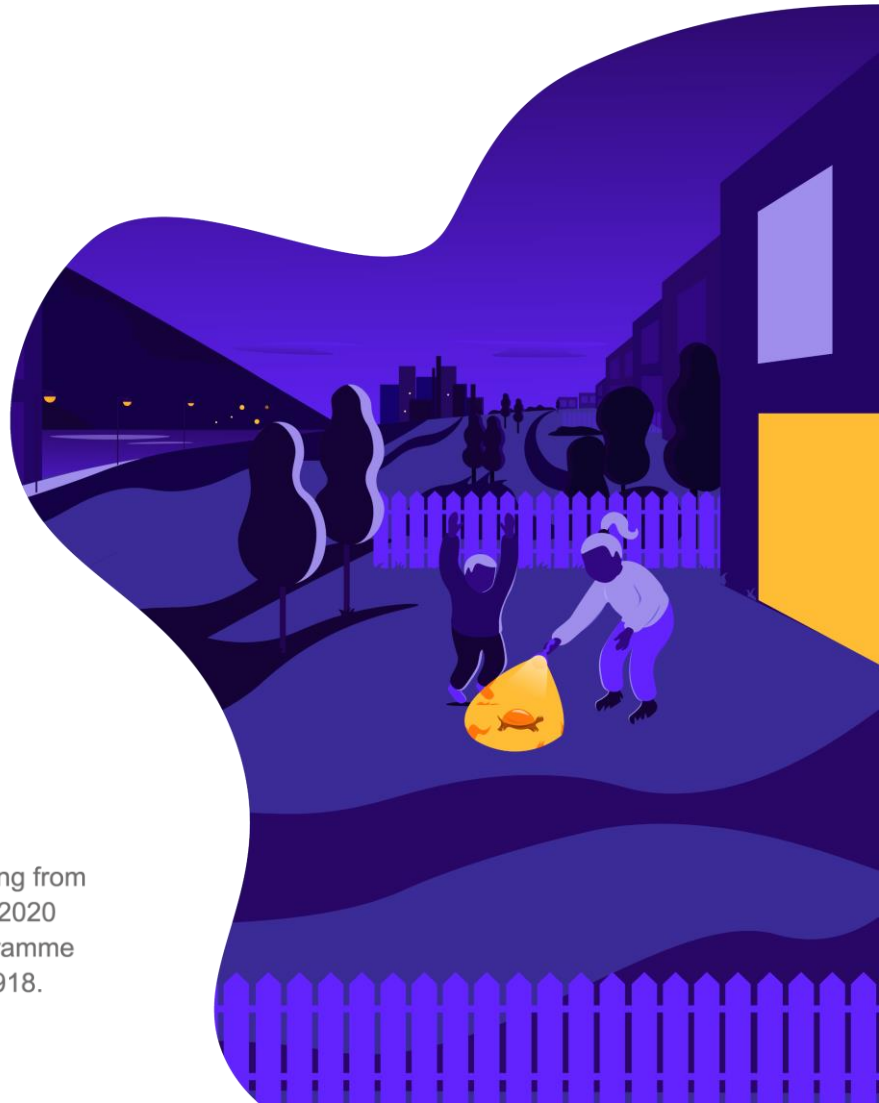


MBx Tool

D5.5 A WEB-BASED CALCULATION TOOL TO SUPPORT DECISION-MAKING AND INVESTMENT

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1. Introduction - MBx tool for decision-making

Sustainable plus-energy neighbourhoods (SPENs) are an innovative concept of decarbonising the building that considers the interaction of the building with the urban infrastructure.

A SPEN is defined as a highly energy efficient and energy flexible neighbourhood with a surplus of energy from renewable sources¹. This concept relies on the interplay between novel technologies at the neighbourhood scale, energy efficiency and flexibility of the buildings, good architectural and spatial qualities, sustainable behavior, and citizen engagement. The premise that a cost reduction can only be achieved by an integrated approach.

The four syn.ikia demo projects deploy sufficiency design measures, such as shared spaces, assets and services (e.g. RES, HVACs, heat and electricity storage). SPENs aim for high energy efficiency to reduce energy demand and achieve a positive energy balance at the neighbourhood scale. SPENs require additional investments compared to business-as-usual (BAU) projects, however, they also provide multiple added social, economic and environmental benefits. At a societal level, they contribute to lower GHG emissions, leading to lower mortality and morbidity rates. Improved accessibility to public and cycling infrastructure contributes to physical and mental health, as well as inclusion and affordability. At an individual level, improved IEQ yields health and productivity benefits for the dwellers. The theoretical framework of MBx tool is detailed in the report *D5.3 Multiple benefits of sustainable plus energy neighbourhoods and their potential impact on policy and investment decisions*.

To scale up SPEN to the private residential sector, there is an increased need to access private funding. The EU Taxonomy and ESG Finance encourage sustainable investments in real estate. Investors, asset managers and policymakers need evidence-based and commonly accepted methodologies to assess ESG aspects of projects. [MBx tool](#), developed within syn.ikia project², is a step forward in quantifying and monetising the social welfare, micro-economic and environmental benefits of projects, by considering the added values of the SPEN approach. This decision-making tool for policymakers and investors uses **Social Cost-Benefit Analysis (S-CBA)** method to compare the benefit-cost ratio and return-on-investment of SPEN against that of BAU. MBx tool can help investors identify ESG investment opportunities and future-proof real estate assets.

More specifically, the MBx tool is a web-based application that helps stakeholders to:

- take a consistent approach across public and private sector to cost benefit analysis, including common values and assumptions
- take a long-term and broad view of societal impacts, costs and benefits of SPENs and other similar initiatives
- rigorously assess these by monetizing and discounting impacts, where possible, and
- be transparent about the assumptions and evidence base.

MBx tool is a step forward in gathering evidence-based multiple benefits and the assumptions of the methodology are detailed in *D5.4 A methodology report on the required calculations for the quantification and monetisation of multiple benefits*.

Initiatives such as SPEN are not evaluated on MBx results alone, since many factors are considered in the decision-making process. MBx results together with unmonetised impacts, evidence base and assumptions inform value-for-money advice. Return on investment is considered alongside other factors such as strategic alignment with priorities, financial constraints and implementation risks.

¹ An evaluation framework for Sustainable Plus Energy Neighbourhoods: Moving beyond the traditional building energy assessment, Energies, 2021, 14, 4314. Salom J. et al. syn.ikia project. <https://doi.org/10.3390/en14144314>

² <https://www.synikia.eu/about-syn-ikia/>

2. Steps of development

7.1 Methodology of quantification and monetisation

MBx contains a database prepared from international research and European publicly available data that can be used to value impacts (or several multiple benefits). An impact value provides a quantified numerical value in relation to one or more impacts of an initiative. In some situations, a value may be a cost, in others, it could be a saving. Examples include the costs of a general practitioner visit and increased disposable income for individuals. Developers have derived the values using a variety of non-market valuation methodologies. The values are adjusted to reflect a common time period.

The impacts are calculated using specific methodologies as outlined in *D5.4 A methodology report on the required calculations for the quantification and monetisation of multiple benefits*³.

For each multiple benefit to be considered in policy-related or investment decision-making, the outcome must have a direct link to its market valuation or € value. In other words, in most cases the impact on the end user, investor or other beneficiary should be monetised. For example, benefits related to employee productivity can be valued as financial gains and benefits related to health can be valued as health care costs. The scope and complexity of the policy objective or project will determine the most appropriate calculation methods, modelling approaches or other complex models may be used for valuation purposes, i.e., monetisation. It is theoretically possible to estimate the monetary value for each benefit.

This is achieved by first quantifying the impact of the measure in physical units (e.g. number of life years saved, number of full-time jobs created, tonnes of CO₂ avoided etc.) before translating this into a monetary value. For non-market goods and services, the valuation is typically carried out by estimating the willingness to pay for benefits or the willingness to accept compensation for losses (e.g. avoided costs, replacement costs, contingent valuation, hedonic pricing etc.).

7.2 Development of beta version (excel tool)

Before the development of the web-version of the tool a beta version of the tool was developed using the MS excel, to ensure that all the elements of the calculation such as initial input data, impact calculations, formulas and outputs are easily readable and transparent to the partners and reviewers during the early phase of development. The elements of S-CBA were used to develop the tool with a comprehensive impact database developed with partners BPIE, IREC, NTNU and ABUD.

7.3 Testing of the beta version

The beta version (excel tool) was tested internally by project partners and a workshop was conducted to exchange on the key functionalities of the tool. The feedback received was incorporated in the final web development of the tool.

7.4 Development of the final version

The web development of the MBx tool was performed with an external subcontractor (EPIC) in coordination with BPIE. The MBx tool (web-version) was developed using the beta version (excel tool) to make it open access for developers (if required). The web-version was designed to make the tool more user-friendly, accessible and easy to use for investors, developers and policy makers. The web-version went through a series of development phases over a 6-month duration.

³ <https://www.synikia.eu/resource-types/technical-reports/>

7.5 Testing of the final version

The final version of the MBx tool (web-version) was tested using a series of workshops with internal and external partners. Several stakeholders were involved in testing the tool such as developers, policy analysts, architects, etc. Feedback received during workshops was used to make the MBx tool more aligned with the requirements of the stakeholders and ensure that it is clearly understood for the novice and advanced users. Detailed training materials and guides were also developed to support the users.

3. Tool interface

The homepage (see Figure 1) of the [MBx tool website](#) is designed to provide a clear and engaging introduction to the concept of SPEN, as well as instructions guiding users to start using the tool by providing essential information about its features and benefits.

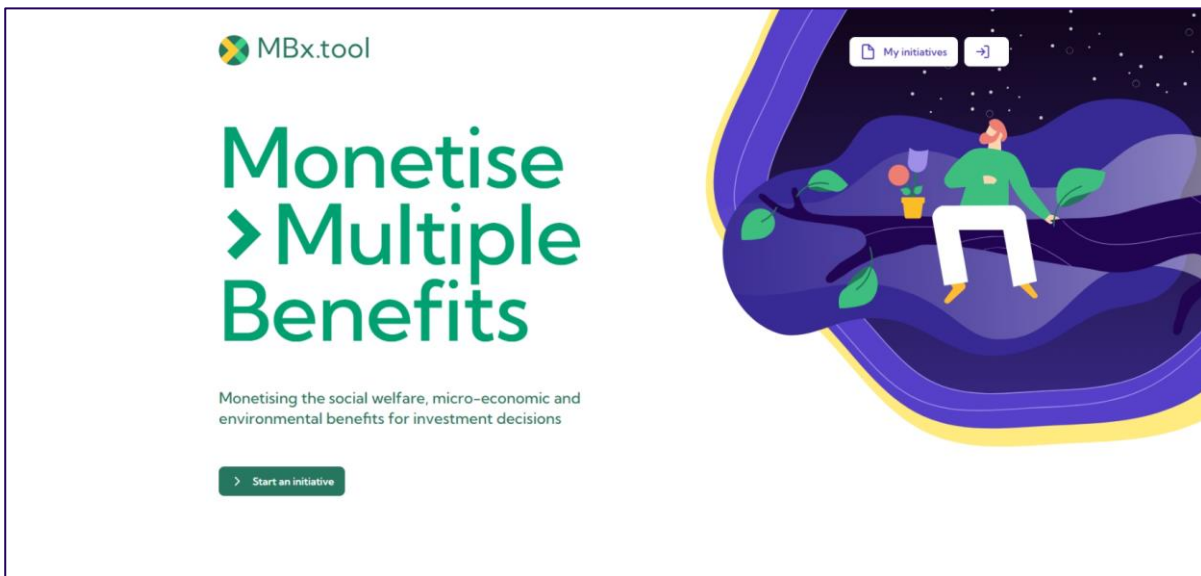


Figure 1: Screenshot of the homepage

3.1 How to use MBx Tool?

A section explaining [how to use the calculator](#) (see Figure 2) in simple steps, explanation of each step. This section includes a case study, based on the data from the Austrian demo site, to guide users and illustrate all the features. The case study can be used as a template for another project, with all the inputs editable, with the option [‘Start demo case’](#).

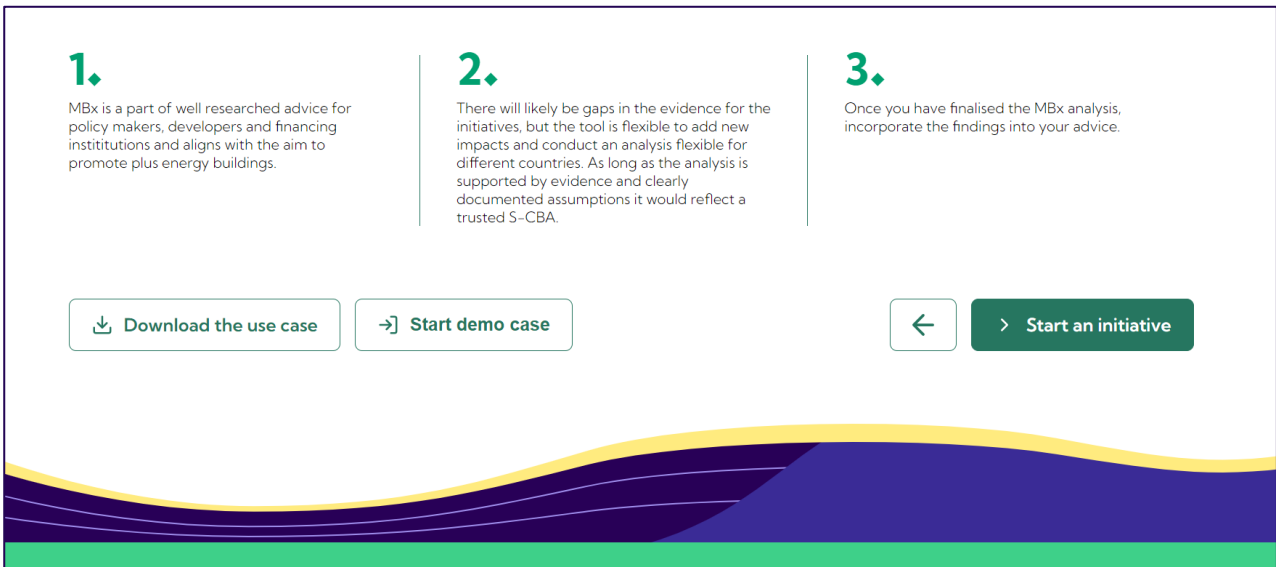



Figure 2: Screenshot on 'How to use the MBx Tool'

3.2 Primary inputs

The first page of a new project (or initiative) includes a series of key inputs, such as the country, total time-period of calculation, number of inhabitants/dwelling units/etc., discount rate and timeline of beneficiaries intervened. The country field selected influences the prefilling of some economic indicators in the following sections (see Figure 3 for Primary inputs page).



My initiatives ↗

Primary Inputs
Cost Inputs
Impact Database
Output Results

Primary Inputs

This page contains a number of primary inputs that drive the modelling of multiple benefit impacts, including the intervention beneficiaries across years and the time period. The MBx model includes up to 50 years.

▼ Initiative Details

E.g. Renovating 120 social housing units in a municipality of Berlin with shared energy infrastructure; New construction of 30 collaborative housing units in Vienna with shared community.

▼ Time period for S-CBA

2024	2025	2026	2027	2028	2029	2030	2031	2032
2		2	2	2	2	2	2	2

2024 ▼

▼ Initiative Intervention Group

2024	2025	2026	2027	2028	2029	2030	2031

2024 ▼

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Figure 3: Screenshot of 'Primary inputs' page

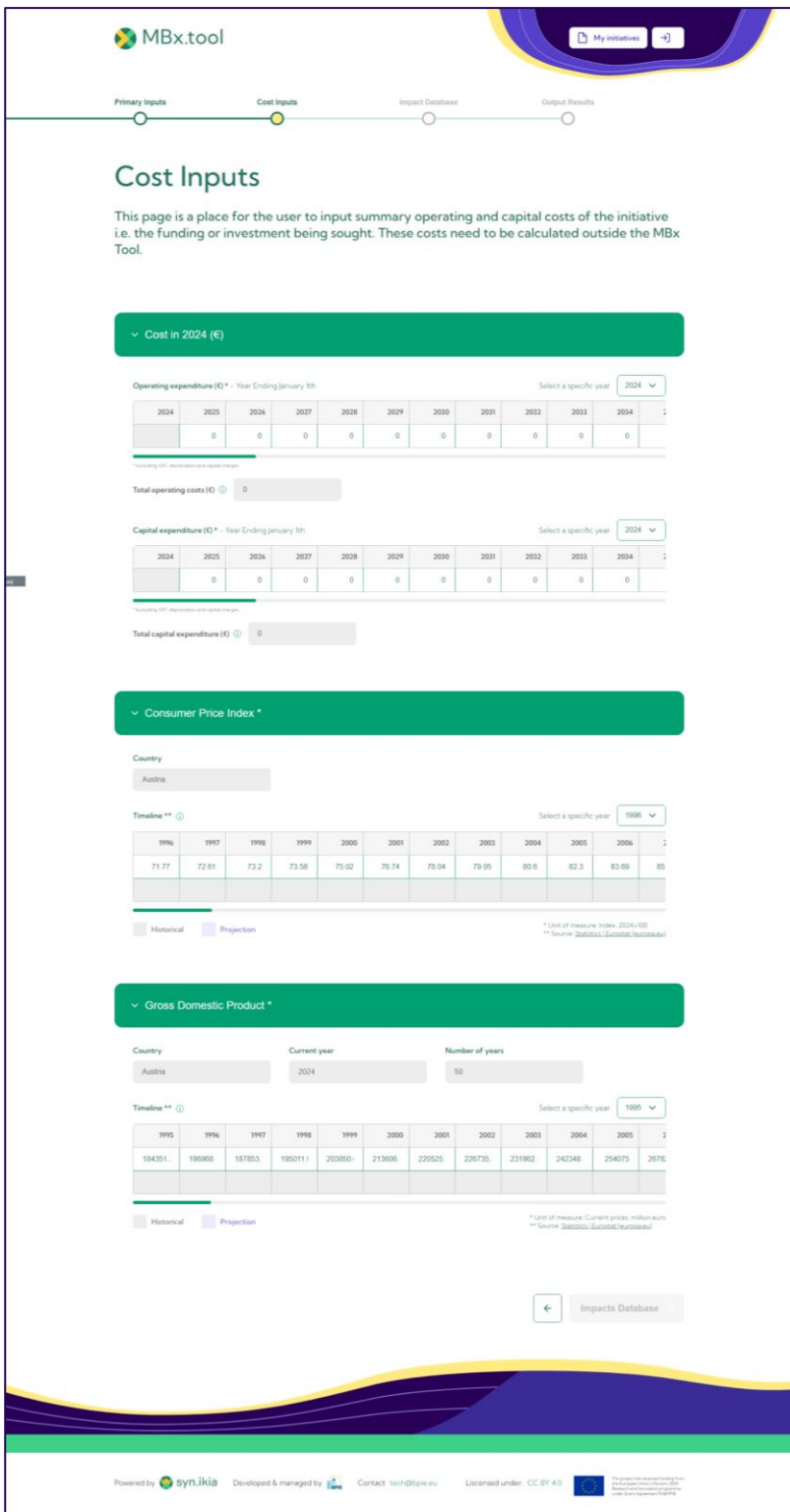
3.3 Cost inputs

In this section the main costs are detailed, such as operating and capital expenditures over the timeline of the calculation period, as well as the Consumer Price Index and Gross Domestic Product. The latter two are

Sustainable plus energy neighbourhoods

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prefilled with data from Eurostat and can be edited by the users if they have better data available (see Figure 4 for cost inputs page).



Cost Inputs

This page is a place for the user to input summary operating and capital costs of the initiative i.e. the funding or investment being sought. These costs need to be calculated outside the MBx Tool.

Cost in 2024 (€)

Operating expenditure (€) * - Year Ending January 31st Select a specific year: 2024

2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
0	0	0	0	0	0	0	0	0	0	0

Total operating costs (€) 0

Capital expenditure (€) * - Year Ending January 31st Select a specific year: 2024

2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
0	0	0	0	0	0	0	0	0	0	0

Total capital expenditure (€) 0

Consumer Price Index *

Country: Austria

Timeline ** Select a specific year: 1996

1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
71.77	72.61	73.2	73.56	75.02	76.74	78.04	79.05	80.6	82.3	83.66

Historical Projection * List of measure index: 2024=100
** Source: Statistics (Eurostat/Eurostat)

Gross Domestic Product *

Country: Austria Current year: 2024 Number of years: 50

Timeline ** Select a specific year: 1995

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
184351	196968	187853	195011	203850	213606	220525	226735	231862	242348	254075

Historical Projection * List of measure: Current prices, million euro
** Source: Statistics (Eurostat/Eurostat)

← Impacts Database




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Figure 4: Screenshot of the 'Cost Input' page

3.4 Impact database

In the impact database (see Figure 5), the project/initiative owner can choose the list of environmental, micro-economic or social welfare categories and can edit each of the parameters of the multiple benefits. There are different Sub-domains under each category such as:

- Energy
- Emissions
- Land
- Energy security
- Income, consumption and wealth
- Real estate
- Financial
- Work
- Occupancy
- Management
- Health
- Housing
- Safety and security
- Leisure and play

Users can also add additional multiple benefits to their projects, and submit them to the admins. The tool will continuously grow and be updated with additional information and KPIs from SPEN projects.

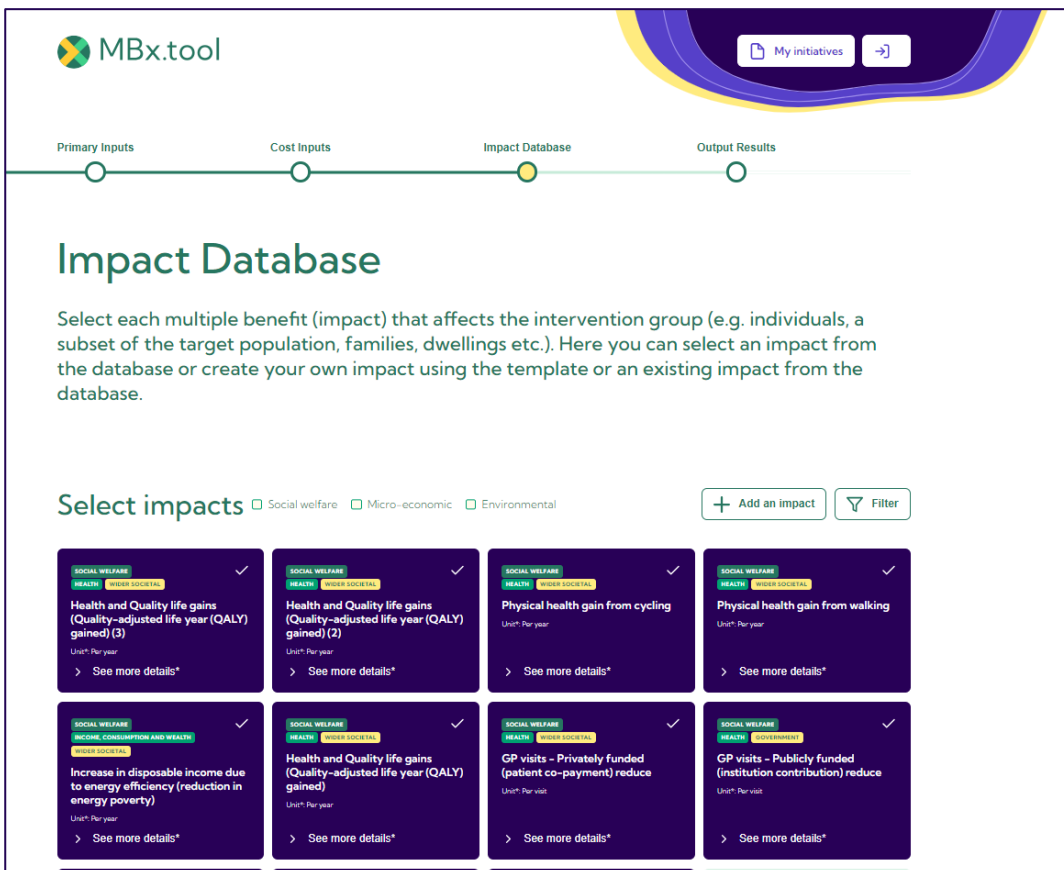


Figure 5: Screenshot of 'Impact database'

3.5 Outputs

This section summarizes the results of the S-CBA analysis (see Figure 6), with a list of indicators, such as:

- Project costs present value i.e. Investment
- Government impacts
- Wider societal impacts
- Total societal impacts, net present value

- Benefit cost ratio, Wider-societal Total
- Return on Investment, Wider-societal Total
- Benefit cost ratio, Wider-societal only
- Benefit cost ratio, Wider-societal only
- Benefit cost ratio, Government only

Graphs illustrate present value of the multiple benefits across sub-domains (see Impact database section), Net Present Value over the years (such as total marginal impact, total cost and net benefits), marginal impact of the intervention and cumulative net benefit. Other tables go into detail about the impact of each multiple benefit.

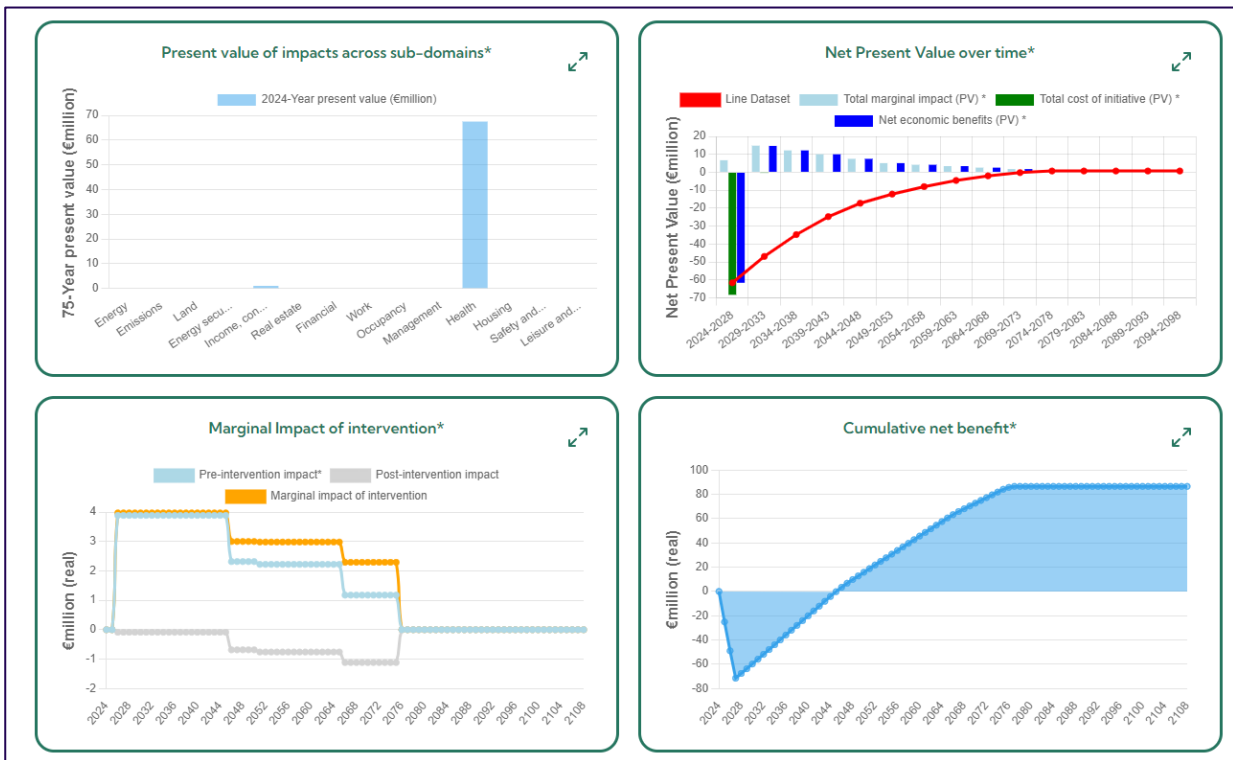


Figure 6: Screenshots of output graphs

The last part of this section, ‘Sensitivity analysis’ (see Figure 7) allows comparing projects/investments by saving various projects as benchmarks. This functionality is extremely useful for comparing multiple investment or policy scenarios.

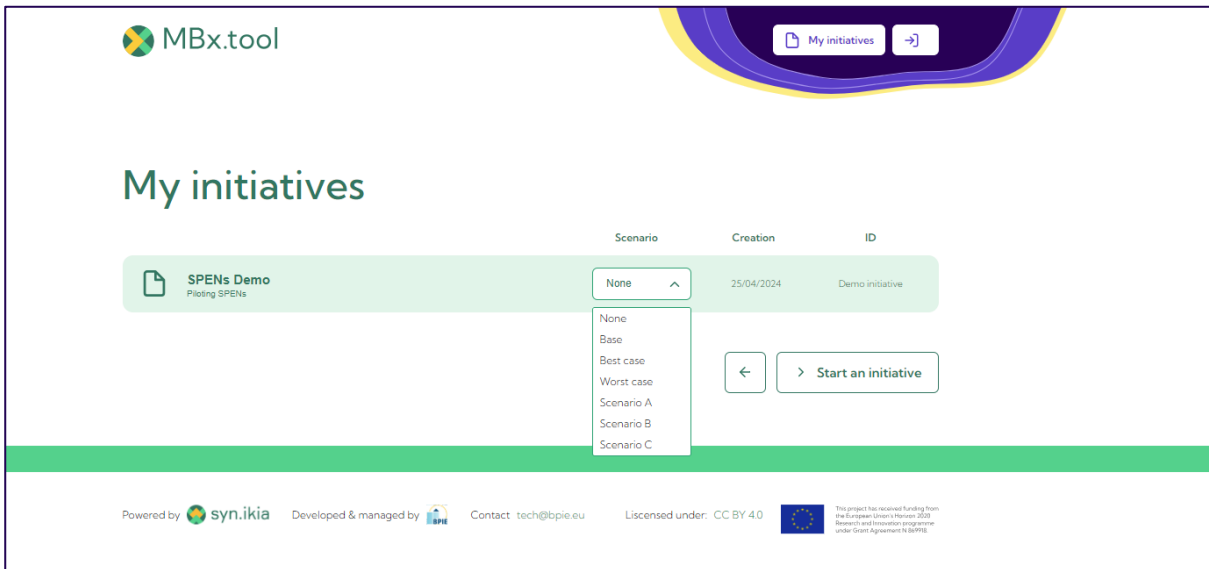


Figure 7: Screenshot of 'Sensitivity analysis' page

4. Use and limitations

The MBx tool has been designed specifically with policymakers, investors, financial institutions, developers and public authorities in mind, but can be used to help calculate present values for many initiatives.

We recognise that there will always be limitations to a tool like MBx. To be able to use the MBx tool, organisations need to quantify impacts and success rates, for example, the number of people expected to gain employment, based on the best available data and evidence about the relevant impacts of an initiative. There will be gaps in the evidence for how effective an initiative might be, for example when trying something new.

The advantage of the MBx tool is that it makes assumptions explicit, and values different types of costs and benefits in a consistent way. This provides the basis for more informed choices between the different options. Discussions should consider all impacts including unmonetised impacts, as well as those impacts able to be monetised using the MBx tool.

There will likely be gaps in the evidence for the initiatives, but the tool is flexible to add new impacts and conduct an analysis flexible for different countries. As long as the analysis is supported by evidence and clearly documented assumptions it will reflect a trusted S-CBA.

It is recommended that the users refer to the use case developed in the tool using the link below:

[\[Link to the USE case\]](#)

5. Future development of the tool

After the launch of the tool, a free maintenance of the web app by the developers is included for the duration of 2 months, and afterwards will be in place a system with ticketing to fix the errors. The MBx tool was created in a way to be able to be updated and kept running after syn.ikia project is over. Two years after the end of the project, the web tool will be migrated to the BPIE website. The researchers are currently able to update the database of the multiple benefit tools without the need for web developers. The MBx users are also able to adjust the default inputs of the multiple benefits, as well as to create new ones for their project and send them to the admins to be added to the tool for other users. The tool currently gathers the existing multiple benefits, which are backed up by existing evidence, but with the growing number of SPEN/positive energy neighbourhoods (PEN)/positive energy districts (PED) projects and initiatives at European and global levels

(e.g. IEA Annex 83), there will be growing evidence of the social and environmental multiple benefits which can be added to the tool on a later stage.

6. Appendix A – Glossary of Terms:

MBx tool	Multiple benefits tool
PED	Positive Energy District
PEN	Positive Energy Neighbourhood
SPEN	Sustainable Plus Energy Neighbourhood
S-CBA	Social Cost-Benefit Analysis

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