ODYSSEE-MURE

Updated Facility on Multiple Benefits of Energy Efficiency

Deliverable 4.2

Project title: ODYSSEE-MURE – Monitoring the Energy Efficiency Pillar for Climate Neutrality

Lead partner for deliverable: Fraunhofer ISI

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ODYSSEE-MURE – Monitoring the Energy Efficiency Pillar for Climate Neutrality

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List of abbreviations

API	Application Programming Interface
EED	Energy Efficiency Directive
EnC	Energy Community Contracting Parties
MB	Multiple Benefits
MB:EE	Multiple Benefits of Energy Efficiency (Tool)
MI	Multiple Impacts
NECP	National Energy and Climate Plan
NTs	National Teams

1 Introductory Remarks

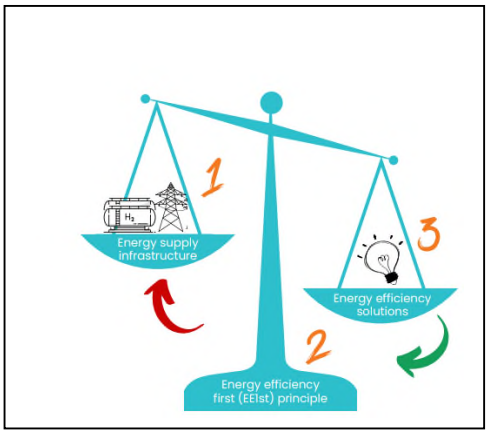
According to Task 4.2 of the proposal for the ODYSSEE-MURE project, it was planned to update and improve the Multiple Benefits of Energy Efficiency (MB:EE) facility, attached to the ODYSSEE-MURE project. The Multiple Benefits of Energy Efficiency (MB:EE) facility has been pivotal in the previous ODYSSEE-MURE project by providing inputs for the impact assessment of the EED proposal (2021) under the Fit-for-55-Package, notable on energy poverty issues. As noted in the interim Technical Report, in the meantime, a more powerful tool for multiple benefits linked to energy efficiency has been developed in the MICAT project which is now further evolving with the SEED-MICAT project, (https://micatool.eu/seed-micat-project-en/), coordinated by Fraunhofer ISI. Hence, instead of continuing with two lines of multiple benefit approaches, it was decided to attach the more powerful MICATool to the ODYSSEE-MURE databases.

2 Multiple Impacts of Energy Efficiency and the SEED-MICAT project

Multiple Benefits of Energy Efficiency (MB) are strongly linked to the **Energy Efficiency First (EE1st) principle** (Article 3 EED 2023):

- Article 3(5a) states: "***In applying the energy efficiency first principle***, *Member States shall promote and, where cost-benefit analyses are required, ensure the application of, and make publicly available,* ***cost-benefit methodologies that allow proper assessment of the wider benefits of energy efficiency solutions*** *where appropriate, taking into account the entire life cycle and long-term perspective, system and cost efficiency, security of supply and quantification from the societal, health, economic and climate neutrality perspectives, sustainability and circular economy principles in transition to climate neutrality.*"
- Article 3(5b) requires Member States to "**address the impact on energy poverty**" in applying the EE1st principle
- Article 3(5d) provides for Member States to report on how the **EE1st** principle has been **integrated into their NECP progress reports**, including "an assessment of the application and benefits" of the principle.

Why are Multiple Benefits important?

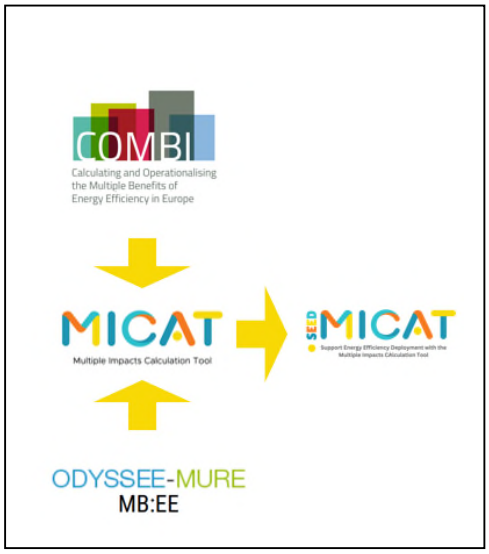


1 Ignoring multiple impacts undermines the cost-effectiveness of energy efficiency solutions

2 The EE1st principle calls for a fair comparison of energy supply and energy efficiency in energy related decisions

3 Assessment of multiple impacts, shifting the economic balance in favour of energy efficiency

In this frame, the SEED-MICAT project[1] (**S**upport **E**nergy **E**fficiency **D**eployment with the **M**ultiple **I**mpacts **CA**lculation **T**ool) has been developing over the past years a comprehensive approach to estimate Multiple Impacts of Energy Efficiency by providing a publicly available and easily usable online tool. It intends notably to:



- **improve scientific knowledge** and methods to quantify Multiple Impacts (MI)
- underline the **importance of MIs** in policy evaluations
- **facilitate assessment of MI** of policies at EU, national, and local levels by
    - **quantifying and monetising** different categories of multiple impacts
    - **going beyond the approaches** of earlier MB-Tools, such as ODYSSEE-MURE MB:EE and COMBI
    - covering several **key scenarios,** allow evaluation of customised scenarios and policy measures
    - **maximizing the usefulness** for a large target group and cover a wide range of use cases

The concrete objectives of SEED-MICAT are:

- **to support** the **EU** and its **Member States** at all governance levels in **including Multiple Impacts** in their **operationalisation and implementation of the Energy Efficiency First principle**, based on a strong and reliable analytical tool – the **MICATool**.
- To expand the methodology to renewable energy souces (RES)
- To provide capacity building to the users or the Tool

Figure 1 shows the overall quantification framework of the MICATool:

- It starts from the energy savings (or in the case of renewables, from the installed power) as main inputs. Some further auxiliary data complete the inputs (see Figure 2).
- Quantified Multiple Impacts are then calculated in physical terms (e.g. number of avoided deaths from air pollution) through functional relationships (see Figure 2).
- As far as possible, the Multiple Impacts are converted to monetized impacts in three categories: social, economic and environmental impacts (see)
- Finally the monetized impacts are aggregated, considering overlap between them (see)

[1] https://micatool.eu/seed-micat-project-en/index.php

Figure 1: Overall framework of the MICATool

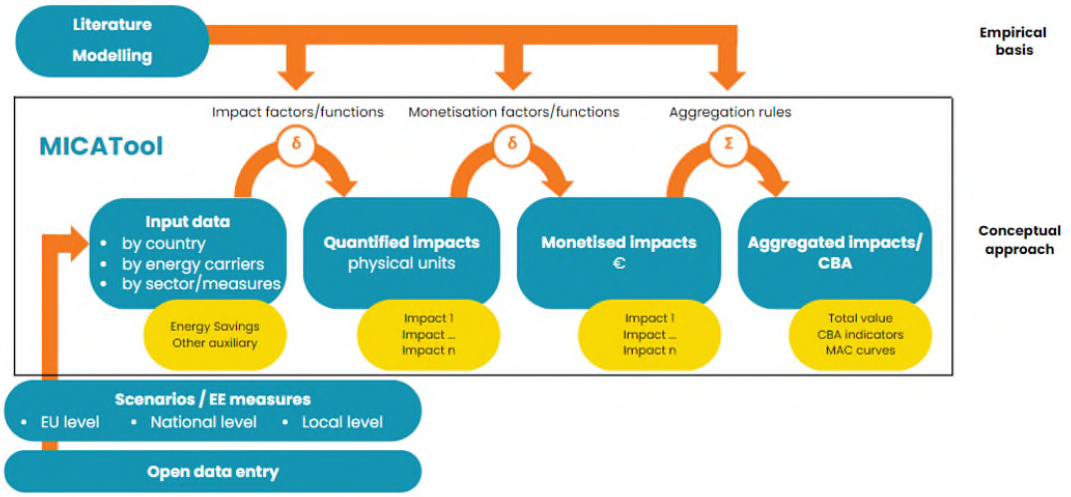


Figure 2: Impact quantification in the MICATool

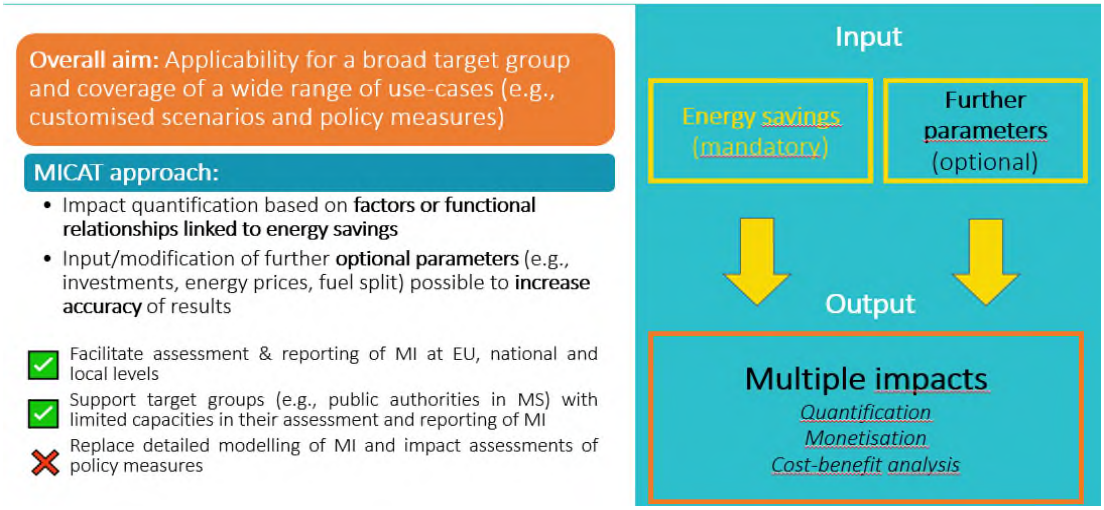


Figure 3: Impact monetisation in the MICATool

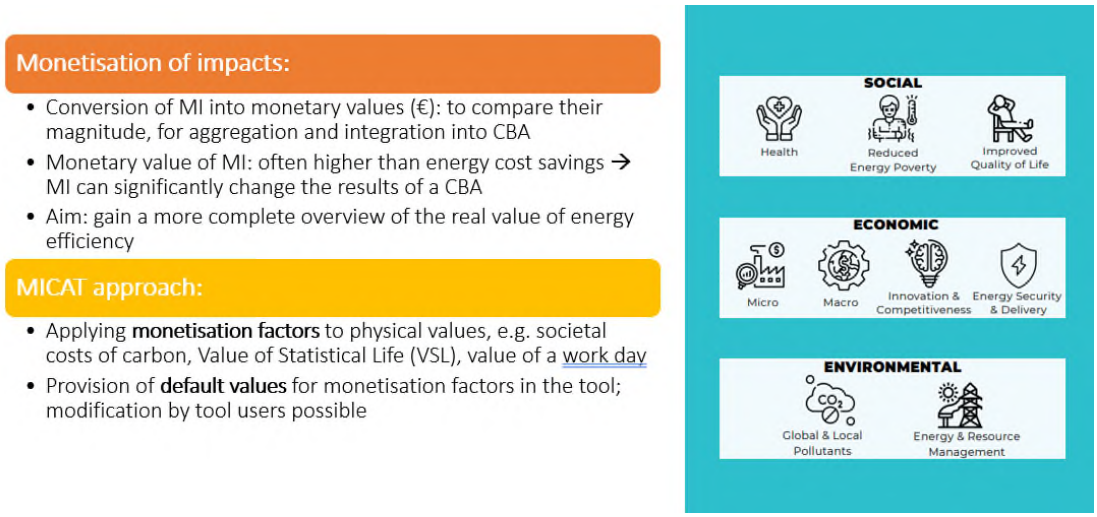
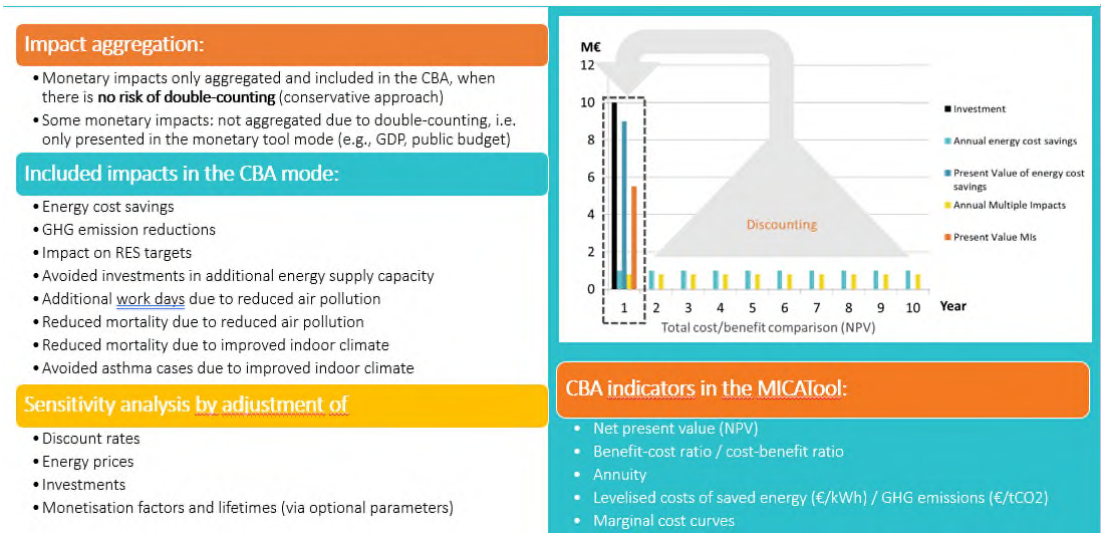


Figure 4: Impact aggregation and Cost-Benefit Analysis in the MICATool



3 The MICATool for the Assessment of Multiple Impacts of Energy Efficiency and its application in the frame of the ODYSSEE-MURE project

The MICATool is available at the website https://app.micatool.eu/. Its entrance webpage (see Figure 5) has been modified to adapt specifically to the ODYSSEE-MURE project.

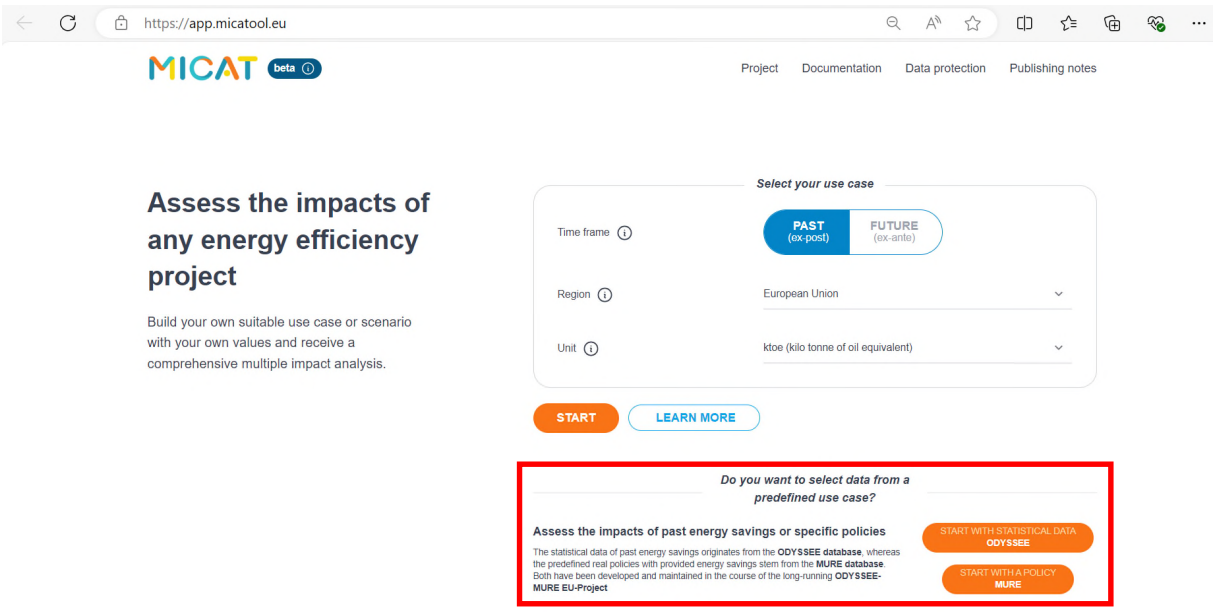
There are two configurations:

- The MICATool builds first on the **top-down savings** which are calculated in the ODYSSEE-MURE project (ODYSSEE part) based on statistical data. For recall: these savings include generally not only policy induced savings but also energy savings arising from autonomous progress or market-induced changes in energy demand.

- The MICATool builds second on the **bottom-up savings** which are calculated in the ODYSSEE-MURE project (MURE part) based on energy efficiency measure evaluations. For recall: these savings focus on policy induced savings (though there can be overlapping effects, e.g. free-rider effects in policy programmes).

In the following two section we will exemplify these two use cases.

Figure 5: Entrance page to the MICATool for the Assessment of Multiple Impacts of Energy Efficiency



4 The MICATool for the Assessment of Multiple Impacts of Energy Efficiency and its application in the frame of the ODYSSEE Top-down indicators

In this section we show specific examples of the application of the MICATool to the ODYSSEE top-down indicators (see Figure 6). The savings are calculated in the Energy Savings Tool of ODYSSEE (available at https://www.indicators.odyssee-mure.eu/energy-saving.html) (see Figure 7).These savings are calculated for different sectors (households, industry, transport, services) based on different end-uses in each sector and for a given time period and geographic entity.

Figure 6: MICATool – The link to ODYSSEE indicators

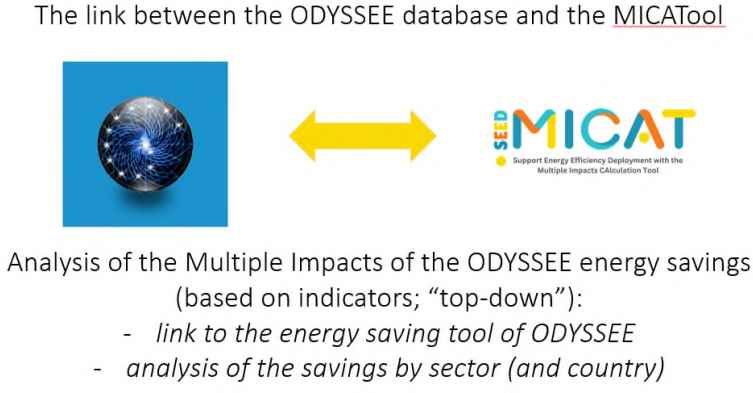
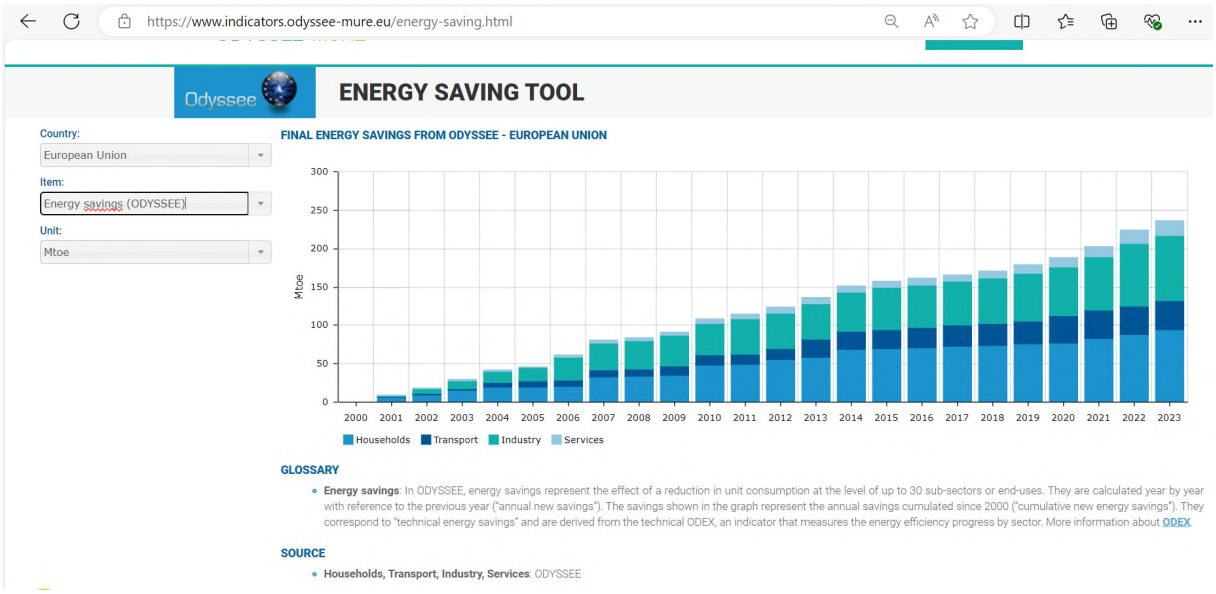


Figure 7: The Energy Saving Tool in ODYSSEE



Source: https://www.indicators.odyssee-mure.eu/energy-saving.html

The top-down savings for each sector are then handed over to the MICATool and used for the Multiple Impact calculations (example households, European Union, energy savings from 2000 to 2022, see Figure 8 and Figure 9). In the example, the savings are mainly associated with the building envelope, hence mostly with fossil fuels for heating the buildings

Figure 8: Energy Savings from the Energy Savings Tool in ODYSSEE handed over to the MICATool (example households, European Union)

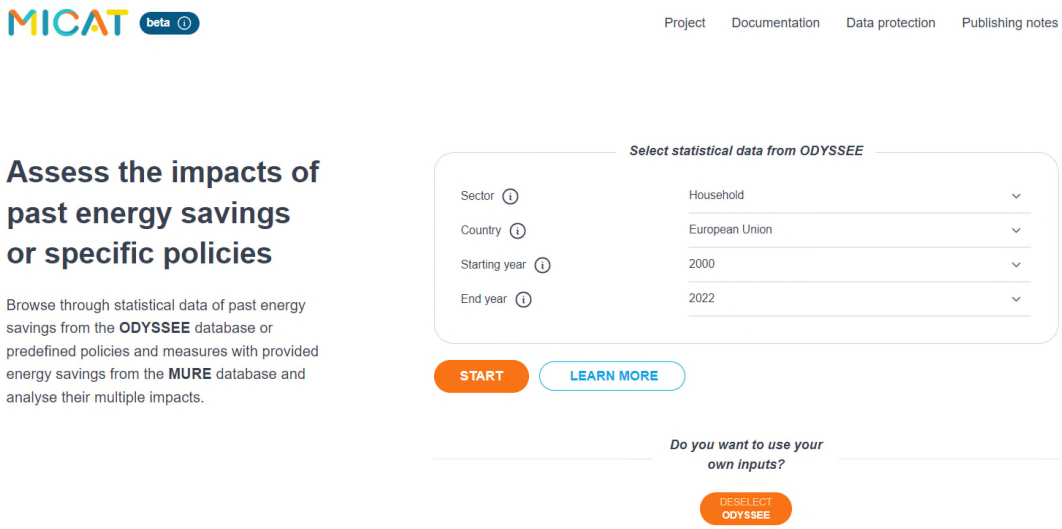
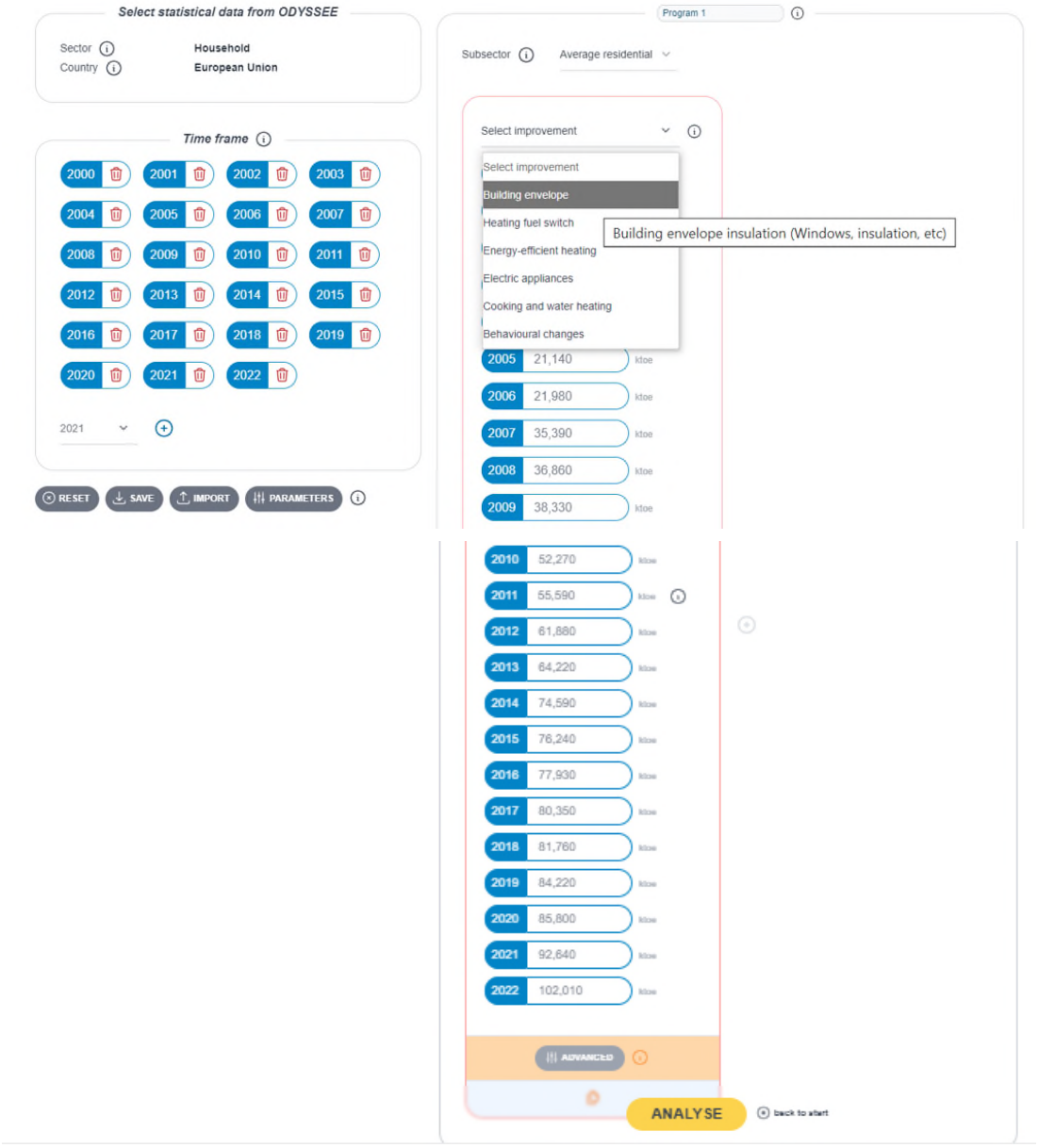


Figure 9: Energy Savings from the Energy Savings Tool in ODYSSEE 2000-2022 in the MICATool (example households, European Union)



The MICATool then calculates physical Multiple Impacts in three categories (see Figure 3 and Figure 10):

- Social Multiple Impacts (a:)
- Economic Multiple Impacts (b:)
- Environmental Multiple Impacts (c:)

Finally, the monetary impacts (overview, see Figure 11) are derived from the top-down savings. The specific example shows impacts in the multi-billion Euro range.

Figure 10: Example of Multiple Impacts (a: Social, b: Economic, c: Environmental) calculated from the top-down energy savings from the Energy Savings Tool in ODYSSEE 2000-2022 (example households, European Union)

a:

b:

c:

Figure 11: Monetisation of Multiple Impacts (overview) from top-down savings in households (European Union)

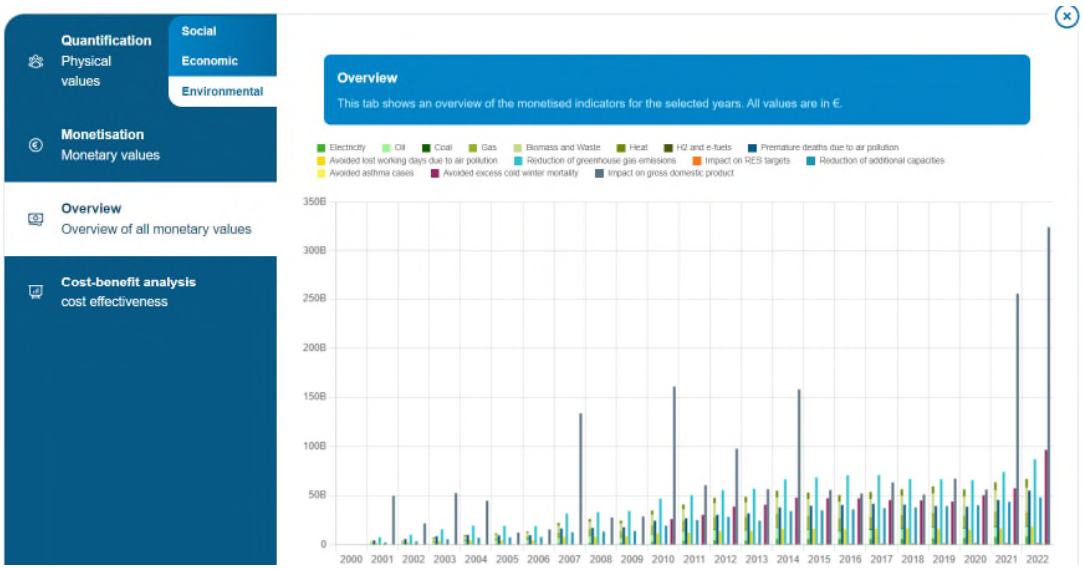


Figure 12 shows a modified example: the savings are here associated with the building envelope, (around 20%) and with electricity savings on electricity uses. In this case there are more Multiple Impacts from avoided electric capacities and from health impacts due to air pollution, than in the original example.

Figure 12: Modified example with savings being associated with buildings and electricity savings

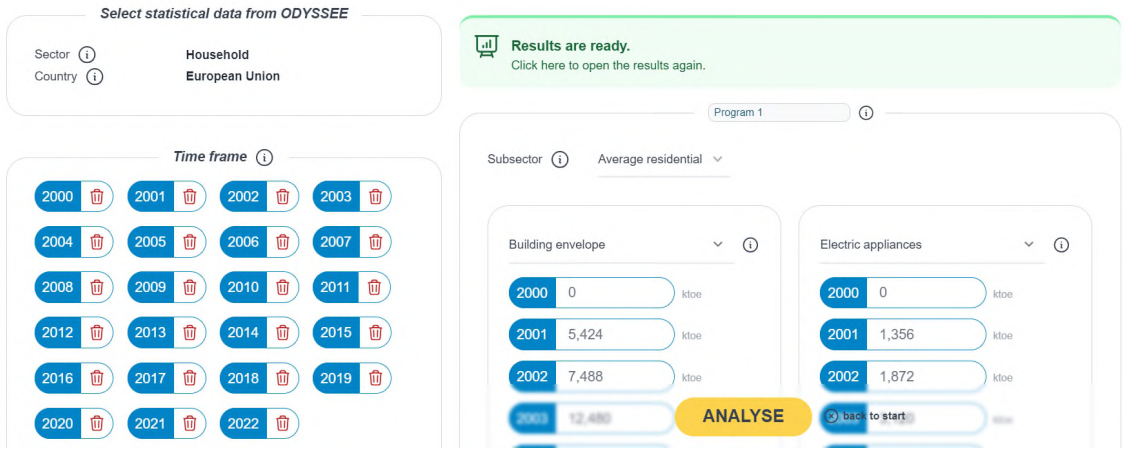
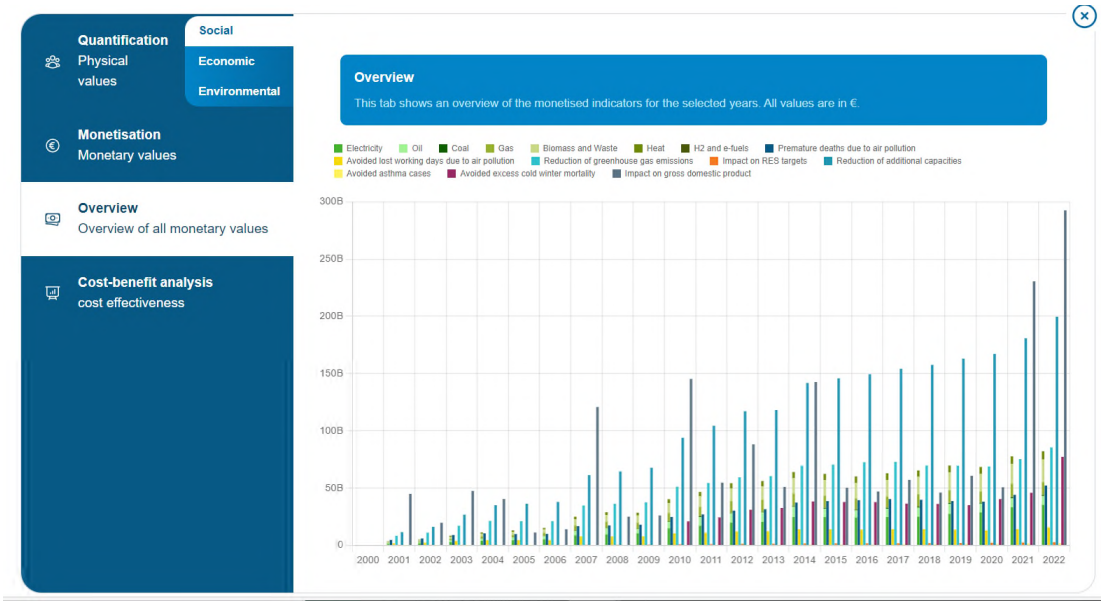


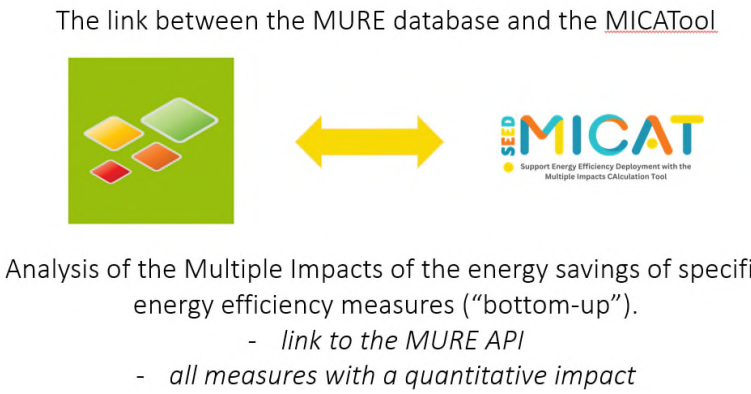
Figure 13: Monetisation of Multiple Impacts (overview) from top-down savings in households (European Union, modified example)



5 The MICATool for the Assessment of Multiple Impacts of Energy Efficiency and its application in the frame of the MURE Bottom-up savings

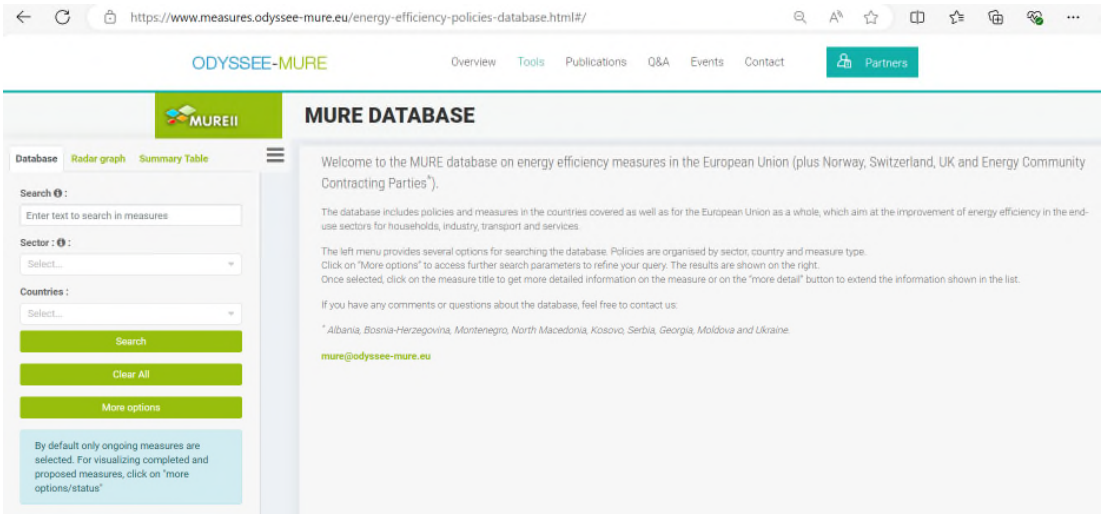
In this section we show specific examples of the application of the MICATool to the MURE Bottom-up savings (see Figure 14). The savings are derived from quantified impact evaluations stored in the MURE database (see Figure 15). Savings can also be semi-quantified based on expert estimates. For the moment these are not included in the calculations. These savings are calculated for specific policy measures in different sectors (households, industry, transport, services) for a given time period and geographic entity.

Figure 14: MICATool – The link to MURE bottom-up savings



The MURE database (www.odyssee-mure.eu) contains at present around 3200 measures for energy efficiency of 27 EU Member States, Norway, Switzerland and United Kingdom (see Figure 15). Eight Energy Community Contracting Parties (EnC) parties[2] were added to the MURE database in 2022. Serbia was already included. The MURE database is accessible at the following link: https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/

Figure 15: MURE Database on Energy Efficiency Policies



[2] Albania, Bosnia-Herzegovina, Montenegro, North Macedonia, Kosovo, Georgia, Moldova and Ukraine

The specific example, we focus on first, is a car scrapping programme in Germany (see Figure 16), where we choose an appropriate link to an improvement action (see Figure 17).

Figure 16: Choice of the policy programme where to assess Multiple Impacts (car scrapping programme Germany)

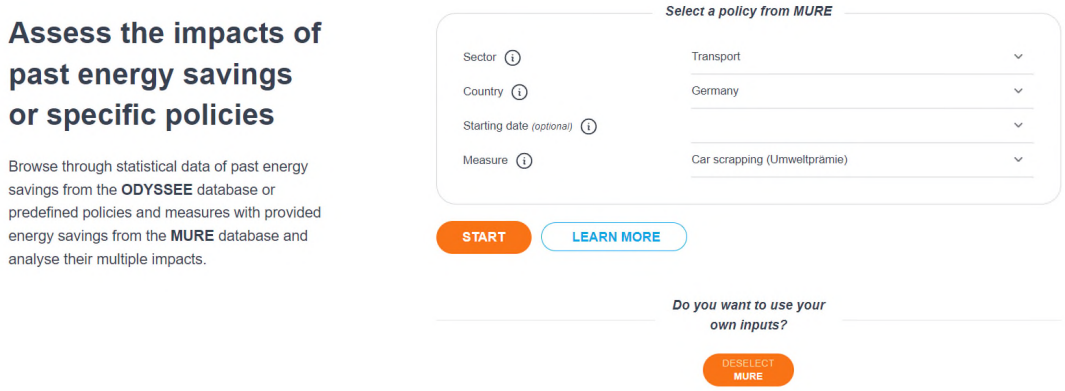
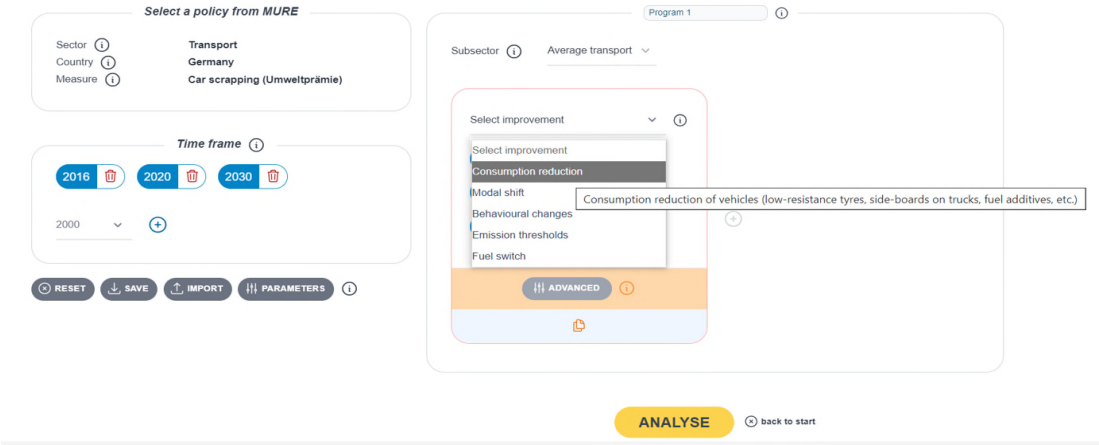


Figure 17: Selection of the improvement action related to the policy programme where to assess Multiple Impacts (car scrapping programme Germany)

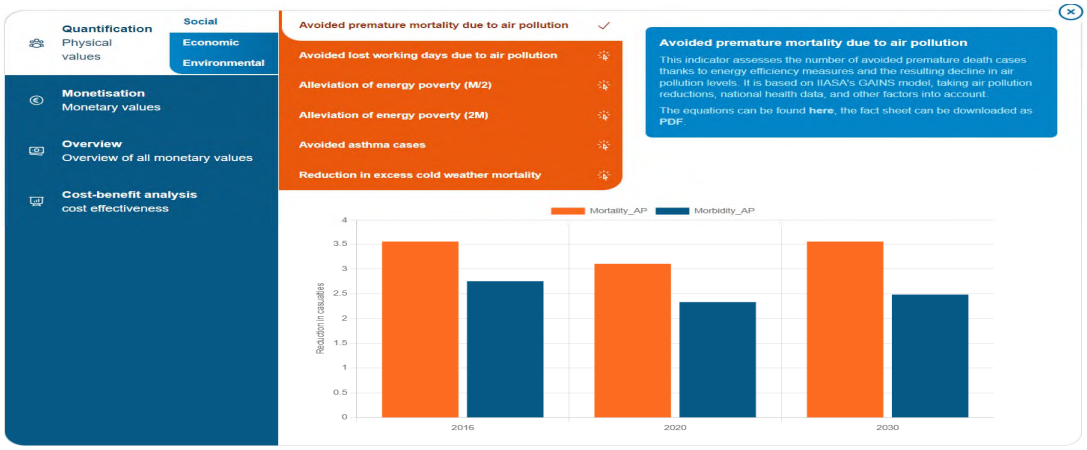


The MICATool then again calculates physical Multiple Impacts in three categories (see Figure 3 and Figure 18):

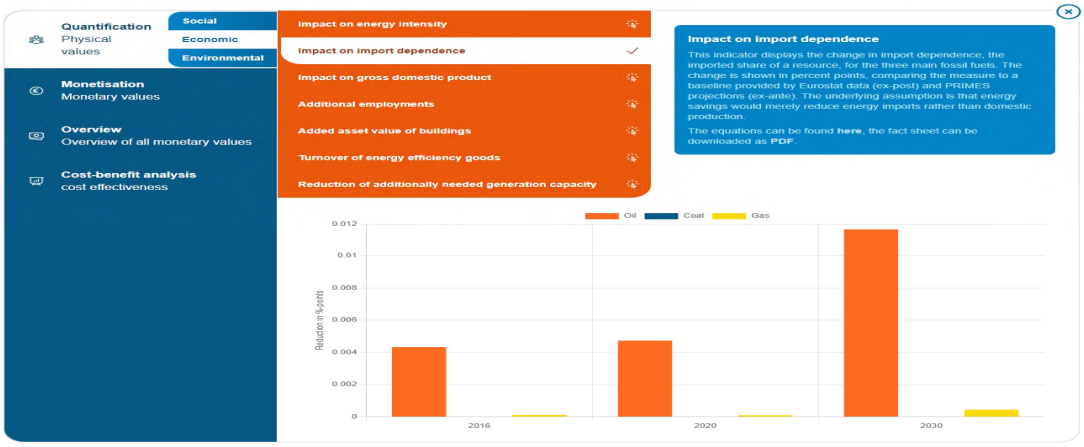
- Social Multiple Impacts (a:)
- Economic Multiple Impacts (b:)
- Environmental Multiple Impacts (c:)

Finally, the monetary impacts (overview, see Figure 19) are derived from the top-down savings. Naturally, as this is a single programme which is evaluated in one country, the impacts are much smaller than for a whole sector and the European Union, as previously presented for top-down savings.

Figure 18: Example of Multiple Impacts (a: Social, b: Economic, c: Environmental) calculated from the bottom-up energy savings linked to the car scrapping programme in Germany



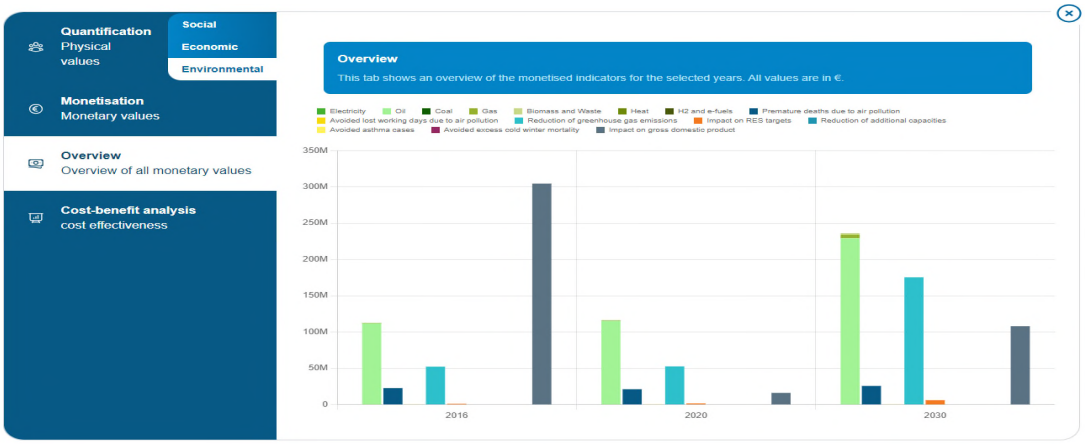
a:



b;

c:

Figure 19: Monetisation of Multiple Impacts (overview) from bottom-up savings (car scrapping programme Germany)



Finally, we choose as further specific example, the "Down-a-degree campaign" in Finland (see Figure 20), where we transfer again the savings from the MURE database (Figure 21) and choose again an appropriate link to an improvement action (see Figure 22).

Figure 20: Choice of the policy programme where to assess Multiple Impacts ("Down-a-degree campaign" Finland)

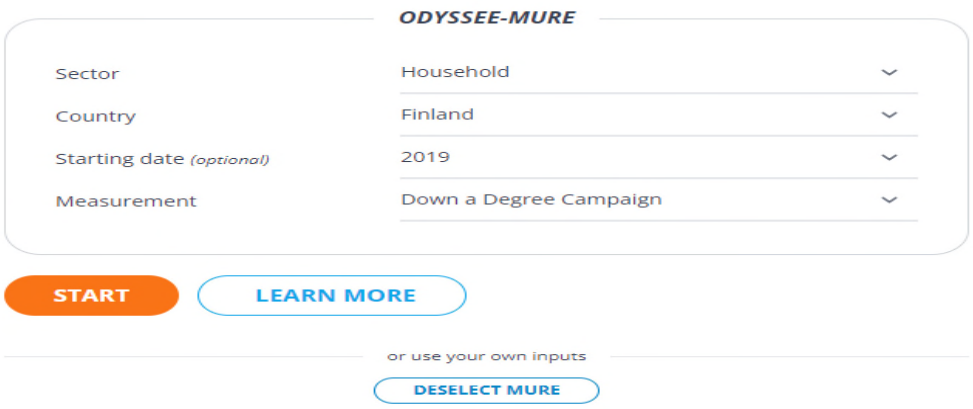


Figure 21: Transfer of the energy savings from the MURE database to the MICATool to assess Multiple Impacts ("Down-a-degree campaign" Finland)

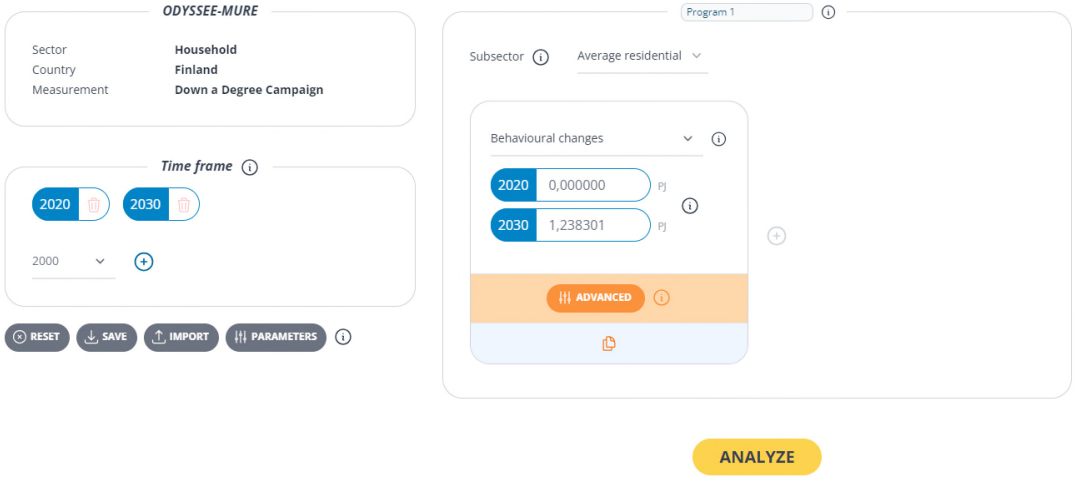


Figure 22: Selection of the improvement action related to the policy programme where to assess Multiple Impacts ("Down-a-degree campaign" Finland)

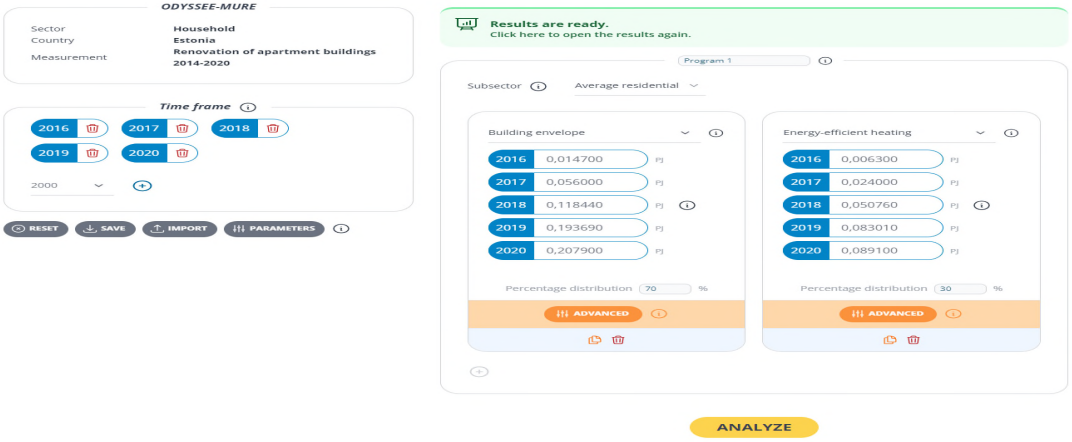
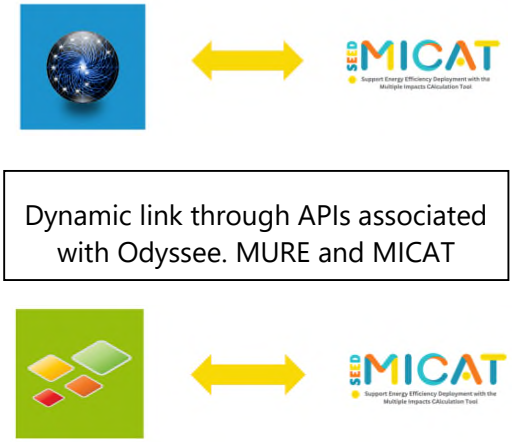


Figure 23: Quantification of Environmental Multiple Impacts from bottom-up savings ("Down-a-degree campaign" Finland, reduction of air pollution)

6 Conclusions and Outlook

As noted in the introduction, a more powerful tool for multiple benefits linked to energy efficiency has been developed in the MICAT project which is now further evolving with the SEED-MICAT project (https://micatool.eu/seed-micat-project-en/), coordinated by Fraunhofer ISI. Hence, instead of continuing with two lines of multiple benefit approaches, it was decided to attach the more powerful MICATool to the ODYSSEE-MURE databases. This combination of tools will allow to further exploit the rich potential presented by the ODYSSEE and MURE databases by adding the calculation of Multiple Impacts to the top-down savings associated with statistical indicators in ODYSSEE and to the bottom-up savings (policy-related savings) associated with the MURE database.

At present, the link between the two set of tools is static, i.e. there is not yet a full exploitation of the fact that both tool sets have well developed Application Programming Interfaces(APIs), except for the ODYSSEE database. This draw-back could be improved in potential future developments of ODYSSEE-MURE.



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ODYSSEE-MURE. (n.d.). Energy efficiency policies database. Retrieved December 21, 2024, from https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/

MICATool. Retrieved December 21, 2024, from https://micatool.eu/seed-micat-project-en/index.php