FICHE NO 13

IMPLEMENTING ACT ON THE GUIDANCE FOR THE METHODOLOGY FOR THE COST-BENEFIT ANALYSIS OF MAJOR PROJECTS

IMPLEMENTING ACT ON THE CALCULATION OF NET REVENUE FOR REVENUE GENERATING OPERATIONS

VERSION NO 1 –20/06/13

Regulation	Article
Common Provisions Regulation	Article 91(1) Information necessary for the approval of major projects Article 54 (3) (b) – Operations generating net revenue after completion

This document is provisional, without prejudice to the on-going negotiations in the Trilogues between the European Parliament and the Council (in line with the principle that "nothing is agreed until everything is agreed"). This document is a draft that shall be adjusted following the expert meeting.

It does not prejudge the final nature of the basic act, nor the content of any delegated or implementing act that may be prepared by the Commission.

1. EMPOWERMENT

Article 91 (1) of the CPR (Presidency compromise text) provides for the following empowerment:

"The Commission shall provide indicative guidance on the methodology to be used in carrying out the cost-benefit analysis referred to in point (e) in accordance with the advisory procedure referred to in Article 143(2)."

Article 54 (3) (b) of the CPR (Presidency compromise text) provides for the following empowerment.

/…/"Calculation of **discounted** net revenue of the operation, taking into account the **reference period appropriate to the sector or subsector applicable to the operation, the profitability normally expected of the category of investment concerned,** application of the polluter-pays principle and, if appropriate, considerations of equity linked to the relative prosperity of the Member State or region concerned. The Commission shall adopt the methodology **[…]** by means of implementing acts in accordance with the examination procedure referred to in Article 143(3)."

Please note that the legal form and the procedure for the adoption of these acts still subject to discussions between the co- legislators.

2. MAIN OBJECTIVES AND SCOPE

Article 91 setting out the empowerment for the adoption of guidance on the methodology for the cost-benefit analysis clearly limits the scope of this methodology to major projects (and therefore only to the ERDF and the Cohesion Fund).

Article 54 on operations generating revenue after their completion applies, in addition to cohesion policy, also to operations under EAFRD and EMFF, and within cohesion policy both to operations below and above the major project threshold (with the exception of exemptions set out in Article 54 (7) of the CPR).

Therefore these Articles and empowerments have a somewhat different scope.

However, given that:

1. The methodology for the calculation of net revenue should apply alongside other operations also to revenue generating major projects; and that

2. financial analysis, including the calculation of net revenue, is also part of the cost-benefit analysis of major projects;

there is an area of overlap between methodologies referred to in Article 54 and Article 91.

Different legal solutions (including cross-referencing) are possible to ensure coherence between these methodologies. The final choice of the most appropriate legal drafting option

depends also on the legal form and the adoption procedure decided agreed by the co-legislators.

Methodology for the calculation of discounted net revenue in case of revenue generating operations

Article 54 of the CPR sets out an empowerment for the Commission to adopt a methodology for the calculation of discounted net revenue. The application of this methodology is an alternative to the application of the flat rate revenue percentages established on the basis of the same Article.

Pending examination on appropriate legal drafting options, it is proposed that the methodology for the calculation of discounted net revenue referred to in Article 54 of the CPR would correspond to section 2.2 (financial analysis) of the methodology for cost benefit analysis (annexed).

Methodology for the coast-benefit analysis of major projects

Article 91 (1) CPR provides that the Commission shall provide indicative guidance on the methodology to be used in carrying out the cost-benefit analysis referred to in point (e) of the information necessary for the approval of major projects – a cost-benefit analysis, including an economic and a financial analysis, and a risk assessment.

A Cost Benefit Analysis (CBA) is required to demonstrate that the project is desirable from an economic point of view and contributes to the goals of EU regional policy and that the contribution of the Structural Funds or the Cohesion Fund (hereinafter, "the Funds") is needed for the project to be financially viable.

A CBA is required for a "**major project**" (Art. 90 of CPR) for which the *total eligible cost* exceeds:

- €75 million in the case of operations contributing to the thematic objectives under Article 9 (7) of the CPR;
- €50 million in all other fields.

The objective of this implementing act is to present a set of working rules to ensure consistency and rigour in the cost benefit analysis of major projects that are subject to co-financing from the Funds and in the assessment of CBAs by the Commission or independent experts.
The CBA principles and working rules contained in this act shall be considered as a standard approach for all managing authorities (which either commission CBAs or undertake them internally) and those involved in the appraisal of major projects. It follows international best practice and builds on the experience gained in project preparation and appraisal during the previous programming periods, while taking into account the new regulatory context for the 2014-2020 programming period.

In addition a practical guide to cost benefit analysis will be prepared. It will cover in detail the general principles of the methodology and the international best practice for carrying-out CBAs as well as CBA sectoral guidelines which will set out relevant case studies.

Member States are encouraged to develop their own CBA guidance frameworks using this implementing act to take account of specific institutional settings and other national contexts.

3. MAIN ELEMENTS

The acts will set out:

- Key steps required for carrying out cost benefit analysis; including financial analysis based on Article 54 of the CPR;
- Key principles for conducting cost benefit analysis, including financial analysis based on Article 54 of the CPR, and its appraisal.

4. CONTENT

The legal text should cover the following aspects of Cost Benefit Analysis.

- Presentation of the socio-economic context and definition of objectives.
- Identification of the project.
- Feasibility of the project with demand and option analysis.
- Financial analysis (applied taking into account Article 54 of the CPR).
- Economic analysis.
- Risk assessment.

5. MAIN CHANGES COMPARED TO THE PERIOD 2007-2013 (WHERE APPROPRIATE)

Compared with the current programming period (and the Guidance on the Methodology for carrying out Cost-Benefit Analysis – Working Document No. 4) the key changes are:

- reference periods provided for sectors not covered before;
- typical economic benefits per sector to be considered as a minimum;
- application of CBA in special cases: cost-effectiveness analysis;
- simplified risk assessment with a focus on qualitative analysis and risk prevention;
- typical risks per sector to be considered as a minimum.

Summary table of main changes in the CBA methodology

2014-2020 Implementing Act on CBA methodology	**2007-2013 Working Document No. 4**	**Reason for change**
Reference periods provided for all main sectors	Reference periods missing for some sectors such as research and innovation, broadband	Complete sectoral coverage
Typical economic benefits per sector to be considered as a minimum	No minimum	Ensure consistency and rigour in the economic analysis

Cost-effectiveness analysis as an option for certain projects	No such option	Simplification for certain types of projects, mainly those driven by compliance with EU legislation, where benefits are very difficult to measure
Compulsory steps of risk assessment: sensitivity analysis and qualitative risk analysis and non-compulsory steps such as probability distributions and quantitative risk analysis	All steps compulsory with less attention to qualitative risk analysis	Simplification to focus on qualitative analysis and risk prevention
Typical risks per sector to be considered as a minimum	No minimum	Ensure consistency and rigour in the risk assessment and enhance its value

6. ANNEXES

Annex 1: Guidance on the methodology to be used in carrying out the cost-benefit analysis of major projects (including section 2.2. on financial analysis based on Article 54 of the CPR)

Annex 1: The methodology for cost-benefit analysis of major projects

1. GENERAL PRINCIPLES

1.1. The objective of a cost benefit analysis (hereinafter referred to as 'CBA') is to support the major project assessment in order to:
- assess whether the major project ***is worth*** **co-financing** (from an economic point of view);
- assess whether the major project ***needs*** **co-financing** (from a financial point of view).

1.2. A CBA shall be:

- prepared as early as possible in the project preparation phase after preparation of the feasibility studies;
- considered as an element of a major project application to be taken into consideration in conjunction with other documents prepared for major projects including those containing other information referred to in Article 91 of the Common Provisions Regulation (CPR).

1.3. A CBA shall comply with the following general principles:

- CBA must be performed against predetermined objectives;
- CBA requires a common measurement unit (usually monetary);
- CBA requires a comparison of a with-project and without-project scenario (incremental analysis);
- CBA requires reference to the society in which project takes place;
- CBA requires reference to the timeframe which is relevant for the project;
- CBA requires a risk assessment to deal with uncertainty.

1. 4. A CBA for a major project shall include the six elements set out below:

1) Presentation of the socio-economic context and definition of objectives;
2) Identification of the project;
3) Results of feasibility studies with demand and option analysis;
4) Financial analysis;
5) Economic analysis;
6) Risk assessment.

2. STAGES OF THE COST BENEFIT ANALYSIS

2.1 Presentation of the socio-economic context and definition of objectives, identification of the project, feasibility of the project with demand and option analysis

2.1.1 Presentation of the socio-economic context and definition of objectives

The assessment of the socio-economic context requires defining: the geographical scope and impact area, final beneficiaries and all stakeholders that have a role in the project.

Clear objectives shall be defined for the project in order to verify that the investment responds to an existing need and to assess the results and the impact of the project.

The definition of the objectives shall be used to identify the project benefits and assess the project contribution to welfare.

2.1.2 Identification of the project

The identification of the major project shall take place taking into account the definition of a major project set out in Article 90 of the CPR and as well as the following principles:

1) the project needs to be clearly identified as a self-sufficient unit of analysis;
2) indirect and network effects and relevant stakeholders whose welfare counts in the aggregation of net benefits shall be taken into account;
3) technical lots, administrative or financial phases that cannot be regarded as being operational in themselves, shall be analysed within the CBA together with other phases comprising a major project;
4) if a project consists of multiple separate components aiming at different objectives, each component needs to be analysed independently.

2.1.3 Feasibility of the project with demand and option analysis

The results of feasibility studies, which cover the following aspects: demand analysis; option analysis; available technology; the production plan (including the utilisation rate of the infrastructure); personnel requirements; the scale of the project, location, physical inputs, timing and implementation, phases of expansion and financial planning; environmental aspects, shall be taken into account in the cost benefit analysis.

It shall be taken into account that:

1. Feasibility analysis identifies the potential constraints and related solutions with respect to technical, economic, regulatory and institutional aspects. A project is feasible when its design satisfies the technical, legal, financial and other constraints relevant to the nation, region or specific site. Several project options may be feasible.

2. Demand analysis identifies the need for an investment and considers as a minimum:

1) the current demand, by the use of models and actual data;
2) the forecast demand, from macroeconomic and sector forecasts and elasticity estimates of demand to relevant prices and income;
3) supply side aspects including the analysis of existing supply and expected (infrastructure) developments.

3. Option analysis is performed to assess different project options which have been identified and put forward according to how well they meet the project objectives on the basis of clearly identified criteria.

The **best option** is selected and evidence should be provided that the selected project is the optimal alternative between the options considered.

Key aspects of selecting the best option:
- if different alternatives have the same, unique objective and the same or very similar externalities, it is recommended that the selection is based on the least cost solution per unit of output produced.

- if the output and externalities are different in different options (assuming all share the same objective) e.g. solid waste projects, it is recommended to undertake a simplified CBA for all main options to select the best alternative.

2.2 Financial analysis

As set out in Article 91(1) (e) of the CPR, a financial analysis must be included in the CBA.

Financial analysis should, where possible and appropriate, be carried out **from the point of view of the project owner** and/or operator allowing to verify and guarantee cash balance in order to verify the financial sustainability and to calculate the indices of financial return on the investment project based on the discounted cash flows, related exclusively to the economic entity that activates the project.

If the owner and the operator are not the same entity, **a consolidated financial analysis,** which excludes cash flows between the owner and the operator, should be undertaken.

Where possible and appropriate, the financial analysis should be carried out in **constant prices** (prices fixed at a base-year) where current prices are adjusted by the Consumer Price Index (CPI).

2.2.1 Discounted cash flow methodology

A **discounted cash flow method** must be used in carrying-out financial analysis. It requires that:

a) **Only cash flows** i.e., the actual amount of cash being paid out or received by the project, **are considered**.

Non-cash accounting items shall be excluded from the analysis as they are not coherent with the discounted cash flow method. Non-cash accounting items include but are not limited to:

- depreciation;
- any reserves for future replacement costs;
- contingency reserves. Where necessary contingencies can be included in the eligible cost for the calculation of the EU grant, without exceeding 10% of the total investment cost net of contingencies.

b) **The time value of money is considered** when aggregating i.e. adding or subtracting cash flows occurring in different years. This requires that 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 analysis.

As a general rule, a **5% financial discount rate** in real terms shall be used as an indicative benchmark for public investment projects co-financed by the Funds.

Member States may establish benchmarks for the financial discount rate, which differ from 5% on the condition that they:

1) provide justification for this benchmark; and
2) ensure their consistent application across similar projects in the same country, region or sector.

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

1) the Member State's specific macroeconomic conditions and international macroeconomic trends and conjunctures;
2) the nature of the investor;
3) the sector concerned.

A higher discount rate may be used where important private capital is involved in project financing (i.e. private project promoter, PPP). The following method may be used to adjust the 5% financial discount rate:

Ad-hoc discount rate for private promoter = 5%*share of EU and national public funds + company WACC*share of private funding (note: company WACC must be adjusted to real terms) where: WACC is the weighted average cost of capital

2.2.2 Other principles of financial analysis

In addition to the discounted cash flow method the financial analysis shall also follow the following principles:

1) the **incremental method** must be used i.e. cash flows are calculated on the basis of the differences in the costs and benefits between the scenario with the project and the counterfactual scenario which is defined as what would happen in absence of the project;

2) cash flows must be considered in the year in which they occur and over a given **reference period i.e.** 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.

As a general rule the **reference periods by sector** as set out in Table 1 should be used. Where justified, a reference period different from those set out in Table 1 may be used to ensure that it is suitable for the specific sector and the type of investment. The reference periods take into account the implementation period, usually 2–3 years, which can be adjusted for unusually long construction periods of more than 3 years.

Table X:

Sector	**Reference period (years)**

Railways	30
Water supply/sanitation	30
Roads	25-30
Waste management	15-30
Ports and airports	25
Energy	15-25
Research and Innovation	15-25
Broadband	15-20
Industry	10

3) for project assets with design lifetimes in excess of reference period, their **residual value** should be computed. It should be calculated as a cash-inflow in the last year of the reference period as the residual (non-depreciated) accounting value. Different approaches to residual value calculation may be used in duly justified circumstances.

2.2.3 Data required to perform a financial analysis

The data required to perform a financial analysis are:

(a) Investment costs which include capital costs (both eligible and ineligible costs) incurred in the construction of the project;

(b) Re-investment costs

Cost of periodical re-investments or major upgrades of the initial assets shall be regarded as an investment cost which is not eligible, and shall be included in the discounted investment cost for the calculation of the funding gap (if applicable). The proof of disposal of sufficient resources to cover these costs in the future must be provided in the sustainability analysis.

It is preferable not to compute cash-flows for large re-investments close to the end of the reference period but to extend the end of reference period by a limited number of years to match with the end of the last reinvestment cycle or extend the design life of relevant assets by limited number of years to match with the end of the reference period.

(c) Replacement costs

Replacement costs which will incur during the reference period to cover replacement of the short-life equipment (3-5 years) may include short-life engineering plants and equipment such as filters and instruments, vehicles, furniture, office and IT equipment etc.

Replacement costs shall be regarded as operating costs, and must be included in the discounted net revenue for the calculation of the funding gap, if applicable.

(d) Operating costs shall include all the recurrent costs to operate and maintain the new or rehabilitated assets created with the project. Typical operating costs can be fixed (such as staff, maintenance and repair, general management and administration, insurance) and/or variable (such as for consumption of raw materials, energy, other process consumables, in some cases also maintenance and repair), the actual composition being project specific.

O&M costs shall be calculated in accordance with the incremental method:

- the incremental O&M costs shall be calculated comparing cost of the with-project scenario with those of the counterfactual scenario, i.e. only the costs that are directly attributable to the project should be considered;
- negative values may be obtained when projects result in overall O&M cost savings;
- in cases where a project consists in a completely new asset (e.g. there is no pre-existing service or infrastructure) the incremental O&M costs shall be those of the with-project scenario.

(e) <u>Revenues</u> shall include cash-inflows accrued by the project in the form of:

- contributions from final users of the infrastructure built by the project in the form of tariffs, service fees or charges,
- income from sale or rent of land or buildings rehabilitated/built by the project,
- income from sale of products or by-products produced by the project on the market,
- income from sale of other project related services.

Revenues shall be calculated in accordance with the incremental method:

- incremental revenues shall be calculated by comparing revenues of the with-project scenario with those of the counterfactual scenario, i.e. only the revenues that are directly attributable to the project shall be considered;
- where a project adds new assets to complement a pre-existing service or infrastructure, both additional contributions from existing users and contributions from new users of the new service/infrastructure shall be taken into account;
- where a project consists of a completely new asset (e.g. there is no pre-existing service or infrastructure) the incremental revenues shall be those of the with-project scenario.

The following items shall not be included in the calculation of future revenues:

1) transfers or subsidies;
2) VAT or other indirect taxes charged by the firm to the consumer, because these are normally paid back to the fiscal administration.

In sectors where this is relevant, including the environmental sector**, tariffs shall be fixed in compliance with the polluter-pays and the full-cost recovery principles taking into account affordability limitations.**

Key aspects of **polluter-pays principle include**:

1) user charges and fees to recover the full cost (including capital costs) of environmental services;
2) charging systems ensuring that the environmental costs of pollution and preventive measures are borne by those who cause pollution;
3) charging systems which are 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.

Key aspects of the **full-cost recovery** principle include:

1) the tariff level fixed so as to recover the capital cost, the operating and maintenance cost, including environmental and resource costs;
2) the tariff structure attempting to maximise the project's revenues before public subsidies, while taking affordability into account.

Key aspects of **affordability** of tariffs include the following principles:

1) Users should pay no more (but also not less) than what they the can afford;
2) Member States may cap the level of charges or subsidise the tariff 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;
3) In sectors where affordability is a relevant aspect, the requirement for minimum-cost recovery should be to cover at least the operating and maintenance costs and the cost of replacement of project assets foreseen during the reference period to guarantee project sustainability;
4) In certain sectors e.g. water sector in addition to the affordability of tariffs, the affordability of connections (or other such fees) should be taken into account.

Member States shall consider providing in their guidance documents information on the affordability ratios (for average and/or low-income groups) to be used as a benchmark for projects and in the actual project application.

Limitations of the polluter-pays principle and full-cost recovery principle in user charges and fees should:

1) not jeopardize the financial sustainability of the project;
2) as a general rule, be seen as temporary restrictions and maintained only as long as the affordability limitation of users exists.

(f) <u>Source of funding</u> shall include equity capital of the investor (either public or private), capital from loans (in this case loan repayment and interests are a project outflow for the sustainability) and any additional financial resources such as grants.

2.2.4 Results of the financial analysis

The financial analysis shall include:

1) Assessment of the financial profitability of the investment and own (national) capital;
2) Determining the appropriate (maximum) contribution from the Funds;
3) Checking the financial sustainability of the project.

(a) Evaluation of financial profitability (FNPV and FRR) of the investment and own (national) capital

Financial Net Present Value (FNPV) is the sum that results when the expected investment and operating costs of the project (discounted) are deducted from the discounted value of the expected revenues.

Financial Rate of Return (FRR) is the discount rate that produces a zero FNPV.

The financial profitability of an investment is assessed by estimating the financial net present value and the financial rate of return of the investment (**FNPV/C and FRR/C**). These indicators compare investment costs to net revenues and measure the extent to which the project's net revenues are able to repay the investment, **regardless of the sources of financing**. Interest payments shall not be included in the calculation FNPV/C.

For a project to require the contribution of the Funds:
- FNPV/C before the EU contribution must be negative (except for some projects falling under State aid rules for which this may not be relevant);
- FRR/C must be lower than the discount rate used for the analysis.

If a major project shows **higher financial profitability** (FRR/C) it will, as a general rule, be considered sufficient for an investor to implement the project without Union contribution. A Union contribution is justified only if it is demonstrated that the investment is not bankable on its own considering that the risks for an investor to implement the project e.g. **highly innovative** project are too high to carry out the investment without a public grant.

The financial profitability of own (national) capital is assessed by estimating the financial net present value and the financial rate of return on capital (**FNPV/K and FRR/K**). These indicators measure the extent to which the project's net revenues are able to repay the financial resources provided by the national funds (both private and public sources).

Calculation of FNPV/K and FRR/K requires that

- the financial resources - net of EU support- invested in the project are treated as outflows;
- capital contributions are considered at the moment they are actually paid out for the project or reimbursed (in the case of loans);
- interest payments are included in the table for the analysis of the return on capital (FNPV/K).

(b) Determination of the appropriate (maximum) contribution from the Funds for revenue generating projects

There are three methods for determining net revenue, decisional amount, EU grant in accordance with Article 54 of the CPR (Revenue-generating operations):

1. **Calculation of discounted net revenue using the funding gap method**
   This is the method used in 2007-2013 period for revenue-generating projects falling under Article 55 of Council Regulation (EC) 1083/2006. The funding gap rate of the project is the share of the discounted cost of the initial investment not covered by the project's discounted net revenues. The following formula shows the calculation of funding gap:

   $$DEE = DIC - DNR = FG$$

   where DEE stands for discounted eligible expenditure
   FG is the funding gap

DIC is discounted investment cost
DNR is discounted net revenue

In order to establish the decisional amount and the Union contribution, the following standard calculation shall be used:

DA = EC * (1-DNR/DIC)= EC*FGR

where DA stands for decisional amount
EC is the eligible cost
FGR is funding gap rate (FG/DIC)

EU grant = DA * maxCFpa

where maxCRps stands for maximum co-financing rate of the priority axis (%)

2. Application of a flat rate net revenue percentage[1]

As a simplified approach to the method described above, the Member State may opt for applying flat rate net revenue percentages to the operations in sector or subsectors defined in Annex [xxx] to CPR:

	Sector	Proposed flat rates
1	**ROAD**	[30%]
2	**RAIL**	[20%]
3	**URBAN TRANSPORT**	[20%]
4	**WATER**	[25%]
5	**SOLID WASTE**	[20%]

Delegated acts are needed for establishment of flat rates in additional sectors (ICT, R&D, energy efficiency etc.) as well as for any technical adjustments of the above flat rates provided in the Annex to CPR

The advantage of this method is that the Member State does not need to calculate the funding gap, instead the decisional amount (and the Union contribution) is directly established as follows:

DA = EC * (1-FR)

where DA stands for decisional amount
FR stands for flat rate (%)

EU grant = DA * maxCRpa

where maxCRpa stands for maximum co-financing rate of the priority axis or measure (%)

3. Application of a decreased cofinancing rate for a chosen priority axis

As an alternative approach to the method n°2, the Member States may decide at the programming stage that a uniform flat rate should be applied to all operations under a

[1] The flat rates and the empowerment to adopt delegated acts are still subject to discussion between the co-legislators.

selected priority axis (i.e. one priority axis – one sector – one flat rate). In that case, the decreased co-financing rate will be subject to Commission decision on the respective programme.
The given priority axis maximum co-financing rate will be decreased as follows:

Reduced maxCRpa = maxCRpa * (1-FR)

The Union contribution is then simply established using the below formula

EU grant = DA * reduced maxCRpa

(c) Ensuring financial sustainability

The financial sustainability analysis is based on undiscounted cash-flow projections and it is mainly used to show that the project will have sufficient cash resources at its disposition enabling it to always cover expenditures for investment and operations throughout the entire reference period.

Key aspects of financial sustainability analysis are as follows:

1) financial sustainability of the project is verified by checking that the cumulated (undiscounted) net cash flow is positive (or zero) on an annual basis and over the entire reference period considered;
2) the net cash flows to be considered for this purpose should:
   - take into account investment costs, all (national and EU) financial resources and net revenues, as well as capital contributions and interests;
   - exclude VAT unless VAT is not recoverable;
   - not take into account the residual value unless the asset is actually liquidated in the last year of analysis considered;
3) in the case of an operation not subject to the requirements set out in Article 54 of the CPR, or whenever negative cash-flows are projected in the future, it must be indicated how costs will be covered with a clear long-term commitment to cover these negative cash flows;

4) if projects fall within a pre-existing infrastructure, such as capacity extension projects, the overall financial sustainability of the system operator in the "with-project scenario" (more than the capacity of the single extended segment) must be checked and a sustainability analysis at a system operator level performed.

2.2.5 Financial analysis in Public Private Partnership (PPP)

The following aspects shall be taken into consideration when the financial analysis is carried out for major projects implemented as a PPP:

1) The financial discount rate may be increased above 5% to reflect a higher opportunity cost of capital to the private investor. This should be justified by the beneficiary on a

case-by-case basis, providing evidence, where available, of the private investor's past returns on similar projects;

2) In case of PPP schemes where the owner of the infrastructure is different from the operator a consolidated analysis, covering both the owner and operator, must be used for the determination of the funding gap, if applicable.
3) FNPV(K) and FRR (K) must be calculated separately for the private partner and public partner, especially if private investment is significant, to ensure there is no over-financing.
4) In order to check profitability of the private capital to avoid unduly high profit generated by EU support the FRR(Kp) indicator shall be calculated comparing the net revenues accrued by the private partner with the resources provided during investment (either through equity or loans). The resulting FRR(Kp) shall be compared with national benchmarks on expected profitability in the given sector.

2.3 Economic analysis

As provided for by Art. 91(1) (e), an economic analysis must be included in the CBA.

Economic analysis is an analysis that is undertaken using economic values, reflecting the values that society would be willing to pay for a good or service.

2.3.1 Key steps of economic analysis

The economic analysis shall be undertaken taking the financial analysis cash flows a starting point.

Economic analysis includes the following steps:

1. **Conversion of market to accounting (shadow) prices** by applying conversion factors to financial prices to correct for market distortions.

2. **Fiscal corrections** to exclude indirect taxes (e.g. VAT), subsidies and pure transfer payments (e.g. social security payments) from the economic analysis. Where indirect taxes/subsidies are intended to correct for externalities, these shall be included in the economic analysis, if considered to adequately reflect the social marginal value of the related externalities and provided that there is no double-counting with other economic costs/benefits.

3. **Monetisation of non-market impacts (corrections for externalities)**: externalities shall be estimated and valued, as appropriate, using stated or revealed preference method (e.g. hedonic pricing) or other methods.

   Economic analysis shall consider **direct effects only** in order to avoid double-counting while generally shadow pricing and monetisation of externalities account for indirect effects.

Financial revenues in the form of user fees, charges and tariffs shall be excluded from the economic analysis, and replaced with estimation of the direct effects on users, either through 'willingness to pay' or accounting prices. User fees, charges and tariffs especially in sectors not exposed to market competition, in regulated sectors or strongly influenced by political considerations should not be used as a proxy for 'willingness to pay' of user.

4. **Discounting of the estimated costs and benefits:** once the stream of economic costs and benefits is estimated, the standard discounted cash flow methodology shall be applied using a ***social discount rate (SDR)***. As a general rules a benchmark for the **social discount rate of 5.5%** shall be used for major projects in Cohesion Member States (Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia) and **3.5%** for the other Member States (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom).

Member States may establish a benchmark for the social discount rate which is different from 5,5% or 3,5%, on the condition that they:

1) provide justification for this reference on the basis of economic growth forecast; and
2) ensure their consistent application across similar projects in the same country, region or sector.

2.3.2 Calculation of the economic performance indicators

The following **economic performance indicators** (see: definitions) are key indicators of the economic analysis:

1) **Economic Net Present Value** (ENPV) is the main reference indicator for project appraisal. It is defined as the difference between the discounted total social benefits and costs.

    a. For a major project to be acceptable from an economic standpoint the project's economic net present value must be positive **(ENPV>0)** demonstrating that the society in a given region or country gains from the project because its benefits exceed costs and therefore, the project should be implemented.

2) **Economic rate of return** (ERR) is the internal rate of return calculated using the economic values and expressing the socio-economic profitability of a project.

    a. Economic rate of return must be greater than the social discount rate **(ERR>SDR)** to justify EU support to a major project.

3) **Benefit/Cost ratio** (B/C) is defined as the net present value of project benefits divided by the net present value of project costs.

a. Benefit/Cost ratio must be greater than one **(B/C>1)** to justify EU support to a major project.

The minimum economic benefits to be considered in the economic analysis are set out by sector in table X.

Table X

Sector / Subsector	**Typical economic benefits**
Water supply and sanitation	(i) improved access to drinking water in terms of availability, reliability and quality of supply (ii) improved quality of surface waters due to pollution abatement (iii) resource cost savings for both producers and customers (iv) where relevant, benefits from treated wastewater re-use
Waste management	(i) reduction of health and environmental hazards (reduced contamination of air, water, soils) (ii) reduction of landfill space/costs (for waste treatment facilities) (iii) recovery of materials and energy (avoided cost of alternative production/generation, incl. externalities) (iv) reduction of GHG emissions (i.e. CO_2, CH_4)
Energy	*EE projects* (i) energy savings (expressed by the economic value of energy including externalities) (ii) reduction of GHG emissions *RES projects* (i) displacement of fossil fuels alternatives (expressed by the economic value of energy generated by likely displaced alternative, including externalities) (ii) reduction of GHG emissions *Electricity/gas grids and infrastructure* (i) value of incremental gas/electricity supplied, including externalities (ii) security and reliability of supply: reduction in supply disruptions (iii) reduction in grid losses (for electricity) (iv) RES integration (for electricity) (v) market integration (e.g. for interconnectors) - price alignment effects (vi) reduction of GHG emissions
Roads Public Transport (railways, urban and suburban systems)	(i) time savings (most important) (ii) vehicle operating costs savings (iii) accident savings (iv) reduction of GHG emissions (v) reduction of non-GHG emissions (i.e. local air pollution impacts) (vi) reduction of noise emissions (sometimes for urban projects)
Airports	(i) reduction in generalised cost of travel (ii) quality of service improvements (e.g. provision of airport contact gates) (iii) reduction of GHG emissions (iv) noise emissions (often important for airport projects)
Seaports	(i) reduction in generalised costs (for movement of goods / people)
RDI	(i) benefit to society of educated labour force (ii) benefit to society of new knowledge creation and dissemination (due to new research contracts and publications) (iii) benefits related to growth of company and knowledge transfer to the economy (iv) benefits attributed to commercial application of Intellectual

	Property
Broadband	(i) growth in consumer surplus (households) (ii) growth in business benefits (iii) savings through provision of e-services (e-Government) (iv) benefits in healthcare through provision of tele-health services

2.3.3. Climate change considerations in the economic analysis

The CBA must take into account costs and benefits related with the shadow cost of carbon, and additional risks, in the mid and long term, in connection with climate change aspects. The volume of the Greenhouse Gas externality and the estimate of external cost of carbon shall be based on a transparent methodology aligned with the EU 2050 decarbonisation objectives.

2.3.4. Application of CBA in special cases

In cases where the benefits of a major project are very difficult or impossible to assess, but where costs can be predicted with reasonable confidence, notably for major projects driven by necessity to ensure compliance with EU legislation, a **cost-effectiveness analysis (CEA)** can be performed instead of a standard CBA. In such cases the appraisal shall focus on verifying that the project is the most efficient alternative to supply a given service at the conditions set out.

CEA is carried out by calculating the cost per unit of 'non monetised' benefit and is required to quantify benefits but not to attach a monetary price or economic value to the benefits.

The conditions for applying CEA are as follows:

- the project produces only one project output which is homogenous and easily measurable;
- this output is a crucial supply, entailing that action to secure it is essential;
- the aim of the major project is to achieve the output at minimal cost;
- there are no relevant externalities;
- there is a wide evidence of benchmarks to verify that chosen technology meets the minimum required cost performance criteria.

2.4 Risk assessment

As set out in 91(1) (e) of the CPR, a risk assessment must be included in the CBA. This is required to deal with the uncertainty that always permeates investment projects. Risk assessment 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.

The risk assessment shall comprise two steps:

1) **Sensitivity analysis**, which determines the "critical" variables or parameters of the model i.e. those whose variations, positive or negative, have the greatest impact on project's performance indicator, shall take the following aspects into consideration:

- the critical variables are the ones whose 1% variation results in more than 5% variation of the NPV or more than 1% of the IRR;

- the analysis is carried out by varying one element at a time and determining the effect of that change on the standard indicators, namely IRR or NPV;
- the **switching values** are defined as the percentage change the critical variable should assume to make the NPV equal to zero (or the IRR equal to discount factor used);
- **scenario analysis** allowing the study of the combined impact of determined sets of critical values and in particular, the combination of optimistic and pessimistic values of a group of variables to build different scenarios, which may hold under certain hypotheses.

2) A **qualitative risk analysis including measures for risk mitigation**, which shall include the following elements:

- a list of risks to which the project is exposed,
- a risk matrix showing for each identified risk, numerical or non-numerical values for the probability of occurrence (e.g. low, medium, high) and the severity of impact on project in case of occurrence,
- interpretation of risk matrix including an assessment of acceptable levels of risk exposure,
- a description of **mitigation measures**, including the function in charge of mitigating the main risks, standard procedures, where appropriate and taking into account best practices, where possible, to be applied to reduce risk exposure, where considered necessary.

In addition the risk assessment may, where appropriate (depending on project size, data availability, residual risk), include the following additional elements:

1) **Probability distributions for critical variables** informing about the likelihood of occurring a given percentage change in the critical variables. Computing the probability distribution of critical variables is necessary to carry out a quantitative risk analysis.

2) **Quantitative risk analysis** based on Montecarlo simulation providing probability distributions and statistical indicators for expected result, STD, etc. of project financial and economic performance indicators.

3) **Options to assess climate risk and mitigation measures** to improve risk management under uncertainty.

The minimum risks to be taken into account in the risk assessment are set out by sector in Table X.

Member States shall consider whether compilation of project risk registers and valuation of project risks assigning a value for each identified risk to provide a firm cost estimate should be a requirement for major projects, and shall set out such requirements, where they consider this appropriate.

Table X

Sector / Subsector	**Specific risks**

Water supply and sanitation	Demand risks: (i) Water consumption lower than predicted (ii) Connection rate to public sewage system slower than predicted Design risks: (iii) Inadequate surveys and investigation e.g. inaccurate hydrological predictions (iv) Inadequate design cost estimates Land acquisition risks: (v) Procedural delays Procurement risks: (vi) Procedural delays Construction risks: (vii) Project cost overruns (viii) Contractor related (bankruptcy, lack of resources) Operational risks: (ix) Reliability of identified water sources (quantity/quality) (x) Maintenance and repair costs higher than predicted, accumulation of technical breakdowns Financial risks: (xi) Tariff increases slower than predicted (xii) Tariff collection lower than predicted
Waste management	Demand risks: (i) Waste generation lower than predicted (ii) Waste flow control/delivery insufficient Design risks: (iii) Inadequate surveys and investigation (iv) Choice of unsuitable technology (v) Inadequate design cost estimates Land acquisition risks: (vi) Procedural delays Procurement risks: (vii) Procedural delays Construction risks: (viii) Project cost overruns Operational risks: (ix) Waste composition other than predicted or having unexpectedly large variations (x) Maintenance and repair costs higher than predicted, accumulation of technical breakdowns (xi) Process outputs fail to meet quality targets Regulatory risks: (xii) Changes of environmental requirements, economic and regulatory instruments (i.e. introduction of landfill taxes, bans on landfilling) Other risks: (xiii) Public opposition
Energy	Demand risks: (i) Demand shortfalls (ii) Evolution of prices of different competing fuels Design risks: (iii) Inadequate design cost estimates Construction risks: (iv) Project cost overruns Operational risks: (v) Maintenance and repair costs higher than predicted, accumulation of technical breakdowns Regulatory risks: (vi) Changes of environmental requirements, economic instruments (i.e. RES support schemes, EU ETS design) Other risks: (vii) Public opposition
Roads	Demand risks:

Public Transport (railways, urban and suburban systems) Airports Seaports	(i) Traffic different than predicted Design risks: (ii) Inadequate site surveys and investigation (iii) Inadequate design cost estimates Administrative risks (permits): (iv) Building permits (v) Utility approvals Land acquisition risks: (vi) Land costs higher than predicted (vii) Procedural delays Procurement risks: (viii) Procedural delays Construction risks: (ix) Project cost overruns (x) Flooding, landslides, etc. (xi) Archaeological findings (xii) Contractor related (bankruptcy, lack of resources) Regulatory risks: (xiii) Changes in environmental requirements Other risks: (xiv) Public opposition
RDI	Demand risks: (i) development of relevant industry (demand for research results and demand for private contracted research) (ii) evolutions on labour market (demand for university graduates and impact on demand for education services in the area) Design risks: (iii) Inadequate design cost estimates Procurement risks: (iv) Supply bottlenecks Implementation risks: (v) Project delays and cost overruns during installation of scientific equipment Operational risks: (vi) Lack of academic staff/researchers
Broadband	Demand risks: Lower than estimated service take-up from retail- and/or wholesale providers Design risks: Increase in capital expenditure Procurement risks: (iii) Delays in project procurement Operational risks: (iv) Increase in operational cost (v) Insufficient committed funding on a national/regional level during the operational phase

Formulas

Formulas for financial analysis:

- Financial net present value (FNPV)

$$\text{FNPV} = \sum_{t=0}^{n} a_t S_t = \frac{S_0}{(1+i)^0} + \frac{S_1}{(1+i)^1} + \ldots + \frac{S_n}{(1+i)^n}$$

- Financial internal rate of return (FRR)

$$FNPV = \sum [S_t / (1+FRR)^t] = 0$$

Where S_t is the balance of cash flow at time t and a_t is the financial discount factor chosen for discounting at time t.

Formulas for economic analysis

- Economic Net Present Value (ENPV)

$$ENPV = \sum_{t=0}^{n} a_t S_t = \frac{S_0}{(1+i)^0} + \frac{S_1}{(1+i)^1} + \ldots + \frac{S_n}{(1+i)^n}$$

- Economic rate of return (ERR)

$$0 = \sum \frac{St}{(1+ERR)^t}$$

- Benefit/Cost ratio (B/C)

$$\frac{B}{C} = \frac{PV(B)}{PV(C)}$$

[1]Welfare weight: C: average consumption level; C_i: per capita consumption; e: constant elasticity of marginal utility of income
[2]Standard Conversion Factor: M: Total imports; X: Total exports; T_m: import taxes; T_x: export taxes
[3]Shadow Exchange Rate: OER: official exchange rate; CI: currency inflow; CO: currency outflow; n: number of years; t: time
[4]Shadow Prices: MC: marginal cost; WTP: willingness-to-pay; p: price
[5]Shadow wage: W: market wage; L: labour; c: conversion factor; d: conversion factor; m: lost annual output of hiring a new employee;
n: reservation wage; t: rate of social security payments and relevant taxes; u: unemployment rate;
z: additional cost of transferring workers (relocation)
[6]Performance indicators: PV: present value; St: balance of cash flow funds; a_t: discount factor; i: discount rate