).

Also, in the context of EU regional policy, the coherence of the project with the objectives of the operational programme/priority axis has to be shown.

A project is defined as a “**major project**” when its *total cost* exceeds (Art. 39):

- €25 million in the case of environment;
- €50 million in other fields.

2.2.2 Financial analysis

The main purpose of the financial analysis is to compute the project’s financial performance indicators. This is usually done from the point of view of the owner of the infrastructure. However, when the owner and the operator are not the same entity, a consolidated financial analysis should be considered. The methodology to be used is discounted cash flow (DCF) analysis. There are two main features of the DCF method:

1. Only *cash flows* are considered, i.e. the actual amount of cash being paid out or received by the project. Thus, for instance, non-cash accounting items like **depreciation and contingency reserves must not be included in the DCF analysis**. However, if the proposed project is supported by a detailed risk analysis, contingencies can be included in the *eligible cost*, without exceeding 10% of the total investment cost net of contingencies. Yet, contingencies should never be included in the costs considered for the determination of the funding gap, as they do not constitute cash flows.

Cash flows must be considered in the year in which they occur and over a given **reference period** (see box below). When the actual economically useful life of the project exceeds the reference period considered, a **residual value** should also be taken into account. Ideally, this should be calculated as the present value of expected net cash-flows during the years of economic life outside the reference period.

THE REFERENCE PERIOD

The reference period is the number of years for which forecasts are provided in the cost benefit analysis. Project forecasts should cover a period appropriate to its economically useful life and long enough to encompass its likely longer term impacts. The lifetime varies according to the nature of the investment. The reference time horizon by sector – based on internationally accepted practice and recommended by the Commission – is provided below:

Sector	Reference time horizon	Sector	Reference time horizon
Energy	15-25	Roads	25-30
Water and environment	30	Industry	10
Railways	30	Other services	15
Ports and airports	25		

- When aggregating (i.e. adding or subtracting) cash flows occurring in different years, the time value of money has to be considered. Therefore, future cash flows are discounted back to the present using a time-declining discount factor whose magnitude is determined by the choice of the discount rate to be used in the DCF analysis (see box below on choosing a discount rate).

As mentioned above, CBA uses the **incremental method**: the project is evaluated on the basis of the differences in the costs and benefits between the scenario with the project and an alternative scenario without the project. However, when the project falls under a pre-existing revenue-generating infrastructure, the application of the incremental method may prove to be difficult or even unworkable. In such a case, the Commission suggests that the **method of remaining historical costs** is used in the financial analysis:

- the scenario without the project is that without any infrastructure;
- the scenario with the project takes into consideration, on the one hand, the cost of investment not only of the new element of infrastructure but also of the infrastructure that already exists estimated at its *current residual value* and, on the other hand, all the income generated by all infrastructure after the project. Operating costs and revenues considered for the entire infrastructure must be those of a scenario of efficient operation.

When appropriate, the current residual value of the existing infrastructure can be calculated as the present value of debt service payments on outstanding loans.

The financial analysis carried out as part of a major project's CBA should particularly aim to:

- Evaluate the **financial profitability of the investment** and own (national) capital
- Determine the appropriate (maximum) **contribution from the Funds**
- Check the **financial sustainability** of the project

The financial profitability of the investment can be assessed by estimating the financial net present value and the financial rate of return of the investment (FNPV/C and FRR/C). These indicators show the capacity of the net revenues to remunerate the investment costs, regardless of the way these are financed. For a project to require the contribution of the Funds, the FNPV/C should be negative and the FRR/C should thus be lower than the discount rate used for the analysis.²

When computing the financial profitability of own (national) *capital* (FNPV/K, FRR/K), the financial resources - net of EU grant - invested in the project are taken as outflows instead of the investment costs. Capital contributions should be considered at the moment they are actually paid out for the project or reimbursed (in the case of loans).

THE DISCOUNT RATE

The discount rate used in the financial analysis should reflect the *opportunity cost of capital* to the investor. This can be thought of as the foregone return on the best alternative project.

The Commission recommends that a 5% financial discount rate in real terms is used as an indicative benchmark for public investment projects co-financed by the Funds. The downwards revision compared with the 2000-2006 programming period reflects changing macroeconomic conditions in the EU.

Values differing from the 5% benchmark may, however, be justified on the grounds of:

- the Member State's specific macroeconomic conditions;
- the nature of the investor: for instance, the discount rate can be higher for PPP projects, where the inclusion of private funds may increase the opportunity cost of capital.
- the sector concerned (e.g., transport, environment, energy, etc.).

The actual (weighted average) cost of capital for a given project should be considered as a lower limit.

It is of utmost importance that consistency is ensured amongst the discount rates used for similar projects in the same region/country. The Commission encourages the Member States to provide their own benchmark for the discount rate in their guidance documents. This reference must then be applied consistently.

It has to be noted that when the discount rate is expressed in *real terms*, the analysis should be carried out at *constant prices* accordingly. If necessary, changes in relative prices need to be taken into account. If *current prices* are used instead, then a *nominal* discount rate must be employed.

The determination of the EU grant is done in accordance with the provisions of Art. 55. Project revenues must be properly taken into account so that the Funds contribution is modulated according to the project's gross self-financing margin and no over-financing occurs. The determination of the EU grant and the underlying "funding gap" method is treated in section 3.

The financial sustainability of the project should be assessed by checking that the cumulated (undiscounted) net cash flows are positive over the entire reference period considered. The net cash flows to be considered for this purpose should take into account

² This is, however, not required for productive investment subject to the state aid rules.

investment costs, all (national and EU) financial resources and net revenues. The residual value is not taken into account here unless the asset is actually liquidated in the last year of analysis considered.

2.2.3 Economic analysis

The rationale underpinning economic evaluation is that project inputs should be valued at their opportunity cost and outputs at consumers' willingness to pay. It should be noted that the opportunity cost does not necessarily correspond to the observed financial cost; similarly, willingness to pay is not always correctly revealed by observed market prices, which may be distorted or even absent. Economic analysis is undertaken from the point of view of society.

The financial analysis cash flows are taken as the starting point of the economic analysis. In determining the economic performance indicators, some adjustments need to be made.

- ***Fiscal corrections:*** indirect taxes (e.g. VAT), subsidies and pure transfer payments (e.g. social security payments) must be deducted. However, prices should be gross of direct taxes. Also, if specific indirect taxes/subsidies are intended to correct for externalities, then these should be included.
- ***Corrections for externalities:*** some impacts may be generated that spill over from the project to other economic agents without any compensation. These effects can either be negative (a new road increasing pollution levels) or positive (a new railway reducing traffic congestion on an alternative road link). As, by definition, externalities occur without monetary compensation, these are not present in the financial analysis and therefore need to be estimated and valued.³
- ***From market to accounting (shadow) prices:*** besides fiscal distortions and externalities, other factors can drive prices away from a competitive market (i.e. efficient) equilibrium: monopoly regimes, trade barriers, labour regulation, incomplete information, etc. In all such cases, observed market (i.e. financial) prices are misleading; accounting (shadow) prices need to be used instead, reflecting inputs' opportunity costs and consumers' willingness to pay for outputs. Accounting prices are computed by applying *conversion factors* to the financial prices.

³ For the estimation of environmental externalities, different methodologies can be employed (e.g., hedonic price, travel cost, contingent valuation, etc.). A useful reference for environmental CBA can be found in Pearce et al. (2005).

THE SHADOW WAGE

Labour market distortions (minimum wages, unemployment benefits, etc.) typically result in a financial wage being higher than the opportunity cost of labour. An appropriate **shadow wage** should be considered. This may be determined as a weighted average of:

- the *shadow wage for competitive labour markets*: for skilled workers and “displaced” unskilled workers (i.e., unskilled workers previously employed in a similar activity). This can be assumed to be equal to the financial wage;
- the *shadow wage for labour markets with involuntary unemployment*: for unskilled workers drawn to the project from unemployment. This can be assumed to equate the average money value of leisure, net of unemployment benefits;
- the *shadow wage for labour markets with informal activities*: for unskilled workers drawn to the project from informal activities. This should reflect the value of the output foregone.

The weight used in the average should reflect the likely proportion of labour drawn from each case. Social security payments should then be deducted.

Where detailed statistical information on the local labour market is not available it is suggested to use the regional unemployment rate as a basis for the determination of the shadow wage. For instance, the following simple formula may be used under conditions of high involuntary unemployment:

$$SW = FW*(1-u)*(1-t)$$

where SW is the shadow wage

FW is the financial (market) wage

u is the regional unemployment rate

t is the rate of social security payments and relevant taxes

Once the stream of economic costs and benefits is estimated, the standard DCF methodology is applied, but a **social discount rate** should be used.

Based on long-term economic growth and pure time-preference rates, the Commission proposes the following **indicative benchmarks for the social discount rate: 5,5% for the Cohesion countries and 3,5% for the others**. Member States may wish to justify different values reflecting specific socio-economic conditions. For instance, the Commissariat Général du Plan, France, recently lowered its reference to 4%, while the UK Treasury consistently applies a 3,5% social discount rate for public sector investments. Once a social discount rate is set as a benchmark, it must be applied consistently to all projects.

The following economic performance indicators can be determined for the project:

- Economic net present value (ENPV): should be greater than zero for the project to be desirable from an economic standpoint.
- Economic rate of return (ERR): should be greater than the social discount rate.
- Benefit/Cost ratio (B/C): should be greater than one.

The ERR and B/C ratio convey interesting information because they are independent of the project's size. However, these indicators may have some computational drawbacks.⁴ The ENPV is more reliable and should be used as the main reference indicator for project appraisal.

The Commission encourages the Member States to provide benchmarks in their guidance documents for the conversion factors and the social discount rate to be used in the economic analysis. These references must be applied consistently across projects. Particular attention should be paid to the determination of the shadow wage: ideally, different conversion factors could be used for different regions and sectors, reflecting possible variations in the relevant labour market (e.g., different unemployment rates).

Not all socio-economic impacts can always be quantified and valued. This is why, in addition to the estimation of performance indicators, consideration of non-monetised costs and benefits should be taken into account, particularly in relation to the following issues: (net) impact on employment, environmental protection, social equality, and equal opportunities.

2.2.4 Sensitivity and risk analysis

As provided for by Art. 40 (e), a “risk assessment” should be included in the CBA. As mentioned above, this is required to deal with the uncertainty that always permeates investment projects. Two main steps should be undertaken:

1. **Sensitivity analysis:** aims to identify the project's *critical variables*. This is done by letting the project variables vary according to a given percentage change and observing the subsequent variations in both financial and economic performance indicators. Variables should be varied one at a time, while keeping the other parameters constant. The Guide then suggests considering as “critical” those variables for which a 1% variation (positive or negative) gives rise to a corresponding variation of 5% in the NPV's base value. Different criteria can, however, be adopted.

Arbitrarily chosen percentage changes are not necessarily consistent with the variables' potential variability. The calculation of the *switching values* can reveal interesting information, by indicating what percentage change in the variables would make the NPV (economic or financial) equal to zero.

2. **Risk analysis:** assessing the impact of given percentage changes in a variable on the project's performance indicators does not say anything about the probability with which this change may occur. Risk analysis deals with this. By assigning appropriate probability distributions to the critical variables, probability distributions for the financial and economic performance indicators can be estimated. This enables the analyst to provide interesting statistics on the project's performance indicators: expected values, standard deviation, coefficient of variation, etc.

⁴ Depending on the cash flow profile, in some particular cases the internal rate of return may be multiple or not defined. Concerning the B/C ratio, its value may for instance depend on whether a given item is considered as a benefit or as a cost reduction.

It should be noted that while it is always possible to do a sensitivity analysis, the same cannot be said for risk analysis. In some cases (e.g. lack of historical data on similar projects) it may prove rather difficult to come up with sensible assumptions on the critical variables' probability distributions. In such cases, a qualitative risk assessment should at least be done to support the results of the sensitivity analysis.

3. DETERMINATION OF THE EU GRANT

3.1 Regulatory framework

Article 55(2) maintains the funding-gap method as the basis for the calculation of EU grant in revenue-generating projects, stipulating that the *eligible expenditure* cannot exceed the current value of the investment cost less the current value of the net revenue from the investment over a specific reference period appropriate to the category of investment concerned.

However, in contrast to the 2000-2006 period, the eligible expenditure and not the co-financing rate is modulated in order to relate the contribution from the Funds to the revenues generated by the project.

It should be noted that Article 55 applies to all projects and not just to major projects. However, "Member States may adopt procedures proportionate to the amounts concerned for monitoring revenues generated by operations whose total cost is below €200.000" – Art. 55(5).

3.2 Scope

Art. 55 applies to investment operations which generate net revenues through charges *borne directly by users*. It does not apply to the following cases:

- Projects that do not generate revenues (e.g., roads without tolls)
- Projects whose revenues do not fully cover the operating costs (e.g., some railways)
- Projects subject to state-aid rules – Art. 55(6).

As a general rule, for all projects that can be subject to CBA it should be possible to estimate the expected revenues, if any, according to Article 55(2). When the estimation of future revenues proves to be difficult, particular attention should be paid to the sensitivity and risk analysis.

3.3 Rationale of the funding gap method

The determination of the level of Community assistance is based on the "funding gap" rate of the project, i.e. the share of the discounted cost of the initial investment not covered by the discounted net revenue of the project.

The identification of the eligible expenditure according to Art. 55(2) ensures that the project has enough financial resources to be implemented and avoids the granting of an undue advantage to the recipient of the aid, i.e. over-financing of the project.

The box below shows the steps to be followed to determine the EU grant in accordance with Art. 55.

**STEPS TO DETERMINING THE EU GRANT
2007-2013 PROGRAMMING PERIOD**

Step 1. Find the funding-gap rate (R):

$$\mathbf{R = Max EE/DIC}$$

where

Max EE is the *maximum eligible expenditure* = DIC-DNR (Art. 55.2)

DIC is the *discounted investment cost*

DNR is the *discounted net revenue* = discounted revenues – discounted operating costs + discounted residual value

Step 2. Find the “decision amount” (DA), i.e. “the amount to which the co-financing rate for the priority axis applies” (Art. 41.2):

$$\mathbf{DA = EC*R}$$

where

EC is the eligible cost.

Step 3. Find the (maximum) EU grant:

$$\mathbf{EU\ grant = DA*Max\ CRpa}$$

where

Max CRpa is the maximum co-funding rate fixed for the priority axis in the Commission’s decision adopting the operational programme (Art. 53.6).

4. SPECIFIC ISSUES

4.1 Normally expected profitability

Profitability refers to the amount of profit received relative to the amount invested. The simplest way to assess profitability is to measure the internal rate of return of the investment, that is the discount rate that makes the discounted flow of the project’s costs and revenues add up to zero. In other words, the internal rate of return is the discount rate at which a stream of costs and revenues has a net present value (NPV) of zero.

The profitability of an investment normally expected is that which provides enough income to exactly cover the inputs’ opportunity cost (the best alternative return that could be earned by the investor’s labour, management and equity capital).

The expected profitability may be strictly dependent on the project’s risks. Risk in turn depends on numerous factors such as: the socio-economic context of the country/region in which the project is implemented, the difficulties of implementation of the project, its economic lifetime, the currency exchange risk and, above all, the risk related to the

projected revenues. These should be appropriately dealt with in the sensitivity and risk analysis.

Art. 55 allows designing the Funds' interventions in such a way that normal expected profitability is duly taken into account and no over-financing occurs. This aspect is particularly relevant when a private partner is involved in the project. In this case, the contribution from the Funds should be determined prudently so that no undue profit is reaped by the private investor.

NORMALLY EXPECTED PROFITABILITY				
Expected Profitability*	Financing scheme	Mainly loans (+ low grants)	Loans + Grants	Public grants
Medium – high		<ul style="list-style-type: none"> – Airports – Energy – Tourism – Telecom/ICT – Industrial estates and business parks – Productive investments 		
Medium			<ul style="list-style-type: none"> – Solid waste – Ports 	
Medium- low			<ul style="list-style-type: none"> – Tolled roads – Public transport – Water supply and waste water treatment plants 	
Low				<ul style="list-style-type: none"> – Railways – Health care – Education – Research, innovation and technology transfer
None				<ul style="list-style-type: none"> – Roads without tolls – Flood prevention

* Source: DG Regio

It should be noted that the table is based on the financial rate of return of the *investment* (FRR/C) which may considerably vary across country and does not necessarily reflect the profitability expected by the investor(s). This should be checked on a case-by-case basis by the project promoter, particularly when a private investor is involved, by estimating the relevant financial rate of return of *capital* (FRR/K).

4.2 Polluter Pays Principle

The Polluter Pays Principle is one of the principles of Community environmental policy (Art. 174 EC Treaty) and applies throughout the European territory. Specific Community legislative provisions exist for waste. Under Directive 2006/12/EC of the European Parliament and of the Council on waste, in accordance with the polluter pays principle, the cost of disposing of waste must be borne by the holder who has waste handled by a waste collector or by an undertaking and/or by the previous holders or the producer from which the waste came (Art. 15).

According to the Water Framework Directive (2000/60/EC) of the European Parliament and of the Council, “Member States shall take account of the principle of recovery of the costs of water services, including environmental and resource costs, in accordance in particular with the polluter pays principle” (Art. 9).

The Commission aims to encourage charging systems where the environmental costs of pollution and preventive measures are borne by those who cause pollution. These charging systems should be proportional to the social marginal production costs, including costs for the environment and those linked to the scarcity of the resources in the case of water, or calculated in such a way as to influence the choice of use of the different modes of operation. So for instance, for transport infrastructure, the charge should cover not only infrastructure costs, but also external costs, i.e. costs connected with accidents, air pollution, noise and congestion.

It should be noted that the funding-gap method has disincentive effects for the application of the polluter pays principle as higher tariffs result in a lower contribution from the Funds, all else equal. However, managing authorities should bear in mind that an appropriate charging system is not only valuable from an economic point of view but is also desirable for the financial sustainability of operations in the long run (see also paragraph 4.3 on affordability issues).

4.3 Equity (affordability)

In the context of Art. 55, “considerations of equity linked to the relative prosperity of the Member State” are to be taken as referring to the affordability of tariffs. Art. 55 implicitly refers to possible variations of the Community assistance (through the determination of eligible expenditure), according to the relative wealth of the country or region concerned, that is to say the capacity of the users to pay. For a given project, the lower the tariffs the higher the EU grant, *ceteris paribus*. So, assuming that the tariffs are set to take regional (national) income levels into account, the lower the regional (national) income the higher the funds’ contribution.

In order to enhance allocative efficiency, the Commission wishes to encourage the development of charging systems which reflect the social marginal production cost. However, when the affordability of tariffs is considered, Member States may wish to artificially cap the level of charges with a view to avoiding a disproportionate financing burden for the users, thereby ensuring that the service or good is affordable also for the most disadvantaged groups.

Ideally, the charging system should be based on the real consumption of resources, and tariffs should at least cover operating and maintenance costs as well as a significant part of the assets' depreciation. An adequate tariff structure should be envisaged attempting to maximise the project's revenues before public subsidies, while taking affordability into account. For instance, a commonly accepted affordability ratio for water supply and sanitation is 4%.

The Commission encourages the Member States to provide information in their guidance documents about the affordability ratios (for average and/or low-income groups) which may be taken as a benchmark for the projects that will be submitted for co-financing.

Managing authorities should be aware of the possible trade-off between the long-term financial sustainability of the operations and the level of tariff at which users will be charged for a good or service taking into account affordability criteria.

Annex II reports some sector (utility) benchmarks of current affordability for the Central-Eastern Europe Cohesion Member States.

4.4 Public Private Partnership (PPP)

Public private partnership (PPP) arrangements come in many forms and are still an evolving concept which must be adapted to the individual needs and characteristics of each project and the project partners. PPP may be an appropriate method of financing investment where there is significant scope for involving the private sector, so as to provide additional capital and a more efficient service. Particular attention should then be paid to the legal structure of the PPP, as this may affect to some extent the eligibility of expenditure that can be co-financed.

PPP arrangements appear particularly attractive for the new Member States given the enormous financing requirements, the large funding shortfall, the need for efficient public services, growing market stability, and trends creating a favourable environment for private investment.

In the context of CBA, the following aspects need to be borne in mind when the financial analysis is carried out:

- The **financial discount rate may be increased** to reflect a higher opportunity cost of capital to the private investor. This should be justified by the project promoter on a case-by-case basis, providing evidence, where available, of the private investor's past returns on similar projects.
- Under several types of PPP schemes (e.g., BOT, DBFO) the owner of the infrastructure (typically the public partner) is different from the operator (the private partner). The financial analysis is usually carried out from the point of view of the owner of the infrastructure. However, in such cases, **a consolidated analysis (owner and operator) should be used for the determination of the funding gap.**

Under Article 55(1), the revenue that needs to be considered for the calculation of the eligible expenditure and subsequently of the project's funding gap is that directly paid by the users through charges.

For instance, under a “shadow tolling” model, users pay no fees. Instead, the public body (owner) pays “tolls” to the private partner (operator) for a given concession period. Using a consolidated financial analysis for the determination of the funding gap ensures that the “tolls” are not considered in this case, consistent with the provisions of Article 55(1). Indeed, the revenue for the operator corresponds to the cost borne by the owner, so that in the consolidated analysis the two cancel each other out and do not affect the project’s net cash flows.

5. CONCLUDING REMARKS

Member States are responsible for applying the provisions laid down in the regulations with regard to cost-benefit analysis and revenue generating projects. For ERDF and Cohesion Fund major projects, the Commission takes the decision and in it sets the contribution from the funds in the light of the information contained in the application and further appraisals if necessary.

In order to ensure consistency within a Member State, it is proposed that Member States develop their own guidance frameworks taking account of specific institutional settings, particularly for the transport and environment sectors. The Commission will continue to assist Member States in their task, with the aid of JASPERS, in order to ensure proper application of EU guidance to national contexts.

This approach will bring substantial benefits in terms of simplification both for the Commission and the Member States, and thereby contribute to speeding up decision procedures for large projects. It will also have an important capacity building effect with a view to the programming period 2007-13.

6. GLOSSARY

Discounting:	the process of adjusting the future value of cost and benefits to the present by a discount rate.
Discount rate:	the rate at which future values are discounted to the present.
Internal rate of return :	the discount rate at which a stream of costs and benefits has a net present value of zero. The internal rate of return is compared with a benchmark in order to evaluate the performance of the proposed project.
Investment cost:	capital cost incurred in the construction of the project.
Operating costs:	cost incurred in the operation of an investment, including cost of routine and extraordinary maintenance but excluding depreciation or capital costs.
Net Present Value (NPV):	the sum that results when the expected costs of the investment are deducted from the discounted value of the expected benefits.
Project:	an operation comprising a series of works, activities or services intended in itself to accomplish an indivisible task of a precise economic or technical nature, which has clearly identified goals
Reference period:	the number of years for which forecasts are provided in the cost benefit analysis.
Residual value:	the net present value of assets at the final year of the reference period selected for evaluation analysis.
Revenue generating project:	any operation involving an investment in infrastructure, the use of which is subject to charges borne directly by users, and any operation involving the sale or rent of land or buildings or the provision of services against payment.
Revenues:	income to be expected from an investment through pricing or charges.

7. REFERENCES

Commissariat général du Plan, *Révision du taux d'actualisation des investissements publics*, 2005.

<http://www.plan.gouv.fr/intranet/upload/actualite/Rapport%20Lebegue%20Taux%20actualisation%2024-01-05.pdf>

European Commission, DG Regional Policy, *Guide to cost-benefit analysis of investment projects*, 2002.

http://europa.eu.int/comm/regional_policy/sources/docgener/guides/cost/guide02_en.pdf

European Commission, DG Regional Policy, *Guidelines for Successful Public–Private Partnerships*, 2003.

http://europa.eu.int/comm/regional_policy/sources/docgener/guides/ppp_en.pdf

European Commission, *HEATCO - Developing Harmonised European Approaches for Transport Costing and Project Assessment*, project funded under the 6th Framework Programme, coordinated by the University of Stuttgart, 2006.

<http://heatco.ier.uni-stuttgart.de/>

European Investment Bank and European Commission, *RAILPAG – Railway Project Appraisal Guidelines*, 2005.

<http://www.railpag.com>

Fankhauser S. and Tepic S., *Can poor consumers pay for energy and water? An affordability analysis for transition countries*, EBRD Working Paper n. 92, 2005.

<http://www.ebrd.com/pubs/econo/wp0092.pdf>

HM Treasury, *Appraisal and evaluation in Central Government. The Green Book*, HMSO, London, 2003.

http://www.hm-treasury.gov.uk/economic_data_and_tools/greenbook/data_greenbook_index.cfm

Pearce D., Atkinson G. and Mourato S., *Cost Benefit Analysis and the Environment: Recent Developments*. OECD / Edward Elgar, Cheltenham, 2005.

ANNEX I:

PUBLIC PRIVATE PARTNERSHIP (PPP)

PPPs can present a number of advantages if they will achieve demonstrable additional value compared to other approaches, if there is an effective implementation structure and if the objectives of all parties can be met within the partnership.

The Commission has identified four principal roles for the private sector in PPP schemes:

- to provide additional capital;
- to provide alternative management and implementation skills;
- to provide value added to the consumer and the public at large;
- to provide better identification of needs and optimal use of resources.

It must be remembered however, that PPP schemes are also complex to design, implement and manage. They are by no means the only or the preferred option.

The Guidelines for Successful Public–Private Partnerships

(http://europa.eu.int/comm/regional_policy/sources/docgener/guides/ppp_en.pdf)

were designed as a practical tool for PPP practitioners in the public sector faced with the opportunity of structuring a PPP scheme and of integrating grant financing. They focus on four key topics:

- ensuring open market access and fair competition;
- protecting the public interest and maximising value added;
- defining the optimal level of grant financing both to realize a viable and sustainable project, but also to avoid any opportunity for windfall profits from grants;
- assessing the most effective type of PPP for a given project.

Types of PPP:

- **Traditional Public Service procurement** – involves service contracting for well defined tasks with ownership of assets and management of financing remaining in the public hands.
- **BOT projects** – the feature of this type of PPP is that, while ownership of assets and responsibility for funding management remains with a public body, the assets have a private operator who derives financial returns from their operation and hence (direct or indirect) charges on users.
- **Concession agreements** – the public sector entrusts operation to a private party but the financing responsibility is shared and the private concessionaire brings equity participation. Asset ownership remains (ultimately) with the public sector.

ANNEX II:

EQUITY (AFFORDABILITY)

The tables below report current affordability ratios for the Central-Eastern Europe Cohesion Member States. Affordability ratios are provided for both average and bottom decile income household. It should be noted that these indicators refer to the *actual* current expenditure for given utility services which do not necessarily reflect the maximum *potentially* affordable tariffs' level. These tables are provided for illustrative purpose only.

Table 1 - Current affordability of utility services, average household (% of total household expenditure)

	Electricity	Heating	Water
Czech Republic	4.2	3.4	1.2
Estonia	3.2	5.4	1.0
Hungary	5.3	1.9	4.1
Latvia	2.2	3.2	0.8
Lithuania	2.8	3.7	1.1
Poland	4.5	2.7	2.0
Slovak Republic	3.5	7.9	1.3
Slovenia	4.5	1.2	1.3
<i>Average affordability</i>	<i>3.8</i>	<i>3.7</i>	<i>1.6</i>

Source: EBRD

Table 2 - Current affordability of utility services, bottom decile (% of total household expenditure)

	Electricity	Heating	Water
Czech Republic	5.5	3.3	1.5
Estonia	8.2	15.4	2.4
Hungary	6.3	1.3	4.0
Latvia	2.2	2.8	0.9
Lithuania	3.1	0.7	0.7
Poland	5.7	1.2	1.8
Slovak Republic	11.4	18.6	4.3
Slovenia	9.4	1.9	2.6
<i>Average affordability</i>	<i>6.5</i>	<i>5.7</i>	<i>2.3</i>

Source: EBRD

ANNEX III:

DETERMINATION OF THE EU GRANT: A NUMERICAL EXAMPLE

Let us assume that the assistance of the Funds is requested for a major project under a priority axis for which the co-financing rate (CRpa) is 75%. A 5% discount rate in real terms is used for the financial analysis. The project has the following cash-flow profile:

<i>M€ - 2007 constant prices</i>					
Year	Investment costs	Operating costs	Revenues	Residual value	Net cash flow
2007	25	-	-	-	- 25
2008	25	-	-	-	- 25
2009	25	-	-	-	- 25
2010	25	-	-	-	- 25
2011	-	2	4	-	2
2012	-	2	4	-	2
2013	-	2	4	-	2
2014	-	2	4	-	2
2015	-	2	4	-	2
2016	-	2	4	-	2
2017	-	2	4	-	2
2018	-	2	4	-	2
2019	-	2	4	-	2
2020	-	2	4	-	2
2021	-	2	4	-	2
2022	-	2	4	-	2
2023	-	2	4	-	2
2024	-	2	4	-	2
2025	-	2	4	-	2
2026	-	2	4	5	7
Total	100	32	64	5	
Total (Discounted)	89	18	36	2	-68,93

	Discounted values	Undiscounted values
Total investment cost		100
of which eligible cost (EC), say,		80
Discounted investment cost (DIC)	89	
Discounted net revenue (DNR) = 36+2-18	20	

Step 1) Find the funding-gap rate (R):

We first need to determine the “eligible expenditure” (EE) in accordance with Art. 55.2:

$$EE = DIC - DNR$$

$$EE = 89 - 20 = 69$$

Then, the funding-gap rate (R) is found as:

$$R = EE / DIC$$

$$R = 69 / 89 = 78\%$$

Step 2) Find the “decision amount” (DA), i.e. “the amount to which the co-financing rate for the priority axis applies” (Art. 41.2):

$$DA = EC * R$$

where

EC is the eligible cost

$$DA = 80 * 78\% = 62$$

Step 3) Find the (maximum) EU grant

$$EU \text{ grant} = DA * CR_{pa}$$

where

CR_{pa} is the maximum co-funding rate fixed for the priority axis in the Commission’s decision adopting the operational programme (Art. 53.6).

$$EU \text{ grant} = 62 * 75\% = 47$$