

Guide to Cost Matrix Template

Methodological notes supporting the PDCA toolbox - Techno-Economic Assessment (TEA) (upscaling feasibility and economic profit)

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Document control sheet

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Introduction

The purpose of this document is to support the collection of the technical and economic information necessary to perform the comparative economic evaluation of the alternative waste management scenarios implemented or considered by the Municipality.

This document aims to define the information required in order to assess solutions economic performance. The data collected through this document and Cost matrix template will constitute the basis for the techno-economic assessment.

Scope

To conduct a comparative techno-economic assessment of the alternative waste management scenarios in comparison with the current baseline configuration. The purpose of the assessment is to quantify and compare the CApital EXpenditure (CAPEX), OPerational EXpenditure (OPEX) and revenue streams associated with each configuration, and to determine the incremental economic impact of each alternative solution relative to the baseline system.

The analysis will be performed from a municipal system perspective and will therefore include costs and revenues associated with separation, collection and processing. Unless otherwise agreed, environmental externalities and broader societal costs will not be included in the economic calculation. The evaluation will consider a project lifetime of 10 to 15 years and will assess the evolution of costs over time, taking into account potential increases in treated waste volumes and the impact of economies of scale.

For each alternative scenario, the total net system cost will be calculated as the sum of CAPEX and OPEX minus generated revenues. The difference between this value and the corresponding net cost of the baseline will represent the incremental economic impact of the scenario. Where relevant and supported by data availability, a discounted cash flow approach may also be applied in order to estimate the Net Present Value of each configuration.

Solutions

Include all scenarios identified as relevant configurations for the assessment. For each solution, clearly define the system boundaries and the allocation of waste flows across processing pathways. To help map these waste streams and their transformations, utilizing a Process Block Diagram is highly recommended.

Information collection

In order to perform a robust economic evaluation, detailed technical and financial information is required for each scenario. These data are listed in Cost Matrix Template and are essential for ensuring methodological consistency and traceability of assumptions. In particular, for each scenario it is fundamental to clearly define the total amount of waste treated on an annual basis, expressed in tons per year, as well as the quantification of the products generated by each processing process. The annual production of biogas, biomethane, electricity, heat, compost or digestate must be specified, together with a clear indication of how these outputs are managed. It is necessary to clarify whether these

products are sold, internally reused or externally exported, and, in the case of sale, at which price. These revenue streams directly affect the net economic performance of each scenario and are therefore essential inputs for the analysis.

With respect to investment and operational costs, detailed technical and financial information is requested in the Cost Matrix Template, including installed capacity, total investment cost, expected lifetime and operational expenditures. However, partners may provide the required information in different ways, depending on data availability.

- a) If detailed cost breakdowns are available, the individual entries of Cost Matrix Template can be completed accordingly. In the case of multiple facilities contributing to a given processing chain, such as anaerobic digestion and post-composting performed in separate plants, costs and capacities should be reported individually in order to ensure accurate allocation.
- b) If certain data are not available at this level of detail, partners may indicate that the specific information is unknown; in such cases, values will be estimated using peer-reviewed literature, recognised databases or comparable European case studies, and all assumptions will be clearly documented and validated.
- c) If consolidated and reliable aggregate values for total CAPEX and total OPEX are already available for a given scenario, these overall figures may be provided instead of a detailed breakdown. In this case, it is essential that the aggregated values are clearly associated with defined system boundaries, processing capacities and reference years, in order to ensure methodological consistency.
- d) If existing plants are used, the CAPEX and OPEX data are negligible for the “processing” part. If a fee is paid, it must be reported in the dedicated space in the Cost Matrix Template.

To facilitate data entry, the Cost Matrix Template provides two illustrative sheets demonstrating how the data should be structured:

- Example Solution 1: Focuses on a scenario where waste is utilized to generate heat or electricity, primarily at a municipal scale.
- Example Solution 2: Focuses on solutions for soil improvers operating at reduced scales (for example, in decentralized contexts where transportation is minimized or not required).

These example sheets are intended to serve as a baseline structure. Users can fully adapt and personalize them according to their specific project setup.

Calculation

Once the required technical and financial data have been collected, the economic assessment can be performed. Within the Calculation template, the primary objective is to evaluate the Cost-Benefit Ratio (CBR), which yields standardized key indicators allowing for direct comparison across different solutions. Nevertheless, depending on the specific needs of the LL, alternative or complementary economic assessments may also be applied (e.g., Discounted Cash Flow analysis, specific tax calculations, etc.).

Step-by-Step Calculation Process:

1. Data Validation and Harmonization: To begin the calculation step, the collected CAPEX and OPEX information must be validated and harmonized. Costs and revenues

are converted into standardized metrics (such as annual values, costs per ton of waste treated, or costs per citizen/beneficiary) to ensure consistency.

2. Defining Project Parameters and Assumptions: Key project inputs must be established or assumed based on comparable European projects or industry benchmarks:
 - Project Lifetime: the expected operational duration of the initiative.
 - Discount Rate: The rate used to adjust future cash flows to present value. This rate depends on the nature and risk of the project, so benchmark analysis is recommended to define this value.
 - Growth Rates: Projected annual percentage increases in waste collection/treatment volumes or targeted beneficiaries over time.These parameters enable a dynamic evaluation of the solution's performance throughout its lifecycle.
3. Automated Cash Flow & NPV Processing: Once all validated inputs and assumptions are entered, the calculation template processes the results automatically:
 - Total Annual Expenses & Revenues: calculated for each year of the project lifecycle.
 - Present Value (PV): computed annually using the defined discount rate.
 - Net Present Value (NPV): Aggregated across the total project lifetime.
4. Cost-Benefit Ratio (CBR) Indicator: Finally, the CBR is calculated as the ratio between total discounted investments/expenses and total discounted benefits/revenues:
 - CBR > 1: Indicates that the solution is economically viable under the established conditions and assumptions, as generated revenues outweigh overall investments.
 - Higher CBR Values: Demonstrate greater economic returns relative to the invested capital. This makes the CBR a crucial benchmark for ranking and comparing alternative management scenarios.

It is important to note that while a high CBR highlights financial efficiency, this indicator alone is not sufficient to finalize an investment decision. It should always be evaluated alongside key social, technical, and environmental impact indicators to ensure a complete assessment.

Attachments

- [Cost matrix template](#)
- [Calculation template](#)