STUDY ON SAFE AND SECURE PARKING PLACES FOR TRUCKS
MOVE/C1/2017-300

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Annex to the Long Edition of the Manual for operators and users of Safe and Secure Truck Parking Areas

GUIDE TO COST BENEFIT MODELLING FOR SAFE AND SECURE TRUCK PARKING AREAS

Contents

1. FOREWORD

This guide is an annex to the long edition of the Manual for operators and users of Safe and Secure Truck Parking Areas that was elaborated in 2018 by the EU-funded Study "MOVE/C1/2017-500 – Safe and secure parking places for trucks" (hereinafter referred to as "the Study").

Safe and secure parking areas for trucks are needed to ensure socially fair conditions for professional drivers when taking rests. They are also needed to tackle issues such as cargo crime and unintended transport of illegal immigrants. However, safe and secure parking places remain scarce and the services provided by existing facilities are not always clearly identifiable.

The Study has developed a manual for safe and secure parking places. Its objective was to create the appropriate framework for authorities and private developers who wish to establish safe and secure parking areas. It therefore provides information regarding planning, operation and standardization processes as well as best practices. It serves as a practical guide to safe and secure truck parking area operators, covering topics such as security and comfort levels as well as architectural, financial and technological aspects.

The manual is available in a short and in a long version. The short version provides general information in a condensed way, whereas the long version delivers a detailed presentation targeted at professionals who focus on the deployment and the operation of safe and secure truck parking areas.

For further information please consult *http://sstpa.eu-study.eu*.

2. INTRODUCTION

This Guide to Cost Benefit Modelling for Safe and Secure Truck Parking Areas (SSTPAs) has been designed to provide operators of safe and secure parking areas, investors and clients an introduction to the financial and business-related specificities of Safe and Secure Truck Parking Areas. This Guide is annexed to the Manual for operators and users of Safe and Secure Truck Parking Areas of the EU-funded Study MOVE/C1/2017-500. The manual outlines the following aspects that are key for cost benefit analyses:

IT DESCRIBES THE ROLES OF PRIVATE AND PUBLIC STAKEHOLDERS IN THE DEVELOPMENT OF A SAFE AND SECURE TRUCK PARKING AREA AND PROVIDES A LIST OF STAKEHOLDERS THAT ARE HELPFUL FOR THE SETUP AND THE MANAGEMENT OF SSTPAS.

IT PRESENTS A TAXONOMY OF TRUCK PARKING AREAS.

IT FORMULATES GUIDELINES FOR MANAGERS AND STAFF ON HOW TO ORGANIZE AND MAINTAIN SSTPAS.

IT PROVIDES INFORMATION ON THE AUDITING AND ASSESSMENT PROCEDURES.

The ambition of this Guide to Cost Benefit Modelling for Safe and Secure Truck Parking Areas is the following:

AMEND AND IMPROVE BUSINESS CASE TOOLS INTO A FINANCIAL AND ECONOMIC CBA MODEL FOLLOWING THE GUIDELINES USED FOR ASSESSING INVESTMENT PROJECTS UNDER THE CONNECTING EUROPE FACILITY (CEF) PROGRAMME, SO THAT IT CAN BE APPLIED BY SUPPLY CHAIN STAKEHOLDERS AND AUTHORITIES.

PROVIDE INDICATIONS ON HOW TO MODEL TYPICAL COST AND REVENUE ITEM VALUES THAT ARE NEEDED TO BUILD UP A SUSTAINABLE BUSINESS CASE.

HELP OPERATORS AND AUTHORITIES ASSESS THE FINANCIAL AND SOCIAL SUSTAINABILITY OF DIFFERENT TYPES OF SSTPAS IN CONJUNCTION WITH THE CORE TEXT OF THE MANUAL FOR OPERATORS AND USERS OF SAFE AND SECURE TRUCK PARKING AREAS.

PROVIDE THE OPERATORS OF PARKING AREAS WITH AN APPROPRIATE TOOLKIT TO APPLY FOR PUBLIC FUNDING, SUCH AS, FOR INSTANCE TO THE CEF PROGRAMME OF THE EUROPEAN UNION.

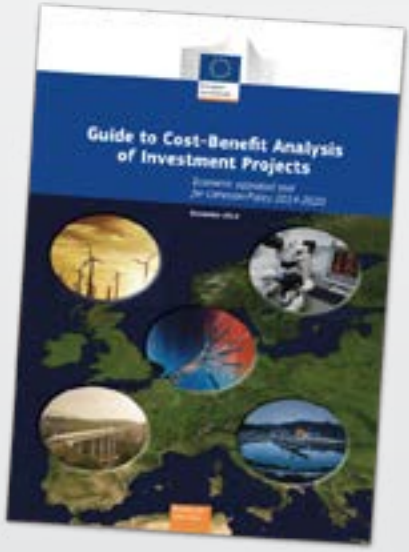
This document does not pretend to be exhaustive. It is designed as a source of information and inspiration to the reader. Each business case is different and varies in terms of scope, objectives and target group.

For a methodological deep-dive on Cost Benefit Analyses the reader may consult the Guide to Cost Benefit Analysis of the European Commission[1]. It provides detailed guidelines for the appraisal of projects funded under the cohesion policy and is a useful guide for infrastructure and transport related projects such as Safe and Secure Truck Parking Areas.

The benefit of conducting such an analysis prior to the inception of a construction project is that it helps the future operator, the investors and the financiers as well as the public authorities understand the financial and the economic impact of the business case that is not necessarily intuitive in the case of safe and secure parking infrastructure.

This Guide to Cost Benefit Modelling for Safe and Secure Truck Parking Areas provides tips on how to conduct a demand analysis (section 3), how to calculate the financial costs related to SSTPAs (section 4), how to forecast financial revenues and economic benefits (section 5), how to develop and display a financial and economic analysis (section 6), how to anticipate and mitigate risk factors during the setup of the SSTPA project (section 7) and which scenarios to consider during sensitivity testing (section 8).

None of the recommendations contained herein are carved in stone, they are designed to support and motivate structured processes and provide good practice examples.



1 The Guide to Costs Benefit Analysis of Investment Projects can be retrieved at *https://ec.europa.eu/inea/sites/inea/files/cba_guide_cohesion_policy.pdf.*

3. DEMAND ANALYSIS

The demand analysis is supposed to investigate the demand for additional or upgraded (secure) parking areas on the basis of the current supply as well as the current and future demand. The **mapping report** displayed on the study website provides an overview of the status of supply and demand in the year 2018.

Relevant parameters for the demand analysis include the current supply of public and private parking areas along the main road sections at which the envisaged plot is located. It is recommended to calculate possible typical trip patterns of truck drivers while taking into account current incident hotspots, projections by competent public authorities, the mandatory rest and driving times of truck drivers and the current use of existing parking facilities.[2]

The most important elements that define future demand for parking facilities include the intensity of road freight transport, and especially international transport, as well as specific areas such as:

The forecast for future demand is typically based on low, medium and high growth scenarios. As a result, the analysis should be able to determine locations at which the upgrade of existing non-secure parking areas or the construction of new parking areas are required, and the level of security according to the standard developed in the study.

The demand analysis is crucial to determine potential costs and revenues/benefits and it plays a significant role in the risk assessment.

2 It is recommended to carry out a professional market survey involving truck drivers, transport companies and shippers (e.g. via market research sessions organized by professional agencies).

4. COST CALCULATION

Cost estimates for an SSTPA take into consideration the costs and the cost standards of similar investment projects, adjusted for the technical characteristics and parameters of the SSTPA concerned. From a financial perspective a differentiation can be made between investment costs, operational costs and replacement costs. For the socio-economic perspective external effects need to be monetized and added to the equation as well.

The following overview proposes how to structure a general estimate of investment costs (4.1), an investment range calculation model based on the corresponding security level (4.2) and the basis for operational costs calculations (4.3).

4.1. GENERAL ESTIMATE OF INVESTMENT COSTS

Pre-implementation costs

The chapter structure below shows the parameters guiding a potential investment cost estimation.

EXPENSES FOR ACQUIRING AND MANAGING THE LAND	
Costs for acquiring the land	Land management costs
Planning for environmental protection	Expenses for the relocation and/or protection of utilities
EXPENSES FOR ENSURING UTILITIES REQUIRED FOR THE INVESTMENT OBJECTIVE	
Expenses related to works for ensuring the provision of utilities necessary for the operation of the investment objective, performed on the location and including expenses related to the connection with utilities	
EXPENSES FOR DESIGN AND TECHNICAL ASSISTANCE	
Surveys and impact assessments | Land surveys | | Report regarding the impact on the environment |	

EXPENSES FOR DESIGN AND TECHNICAL ASSISTANCE	
Technical expertise | Certification of energetic performance and energetic audit of buildings |	Support documents and expenses for obtaining permits, approvals and authorizations
Design | Design subject | Pre-feasibility study | Feasibility study | Technical documentation necessary for obtaining permits, approvals and authorizations | Technical qualitative verification of the technical project and details of execution | Technical project and details of execution |	
Managing purchasing and procurement procedures	Consultancy | Project management for the investment objective | Financial audit |
Technical assistance | Technical assistance by the designer | Technical assistance during the execution of works | Involvement of the designer during the stages included in the control programme of the works according to public authority guidelines | Site supervision |	
OTHER EXPENSES	
Construction and installation works for site organization	Site organization related expenses
Fees, shares, taxes, cost of credit | Fees and interests for credit granted by a lender | Quality control of construction works | Verification made by the state regarding land management, zoning and for authorization of construction works | Fees for compliance approvals and permits and construction or demolition permits |	
Various and unforeseeable expenses	Expenses for information and advertising

Investments during the implementation phase

OBTAINING LAND

Land-related costs
| Payment of concessions (royalties) during the execution of works | Expropriations and compensations | Changing the legal status of the land | Temporary or definitive removal of agricultural or other use | Other expenses provided by law |

LAND MANAGEMENT

Financial estimate for land management
| Demolitions | Dismantling | Decommissioning | Deforestations |
| Collection, sorting and transport of waste to authorized warehouses |
| Optimization of vertical alignment | Accesses/roads/alleys/parking/drainages/ discharge channels, support walls | Dewatering (excluding the ones related to works performed for the primary investment) | Water course deviations |
| Relocations of buildings | Works for site preparation |

PLANNING FOR ENVIRONMENTAL PROTECTION AND BRINGING THE LAND TO ITS INITIAL STATE

Financial estimate for environmental protection
and bringing the land to its initial state
| Planting trees | Re-organizing green areas |
| Reintroducing the temporarily removed surfaces to an agricultural or other use |
| Additional measures to ensure environmental protection |

EXPENSES FOR THE RELOCATION AND/OR PROTECTION OF UTILITIES

Financial estimate for expenses related to the relocation
and/or protection of utilities
| Expenses for the relocation and/or protection of utilities (deviations of utility networks from the related location) |

EXPENSES FOR ENSURING UTILITIES NECESSARY FOR THE INVESTMENT OBJECTIVE

Financial estimate on expenses related to works for ensuring utilities necessary for the operation of the investment objective, performed on the location delimited from a legal point of view as belonging to the investment objective and the expenses related to the utility network connection for:
| Water supply | Sewage | Natural gas supply | Heating | Electrical energy supply |
| Telecommunications | Access roads | Other utilities |

SURVEYS

Financial estimate on land surveys
| Geotechnical studies | Geological studies | Hydrological studies | Hydro-geotechnical studies | Photogrammetry survey (measurements based on photographs) |
Topographic survey | Stability of the soil on which the investment plot is located |

Financial estimate on the report regarding the impact on the environment | Report regarding the impact on the environment |	Financial estimate on other specific surveys | Specialized surveys depending on the specific features of the investment |

SUPPORTING DOCUMENTS AND EXPENSES FOR OBTAINING PERMITS, APPROVALS AND AUTHORIZATIONS

Financial estimate on expenses necessary for elaborating documentation and obtaining permits | Obtaining or extending the validity of the zoning certificate | Obtaining or extending the validity of construction or demolition authorizations | Obtaining permits and approvals for the connection to public networks of water, sewage, gas, heating, electrical energy and telephone line supply | Obtaining the street nomenclature certificate and related address | Preparing documentation, obtaining a provisional land register number and registering the land in the Real Estate Register | | Obtaining administrative documents from the competent authorities in charge of environmental protection | Obtaining civil protection permits | Other permits, approvals and authorizations |

TECHNICAL EXPERTISE

Financial estimate on the technical expertise | Technical expertise of existing buildings, structures and/or, depending on the case, of technical projects, including preparation of the technical expertise report by technical experts |

CERTIFICATION OF ENERGY PERFORMANCE AND ENERGY AUDIT OF BUILDINGS

Financial estimate on the certification of energy performance and energy audit of buildings | Certification of energy performance and energy audit of buildings |

DESIGN

Financial estimate on the design subject	Financial estimate on the pre-feasibility study	Financial estimate on the technical project and details of execution
Financial estimate on technical documentations necessary for obtaining permits, approvals and authorizations	Financial estimate on technical qualitative verification of the technical project and details of execution	Financial estimate on the feasibility study/ documentation for approval of intervention works and general estimate

MANAGING PURCHASING PROCEDURES

Financial estimate on expenses related to organizing and tendering public procurement procedures | Expenses related to the preparation of the tender documentation | | Expenses related to fees, transportation, accommodation and daily allowance of members appointed within the evaluation committees | Prior information notice, participation notice and notice for the award of contracts as well as any correspondence related to public procurement procedures | Expenses related to the organization and tendering of public procurement procedures |

CONSULTANCY

Financial estimate on project management for the investment objective	Financial estimate on financial audits

TECHNICAL ASSISTANCE

Financial estimate on technical assistance from the designer during the execution of works
| Technical assistance from the designer during the execution of works |
| Financial estimate on technical assistance for the participation of the designer during the stages included in the control programme of the execution works in accordance with the guidelines by public authorities |

Financial estimate of site supervision
| Site supervision ensured by specialized and authorized technical personnel |

SITE ORGANIZATION

Financial estimate on construction and installation works for site organization
Locker rooms/barracks/work areas for site personnel	Platforms	Restrooms
Vehicle washing ramps	Warehouses for materials	Foundations for cranes
Electric lighting and power networks	Access means for vehicles and railways
Couplings/connections to utilities	Fencing	Presentation panels	Fire pickets
Expenses related to the dismantlement of the site, including expenses necessary to restore the occupied land to its initial state, upon the completion of the investment works

Financial estimate on expenses related to site organization
| Obtaining construction or demolition permits for site organization works |
| Renting traffic signs | Temporary interruption of transportation networks or supply networks regarding water, sewage, heating, electrical energy or natural gas
| Contracts for assistance by the traffic police | Temporary contracts with electrical energy suppliers, water suppliers and with sanitation units |
| Rents for temporary occupation of the public domain | Cost of electrical energy and water used inside the site during the execution of works | Cost of transportation for non-resident workers and/or their accommodation | Site security | Ensuring the availability of authorized firefighters | Expenses regarding occupational health compliance during the execution of site works |

FEES, SHARES, COST OF CREDIT

Financial estimate on fees and interests for credit granted by lenders

Financial estimate on quality control of construction works | Financial estimate regarding quality assurance in construction works | | Financial estimate on verification made by public authorities regarding land management, zoning and the authorization of construction works |	Financial estimate on taxes for compliance approvals and permits and construction or demolition permits | Taxes for compliance approvals and permits as well as construction or demolition permits |

VARIOUS AND UNFORESEEABLE EXPENSES

Financial estimate on various and unforeseeable expenses
| The various and unforeseeable expenses are to be used in compliance with the legislation on public procurement referring to contractual modifications surfacing during the construction | The various and unforeseeable expenses are estimated based on a percentage, from the value of the expenses provided in the previous chapters at 10% for the execution of a greenfield construction and at 20% for the execution of intervention works on an existing construction |

EXPENSES FOR INFORMATION AND ADVERTISING

Financial estimate on expenses for information and advertising
| Expenses for information and advertising, including the costs for public dissemination |

TRAINING OF OPERATION PERSONNEL

Financial estimate on training of operational personnel
| Expenses necessary for staff training with regards to the proper and efficient use of equipment and technology |

TRIAL RUNS AND TESTS

Financial estimate on trial runs and tests
| Expenses regarding the execution of trial runs and tests, as provided in the project, including surveys, acceptance and certification |

4.2. GENERAL ESTIMATE OF INVESTMENT COSTS

In the project conception phase, it is useful to examine typical investment costs based on the four security levels defined by the Study: Bronze, Silver, Gold and Platinum. A differentiation can be made between "upgrade", "extension" and "greenfield" type of projects. An upgrade strictly designates a plot on which there is an existing non-secure parking area and on which limited groundworks need to be done.

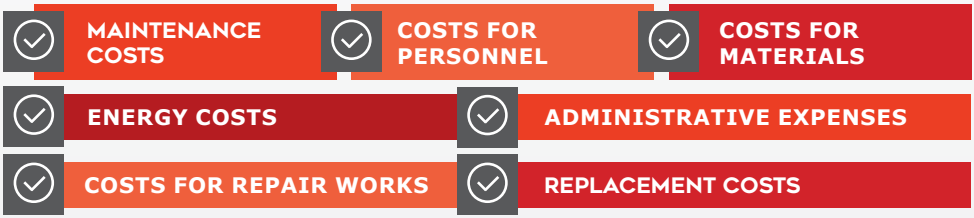
The study website contains regularly updated investment ranges for SSTPA projects. Except for the common service level, the amounts for the 4 security levels are not building on one another. Therefore, the amounts for each measure are not comparable (e.g. lighting for the Bronze level has a lower cost than for the Platinum level as the requirements differ). The figures indicate a range for three parking size scenarios (100 places, 200 places and 300 places) for upgrade projects. The amounts in the table displayed on the Study website https://sstpa.eu-study.eu do not include the costs for staff or staff training that may be required to achieve the respective security levels.

It is recommended to consult the latest market trends and respectively approximate the costs that will necessarily by entailed by complying with the security and service requirements, to which the financial planner will be able to add the financial costs generated by additional services.

4.3. OPERATIONAL COSTS FOR NORMAL LIFE DURATION/AMORTIZATION

Cost types

Costs for maintenance and repairing works typically include the following:



Presumptive evolution of charges

Maintenance and current repair charges are foreseen within the budget of the beneficiary, borne entirely and according to an approved budget planning process.

Scenario analysis

In order to map out a relevant business case, the operator should at least calculate the following four scenarios:

The do-nothing scenario (option 1) will show the results of refraining from building, upgrading or extending the parking area. Option 2 shows the envisaged option that the operator would like to roll out. This option 2 can be compared with options aiming at a lower security level and a higher security level (options 3 and 4) to illustrate the cost/benefit ratios of each case. This will allow for an objective assessment of the appropriate selection of security levels (and potentially additional services) at the foreseen location and in the market environment at this location.

5. REVENUES AND BENEFITS

Both financial revenues and economic benefits should be taken into account in the Cost Benefit Analysis, using a 30 year reference period as advocated by the European Commission. Even if the operators' usual reference period may be shorter, spreading the case over a 30 year period is valuable to assess its value over time. A shorter period is only recommended in case of concessions, depending on the duration of the concession.

Public authorities should note that the SSTPAs have the specificity that considerable replacement costs are typically required every 15 years to replace equipment and mobile construction elements.

The financial revenues are calculated from the operator's perspective. In case of a franchise system, they may either be calculated from the perspective of the franchise holder or the franchisee. The (socio)economic revenues relate to the societal benefits derived from the setup of the SSTPA, which will especially by useful for the communication with public authorities.

Financial revenues typically include the following revenues depending on the business case:

- PARKING AND RESERVATION FEES
- REVENUES FROM OVERNIGHT STAYS
- FOOD SERVICES
- SERVICE FACILITIES
- FUEL REVENUES
- SHOP REVENUES
- OTHER REVENUES

Economic benefits typically include the following:

- BENEFITS FOR THE OPERATOR DUE TO AVOIDED TRANSPORT COSTS
- SAVINGS ON EXTERNAL COSTS
- BUFFERING FUNCTION OF THE PARKING AREA (E.G. IN THE VICINITY OF PORTS AND AIRPORTS)
- THEFT OR CRIME AVOIDANCE
- ROAD SAFETY BENEFITS

These economic benefits require some explanation.

Benefits for the operator due to avoided transport costs

SSTPAs along motorways save drivers time with regard to the search for parking places. This saving represents a reduction of operating costs for transport companies. Cost savings should be determined according to a conservative approach, limited to immediate effects, such as fuel consumption and use of HGVs. The costs per unit are to be set at a reasonable value that can be calculated by taking into account both the average time per truck saved by using the SSTPA and the estimated daily average fixed operating costs per truck.

Socioeconomic factors, such as decreasing stress levels and job dissatisfaction caused by searching for parking lots in different and frequently inappropriate places, play an important role as well. An additional monetization of these factors could be based on sector analyses of health and safety at work, if available.

Buffering

SSTPAs may also function as buffering areas. The parking places provided by SSTPAs can allow truck drivers to rest in case of waiting periods near transport hubs or in the face of heavy congestion or accidents. This helps contain and reduce further traffic congestion. However, the buffering does not result automatically in an additional saving of time spent on the road. Monetisation of indirect benefits requires access to detailed traffic data and high level extrapolations.

Theft or crime avoidance

Cargo theft includes both cargo and vehicle theft. The theft avoidance is calculated annually on the basis of numbers of incidents in the vicinity of the SSTPA and along the transport corridors on which it is located. Crime-related costs include the respective costs in anticipation of crime (e.g. defensive expenditure or insurance), as a consequence of crime (e.g. health & victim services) and in response to crime (e.g. police costs).

External cost savings

The time savings related to finding a suitable SSTPA result in the reduction of operating costs. These savings also represent savings in terms of HGV kilometres, which simultaneously reduce external costs. According to AEA guidelines ("Update of the Handbook on External Costs of Transport"; Ricardo AEA, 2014) the external costs related to vehicle kilometres include congestion costs, costs of noise, costs of air pollution and costs related to infrastructure.

Road safety benefits

Another relevant benefit is the avoidance of accidents due to the availability of SSTPAs. The current lack of safe and secure parking areas provokes accidents, including fatalities, severe and light injuries and material damage. In particular the necessary overnight rest causes problems due to a shortage in adequate parking places. Existing public places are over-occupied and numerous truck drivers park at inappropriate or even illegal places. At night or in periods of bad weather this frequently leads to dangerous situations and accidents, which can be avoided at least partly by using SSTPAs. The monetization of the avoidance of accidents depends on the accident rate prevailing in the region in which the SSTPA is located and on the applicable costs of human injuries or fatalities.

6. FINANCIAL AND ECONOMIC ANALYSIS

The financial analysis is aimed at modelling revenues and costs of a parking area project (see sections 4 and 5), typically over a **30-year period**. It is based on a discounted cashflow analysis.

The **financial discount rate** should be calculated by means of a Weighted Average Cost of Capital Analysis **(WACC analysis)**, or by default, be set at **4%** according to the recommendations of the European Commission.

An **economic discount rate of 3%** is recommended by the European Commission.

The table below disregards land acquisition or land leasing related costs. These costs and their valuation vary greatly across the European Union. If such land costs are included in the project, related costs and expenses may be introduced in the discounted cashflow analysis.

The following assumptions should be taken into account (all prices and costs/benefits are expressed in € at t=0, only real values are considered).

ELEMENT	HYPOTHESES	JUSTIFICATION
Project reference period	• All hypotheses are presumed for a period of 30 years, i.e. the period between year 1-30. • Year 1 is the first year in which the project generates financial results.	Projections will be made for a period close to the economic life of the investment, but sufficiently long in order to allow conclusions on its average and long term impact.
Maintenance and operating costs	• The maintenance and operating costs are estimated according to optimal operation.	The estimation in constant prices offers a high level of comparison and allows the use of a constant update rate.
VAT	• VAT is not taken into account.	Not including VAT in the predicted eligible costs is based on the special waiver granted for this type of investments.
Replacement costs	• Replacement of technological equipment occurs every 10 to 15 years approximately.	SSTPAs face a comparatively high level of replacement costs compared with other types of infrastructures.
Residual value	• The residual value at the end of the analysis period is usually 0.	The economic lifetime corresponds to the analysis period. Typically, the type of equipment in an SSTPA does not have a residual value after 30 years. If the land is taken into account in the reference period, it will have a residual value.

The financial analysis will provide investors, lenders and public authorities with key financial indicators such as the **Financial Net Present Value** and the **Internal (Financial) Rate of Return** of the project. It is recommended to use financial experts to set up a thorough calculation model. In the context of its Connecting Europe Facility programme the European Commission provides a Cost Benefit Analysis cashflow template that may be used for initial steps towards a financial and economic analysis.

7. SENSITIVITY ANALYSIS

A sensitivity analysis should be elaborated by considering the parameters which the beneficiary considers as critical for the project or that might lead to important changes on financial or economic ratios, in comparison with a baseline case.

The sensitivity analysis should review critical financial parameters such as:

- Operating costs
- Sales
- Proportion of the contribution by public authorities

(decreasing the funding gap between costs and revenues)

Within the CEF programme guidelines it is recommended to examine at least the following cases in the **financial sensitivity analysis:**

- **CONSTRUCTION COSTS INCREASE BY 12,5%**
- **CONSTRUCTION COSTS INCREASE BY 25%**
- **PROJECT COMPLETION DELAYED: 6 MONTHS**
- **PROJECT COMPLETION DELAYED: 12 MONTHS**
- **PROJECT COMPLETION DELAYED: 24 MONTHS**
- **START-UP OCCUPANCY RATE LOWER THAN FORECASTED BY 20%**
- **OCCUPANCY RATE DECREASE BY 25% BETWEEN YEAR 15 AND 30**

8. RISK ANALYSIS AND RISK MANAGEMENT

The setup of SSTPAs entails construction-related and procedural risks that may affect the financial and the economic impact of the business case. Moreover, demand risk (actual demand is lower than expected demand) is an important factor as the discussions during the regional conferences of the Study have shown. The risk analysis is often underestimated as a number of investment projects analysed by the study consortium show. Thus, this section expands on the risk analysis and mitigation, which is important for the setup of a solid business case towards investors and public authorities.

HYPOTHESES RELATED TO PROJECT IMPLEMENTATION	
	Compliance with European and national requirements and conditions:
	The supervision and implementation of the project must comply with standards, rules and good practices at EU level. The CEF programme is based on the assumption that these requirements will be met accurately and timely by all involved parties.
	Cooperation of all parties involved in the project:
	For the execution of the works the appointment of experienced, reliable, economically stable and competent contractors is required.
	A stable framework should be aimed at in terms of project financing, documents, available land, works, work permits, building permits and accommodation for all contractors.

8.1. APPROACH TOWARDS RISK

Project risk assessment

The main challenge of SSTPA projects is uncertainty regarding both project deployment and parking demand, which can be interpreted as a risk and which can be expressed quantitatively. Risk exists throughout a construction, upgrade or extension phase and in the early operation phase, so that risk processing must be conducted throughout the project as a continuous activity.

Methodology of risk processing

- RISKIDENTIFICATION
- DEFININGRISKFACTORS
- ANALYSING THE EFFECTS OF RISK FACTORS
- ELABORATING A RISK MANAGEMENTSTRATEGY
- IMPLEMENTING RISK MANAGEMENT

Ranking risk factors

Risk factors produce effects on the project development. Their variation can be quantified, and, as a result, its effect on the project can be expressed quantitatively.

The risk factors that have an effect on the following main project objectives should be considered as crucial:

- PROJECT EXECUTION TERM (TIME)
- BUDGET(FINANCIALS)
- PROJECTRESULTS(QUALITY, QUANTITY, USEFULNESS)

Risk identification

The project risks may include the following (non-exhaustive list):

- WEATHER OR CLIMATE IMPACT
- LEGAL OR REGULATORY CHANGES
- RISK RELATED TO THE DETAILED DESIGN AND CHANGES OF THE AUTHORIZED PROJECT
- RISK RELATED TO TIME PLANNING
- RISKS RELATED TO PROCUREMENT
- RISK RELATED TO THE EXECUTION OF WORKS
- RISK RELATED TO THE OPERATION
- RISK RELATED TO FINANCING
- RISK RELATED TO OTHER PROJECTS CONDUCTED IN PARALLEL
- RISK RELATED TO A LOWER THAN EXPECTED DEMAND

As an example, in the following table, Risk factors have been identified, as well as their impact on the project objectives.

RISK FACTOR	EFFECTS	PROJECT IMPAIRMENT
Weather conditions	Reducing the number of workable days	Budget, Time for execution
Legal and regulatory changes	Changing business climate, tightening of environmental requirements	Budget, Time for execution
Authorities	Delays caused by requests made by authorities	Budget, Time for execution
Designer	Incorrect project design	Budget, Time for execution, Expected results (quality, quantity, usefulness)
Engineer and technical designer	Deficiencies within the public procurement procedure, mistakes in the project evaluation, sloppiness regarding the technical evaluation	Budget, Time for execution, Expected results (quality, quantity, usefulness)
Contractors	Deficiencies caused by contractors	Budget, Time for execution, Expected results (quality, quantity, usefulness)
Behaviour of project owner (beneficiary)	Stopping the implementation of the project, modifying the time schedule	Budget, Time for execution, Expected results (quality, quantity, usefulness)
Risks related to the operation	Subsequent requirements to project authorization by authorities. Additional requirements for the operation	Budget, Time for execution
Collateral projects	Budget modification, time schedule modification	Budget, Time for execution

Analysing the effect of risk factors

Risk factors can be characterised by probability of occurrence and level of impact. The following four combinations are possible:

HIGH PROBABILITY OF OCCURRENCE	**HIGH PROBABILITY OF OCCURRENCE**
MAJOR EFFECT ON THE PROJECT	MINOR EFFECT ON THE PROJECT
LOW PROBABILITY OF OCCURRENCE	**LOW PROBABILITY OF OCCURRENCE**
MAJOR EFFECT ON THE PROJECT	MINOR EFFECT ON THE PROJECT

Taking into consideration these four main categories of risk, the magnitude of the risk factor can be determined by introducing a risk coefficient calculated with the following formula:

K= P + 2 x I, where

- **K: RISKS COEFFICIENT**
- **P: PROBABILITY ON A SCALE FROM 1 TO 5**
- **I: EFFECTS ON THE PROJECT ON A SCALE FROM 1 TO 5**
- **KS: REFERENCE NUMBER OF THE RISK COEFFICIENT**

Based on the value of the risk coefficient, the risk factors can be classified in the following three categories:

- **IF 10 <= K <= 15, THE RISK FACTOR IS CRITICAL**
- **IF 5 <= K < 10, THE RISK FACTOR IS NOT CRITICAL**
- **IF K < 5, THE RISK FACTOR MAY BE OMITTED**

As an example, in the following table the earlier identified risk factors have been rated.

KS	RISK FACTOR	P	EFFECT	I	K
1	Reducing the number of working days	1	Budget, Time for execution	1	3
2	Changing business climate	1	Budget, Time for execution	2	5
3	Tightening environmental requirements	2	Budget, Time for execution	2	6
4	Incorrect project	3	Expected results (quality, quantity, usefulness) Budget, Time for execution	4	11
5	Delays caused by requests made by authorities	2	Budget, Time for execution	4	10
6	Deficiencies of the public procurement procedure	2	Budget, Time for execution Expected results (quality, quantity, usefulness)	4	10
7	Mistakes in project evaluation	2	Budget, Time for execution Expected results (quality, quantity, usefulness)	2	6
8	Sloppiness regarding the technical evaluation	2	Budget, Time for execution Expected results (quality, quantity, usefulness)	5	12
9	Deficiencies caused by the contractor	3	Budget, Time for execution Expected results (quality, quantity, usefulness)	5	13
10	Stopping the implementation of the project	1	Expected results (quality, quantity, usefulness)	5	11
11	Modifying the time schedule	2	Budget, Time for execution	4	10
12	Subsequent requirements regarding project authorization by authorities	2	Budget, Time for execution	1	4
13	Additional requirements for the operation	4	Budget, Time for execution	3	10
14	Collateral projects	3	Budget, Time for execution	1	5

Strategy of risk management

The risks management strategy – namely behaviours and actions with reference to the risks – can be divided into four main types:

As an example, the following table shows possible risk management strategies.

RISK COEFFICIENT	POSSIBLE RISKS	RISK MANAGEMENT STRATEGY			
		Avoidance	Reduction	Transfer	Sharing
KS (4)	Incorrect project, incorrect time schedule		X		
KS (5)	Delays caused by requests made by authorities		X		X
KS (6)	Deficiencies of the public procurement procedure	X	X		X
KS (8)	Sloppiness regarding the technical evaluation	X	X	X	X
KS (9)	Deficiencies caused by the contractor	X	X	X	X
KS (10)	Stopping the implementation of the project	X			
KS (11)	Modifying the time schedule	X	X		
KS (13)	Additional requirements for the operation	X			

The risk management strategies can be explained as follows:

KS (4) – Design errors: The risk coefficient can be reduced if the designer is obliged by contractual clauses to prepare site dispositions and to modify the design in due time.

KS (5) – Delays caused by requests made by authorities: This risk can be reduced if the designer complies with the requirements imposed by authorities when elaborating the project. Risk sharing can be obtained by mandating the designer to obtain all necessary permits from the authorities.

KS (6) – Deficiencies in the public procurement procedure: A part of this risk can be avoided by employing an experienced engineer who, if necessary, can ensure legal consultancy with experienced personnel for the preparation of the execution of works and tender documentation. A part of this risk can be reduced by elaborating a detailed tender documentation in order to assign the execution works and by including a detailed project in the tender. Risk sharing can be obtained by organizing site visits with possible bidders in order to clarify potential questions related to the execution.

KS (8) – Sloppiness regarding the technical evaluation: This risk can be avoided by employing an engineer with experience in technical assistance and supervision of the execution of works in compliance with the provisions of the FIDIC Red Book. This risk can be reduced if the project management team of the beneficiary ensures a proper support to this engineer and seriously evaluates the bidders. This risk can be transmitted to the engineer by mandating him or her to employ competent persons for the evaluation of offers. Risk sharing can be obtained by introducing specific clauses regarding performance in the service contract concluded between the beneficiary and the engineer and by mandating the engineer to prepare professional reports for the assessment of bidders.

KS (9) – Deficiencies caused by the contractor: A part of this risk can be avoided by preparing tender specifications and a documentation for the award of the execution of works, so that the requirements oblige the bidder to present qualified and well prepared staff and equipment in compliance with the types of works and to have a stable financial situation. This risk can be reduced if the beneficiary employs an experienced engineer and if the project management team is effective. This risk can be transmitted if the beneficiary obliges the designer contractually to collaborate and to provide technical assistance throughout the project. This risk can be shared if the contract for the execution of works contains clauses of performance guarantees and if, before signing the contract for works execution, it is mutually agreed to appoint a mediation institution for dispute settlement.

KS (10) – Stopping the implementation of the project: This risk can be AVOIDED if the beneficiary orders the commencement of works after ensuring the funds required for the execution.

KS (11) – Modifying the time schedule: This risk can be avoided if the time schedule prepared by the contractor is realistic. The schedule can be checked by the engineer, who must ensure qualified personnel in order to assess the correctness of the execution schedule. This risk can be reduced by preparing tender specifications and documentation by well-trained staff with regards to the award of the execution of works.

KS (13) – Additional requirements for the operation: This risk can be avoided if the project is prepared as per the requirements of the beneficiary and the users.

8.2. TYPES OF RISK

Environmental risks

The project should comply with national and EU environmental protection provisions. The impact of the proposed works on the environment should remain as limited as possible. The potential environmental impact should be reduced during the execution of the works by preventing factors such as noise, vibration, air pollution, accidental fuel spills caused by transportation and the execution of the works

Usually, no negative impact on the environment should occur in SSTPA projects. On the contrary, by performing the investment, a positive impact will be achieved by eliminating the released emissions and reducing potential nuisances:

WATER QUALITY PROTECTION

The designed works do not pollute surface water and groundwater.

AIR PROTECTION

The design works generate limited air pollution. The contractor must take measures in order to decrease the dust clearance in the atmosphere. During operation no emissions and no toxins are released.

PROTECTION AGAINST NOISE AND VIBRATIONS

Regarding the approach to specific construction and assembly works, the transportation and unloading of equipment is limited in time. The operation during this period of time does not damage the surroundings.

PROTECTION OF SOIL AND SUBSOIL

The design works do not represent sources of pollution for the soil and subsoil.

PROTECTION OF LAND AND WATER ECOSYSTEMS

The designed works do not generate pollutants for the soil and water ecosystems. The distances to buildings comply with legal and regulatory provisions.

WASTE MANAGEMENT

With regards to recyclable wastes, the contractor is responsible for the collection, transport, storage or recovery according to the relevant regulations in force. For other types of waste resulting from electrical installation works, the contractor is responsible for the collection, transport, storage and disposal of the waste.

Technical risks

This category of risks depends directly on the activities under the workplan of the project, in the design stage or during execution:

- Erroneous phasing of works
- Errors in the calculation of technical solutions
- Improper execution of one or various sections of the works
- Failure to comply with regulations and legislation in force
- Difficulties in recruiting and training specialized personnel in maintenance and operation of new installations

Mitigation of technical risks

- Within the workplan sufficient slack has been envisaged for key stages of the project.
- Emphasis will be placed on the verification stage of the design phase.
- The project manager, together with the legal responsible and the technical manager, will deal directly with the collaboration with the entities involved in project implementation.
- The activity of the site supervisor will be monitored.
- In the tender specifications for consultancy contracts remarks will be made on monitoring the quality of the work.
- The technical responsible will be directly involved and will monitor the execution of the works carefully. He or she will implement a rigorous supervision system of the construction works. This will involve organizing partial reports for each stage of the works. They will be provided in the tender documentation and upon the conclusion of related contracts.
- The project will be steered in such a way that it complies with quality standards and provided terms.
- The specifications on materials, equipment and methods of project implementation will be respected.
- Emphasis will be placed on environmental protection and conservation. The tender documentation for the works contract will stipulate the need for minimizing the areas occupied temporarily during construction. The documentation will also list the locations to store the waste resulting from works under the contract as well as the measures to restore the environment.
- The equipment and installation suppliers will be required to train the staff entrusted with maintenance and operation. The recruitment process of the staff will take into account the positions corresponding to their qualification.

Financial risks

- Unjustified increase of purchase prices for machinery and equipment used in the project.
- Increase of the price of construction materials, beyond the foreseen limits.
- Significant modification of exchange rates.

Mitigation of financial risks

- Ensuring the proper conditions for supporting free market competition in order to obtain a higher number of compliant offers during the procurement phase.
- Realistic estimation of the increase of market prices.
- Constitution of reserves for unforeseeable expenses in the project.
- Ensuring at least the amount related to the beneficiary's own contribution in the local budget, plus a risk coefficient of 5%.

Risks related to procurement failures

Failure in performing the procurement process accurately can be managed through a series of measures such as:

- Rigorous compliance of public procurement rules in order to avoid claims.
- Commitment by the beneficiary to include a certain amount in its own budget that could supplement the eligible value of the works execution contract, in order to avoid delays that could occur if no offers comply with the approved budget of the project.
- Widely disseminating the project in order to obtain several technical and economic offers from bidders, but without prejudice to the provisions on public procurement and without favouring certain economic agents.

Institutional risks

There is a risk of poor communication between the entities involved in project implementation, on the one hand, and between contractors of works contracts and equipment suppliers, on the other hand. This can be mitigated through regular meetings, establishing new ways of communication, both formally and informally.

Legal risks

This type of risk is hard to control because it depends directly on the beneficiary of the project:

- Repeating procurement procedures due to low level of participation in tenders.
- Repeating procurement procedures due to repeated high numbers of non-compliant bids received within the tender process.
- Legislative instability – frequent legislative changes that may affect the project.

Mitigation through appropriate project preparation and development

- Human resources with experience in project implementation.
- The development of the financing documentation will be contracted by a specialized company.
- Appropriate financing and/or funding mix tailored to the project.
- Key legal questions are clarified beforehand.

In a nutshell, the analysed investment project risk consists of technical, financial, institutional and legal risks. Typical descriptions of these risks, their consequences and ways to mitigate them, together with an allocation of responsibilities for dealing with the risk to parties involved, are presented in the table below.

RISK CATEGORY	DESCRIPTION	CONSE-QUENCES	MITIGATION	RESPONSI-BILITY OF RISK MANAGEMENT
Construction	Risk of developing an event during the investment's execution period that leads to the impossibility of performing it on time and in line with the estimated costs	Delay in implementation and increase of the works execution costs	In general, the investor shall enter into a contract with a fixed duration and value. The contractor must have the resources and technical capacity to comply with the execution conditions.	Investor/operator
Acceptance of the financing mix by investors and/or authorities	The risk is both physical and operational and it refers to the delay in performing the investment's approval	Consequences for both parties. For the contractors of the works: delayed incomes and lost profits. For the beneficiary: delayed start of using the new option, with all related consequences	The beneficiary shall not perform the payment of the entire value of the work up to the investment's approval.	Investor/operator
Maintenance and repairing	The quality of design and/or works is improper, entailing an increase over projections of the maintenance and costs for repair works	Negative effects on using the new option	The investor can manage the risk by means of contractual guarantee clauses of the works performed by the contractor.	Investor/operator
Technical capacity	The contractor does not have the technical capacity necessary for performing the investment execution works	Operator's inability to perform the investment	The operator examines the technical and financial capacity of the contractor in detail.	Contractor
Outdated or improper technical solutions	The proposed technical solutions are not sufficiently suitable from a technological point of view	All estimated benefits are diminished	The investor can manage the risk by means of contractual clauses regarding the quality of works.	Investor/operator

FINANCIAL RISKS				
Unavailable financing	The funder cannot ensure the financial resources in sufficient amounts	Missing funding for continuing or finalizing the investment	The investor will carefully review its financial commitments in line with the investment's scheduling.	Investor/operator
Incorrect evaluation of investment value and operating costs	The investment value and the operating costs are under-estimated	The investment cannot ensure the investment financing and maintenance	The investor can use its own financial resources (if available) in order to cover additional costs.	Investor/operator
Payment	Real value of payments, over time, is diminished by inflation	Diminishing in real terms the incomes performed by the contractor	The execution process will search for a proper mechanism in order to compensate inflation. The investor shall accept the contractual indexing clauses.	Investor and Contractor
INSTITUTIONAL RISKS				
Modifying system of fees and taxes	Risk that during the project the general taxation system changes to the detriment of the investor	Negative impact on the investor's financial incomes	The investor's incomes must allow the financing of unfavourable differences, up to an amount established between the parties by means of a contract.	Investor/operator
Withdrawal of support received from public authorities	If the facility is based on an additional support, the governmental authority will withdraw this support. This will result in a negative impact on the project	Consequences on the project's financing sources	The investor will try to financially recover the project after the changes affecting the project in a discriminatory way.	Investor and the other beneficiaries of the project

Some of the main risks that can result during the infrastructure project's development are listed in the table below.

RISK CATEGORIES	DETAILS
Technical risks	▪ Design errors ▪ Non-compliant execution of construction works ▪ Non-compliant execution of maintenance works ▪ Non-compliant phasing of works ▪ Lack of synchronization between the works performed in the same perimeter or in nearby areas which can impact the total implementation duration of the entire project.
Financial risks	▪ Increased investment costs as result of the necessity to perform additional works ▪ Increased investment value as result of the related works that were not anticipated (e.g. necessity to deviate certain utility networks) ▪ Erosion of the financial capacity of the beneficiary, generating the risk of default of the necessary expenditure for infrastructure maintenance ▪ Extension of the implementation period of the project ▪ Possibility of declaring certain categories of expenditures ineligible, or application of financial corrections by the funder ▪ Extension of reimbursement period for eligible expenditures
Institutional risks	▪ Distortions in the information flows between the entities participating within the project

8.3. RISK MANAGEMENT MEASURES

The measures to be applied in order to reduce risk may differ from one another since during the implementation period the risk is attributable to the applicant and during the operation period it is attributable to the operator.

During the implementation period

During the implementation of the setup of the SSTPA, the management team will have to avoid any risk by establishing a realistic implementation schedule and by following it. A frequent high impact risk is the emergence of design errors or omissions that may jeopardize the implementation of the project and may lead to additional expenses. This risk can be diminished by verifying the related documents with experienced experts at every preparatory stage. Other risks during the implementation period may be increased due to a longer duration of the works procurement procedures or due to adverse weather conditions.

For the beneficiary, the risk factors are related to an extension of the reimbursement period regarding eligible expenditures by public authorities over the project investment period. This risk can lead to immobilization of financial resources and will have a negative effect on cashflow during the implementation. The implementation team will have an early opportunity to flag estimated investment cost overruns and to notify the beneficiary in order to find resources to finance the delta.

Qualitative construction parameters

As noted, the impact is significant when carrying out works of poor quality, which is why it is essential to prevent this risk. Among the measures to avoid this risk the following are included: existence of a work guarantee, secured by certificates of conformity which require a certain standard of quality and activity monitoring by the project supervisor, who is in charge of checking the quality of the performed works.

During the operating period

Financial sustainability of the project is financed from operating incomes, but it is important to monitor the occupancy level in order to correct any deviations in advertising or interventions to be able to provide maintenance operations. It is recommended to make a conservative forecast of the occupancy during the first three years of operation since shippers, transport companies and truck drivers take time to identify new or upgrade parking facilities, according to the insights generated throughout the Study.

9. CONCLUSION

This document provides a framework for the financial and economic analysis of SSTPAs. It should be used in conjunction with the Long Manual of the Study, the Guide to Cost Benefit Analysis of the European Commission and the Cashflow Template of the European Commission. Further information is available on the Study website *https://sstpa.eu-study.eu*