SEED MICAT

Support Energy Efficiency Deployment with the Multiple Impacts CAlculation Tool

The Multiple Impacts of Energy Efficiency:

The SEED MICAT project and the MICATool

Niklas Reinfandt - *Fraunhofer ISI*

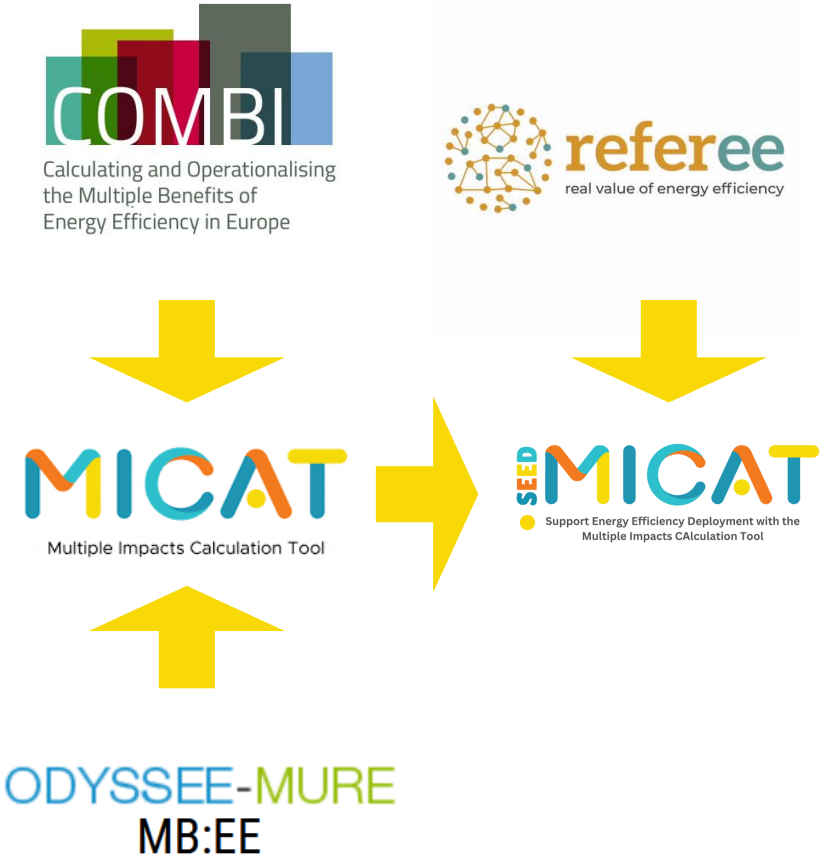
Co-funded by the European Union under project ID 101120599. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them.

The MICAT and SEED MICAT project

Development of a comprehensive approach to estimate Multiple Impacts of Energy Efficiency by providing a publicly available and easily usable online tool.

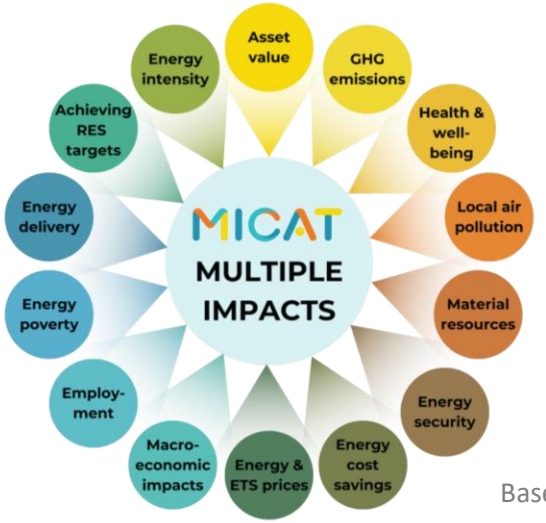
- **Improve scientific knowledge** and methods to quantify Multiple Impacts
- Underline the **importance of MIs** in policy evaluations
- **Facilitate assessment of MI** of policies at EU, national, and local levels
  - **Quantification and monetisation** of different categories of multiple impacts
  - **Go beyond the approaches** of earlier MB-Tools, such as Odyssee-Mure MB:EE and COMBI
  - Cover several **key scenarios,** allow evaluation of customised scenarios and policy measures
  - **Maximise usefulness** for a large target group and cover a wide range of use cases

MICAT: Multiple **I**mpacts **Ca**lculation **T**ool

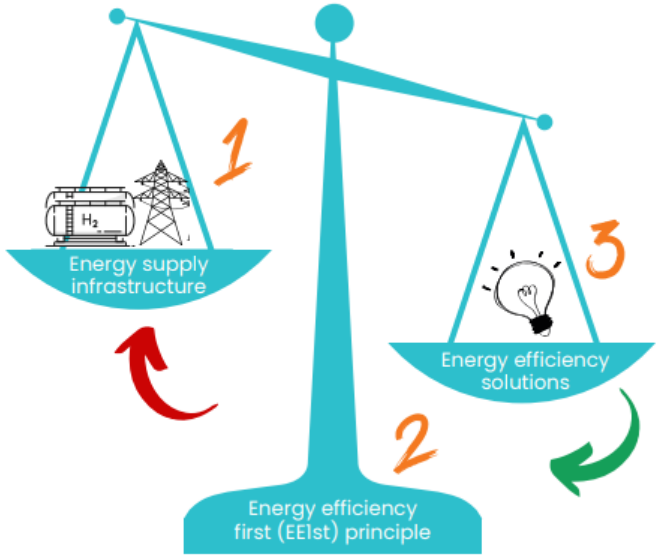


What are multiple impacts?

- also known as multiple benefits, co-benefits, ancillary benefits, non-energy benefits
- accompany energy efficiency projects and provide additional arguments to implement energy efficiency measures, but are rarely reported



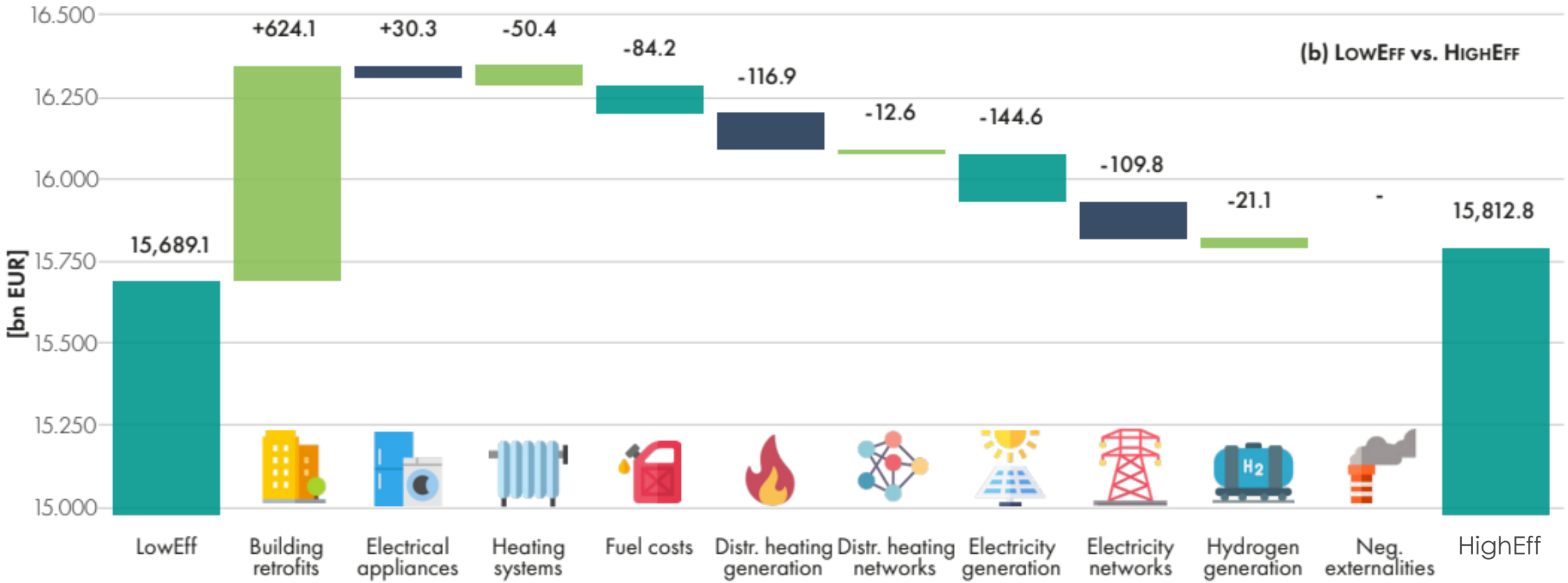
Based on IEA (2014)



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

Example: Energy System Cost 2020-2050

Not a clear argument for Energy Efficiency First



Source: www.enefirst.eu

Link to the Energy Efficiency Directive

MB are strongly linked to the **Energy Efficiency First (EE1st) principle** (Article 3 in Directive EU 2023/1791 ("EED"))

- Article 3(1) requires Member States to "**ensure that energy efficiency solutions** […] **are assessed in planning, policy and major investment decisions**" (exceeding €100 million or €175 million for transport infrastructure)

- Article 3(5a):

*" **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."*

Link to the Energy Efficiency Directive

- 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.

How to translate all these aspects into practice?

→ more info in the guidance note (Recommendation EU 2024/2143)

Recommendation EU 2024/2143

How to ensure a proper assessment?

- Identify relevant multiple impacts
- Quantify them (in physical units)
- Monetise them
- Avoid double counting (no overlaps)

Recommendation EU 2024/2143, page 13:
"Publicly owned or regulated entities may be directly requested by national authorities to implement the EE1st principle in their operations based on societal CBA. (…)"

Based on this, perform a CBA, which could include:

- **technical analysis** (i.e. identify potential EE alternatives)
- **financial analysis** (from the perspective of the investor)
- **economic analysis** (from the perspective of the society as a whole, i.e. considering the wider benefits of EE1st "societal CBA" with the monetisation of environmental, health, and other societal impacts)

Private entities

- Regulated entities (TSOs and DSOs as set in art. 27, EED)
- Public entities (if required by MS)

Objective of SEED MICAT

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**.

- expand the methodology (RES, policy module)
- capacity building

Overall quantification framework of MICAT

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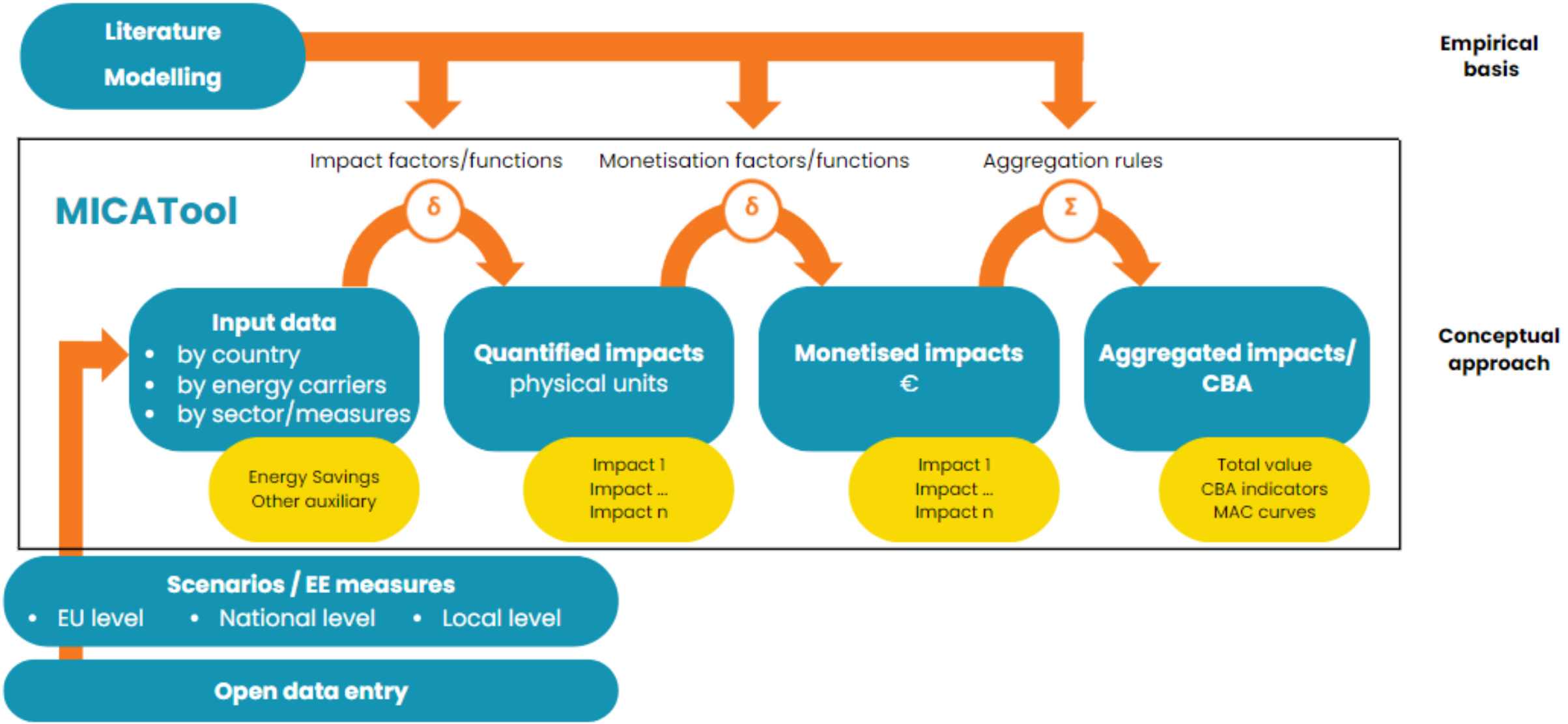

Impact quantification

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Overall aim: Applicability for a broad target group and coverage of a wide range of use-cases (e.g., customised scenarios and policy measures)

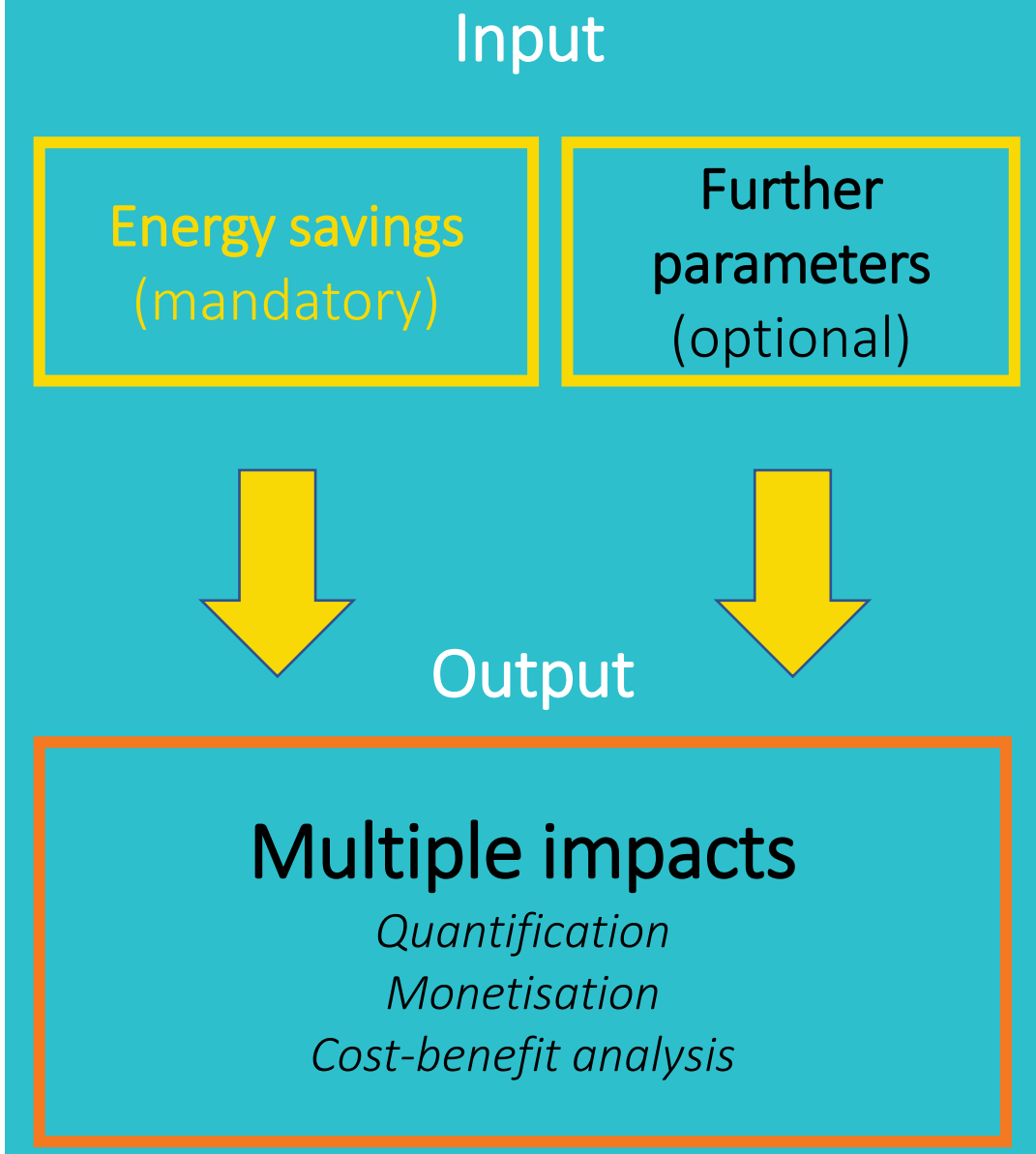
MICAT approach:

- Impact quantification based on **factors or functional relationships linked to energy savings**
- Input/modification of further **optional parameters** (e.g., investments, energy prices, fuel split) possible to **increase accuracy** of results

✅ Facilitate assessment & reporting of MI at EU, national and local levels

✅ Support target groups (e.g., public authorities in MS) with limited capacities in their assessment and reporting of MI

❌ Replace detailed modelling of MI and impact assessments of policy measures



Impact monetisation

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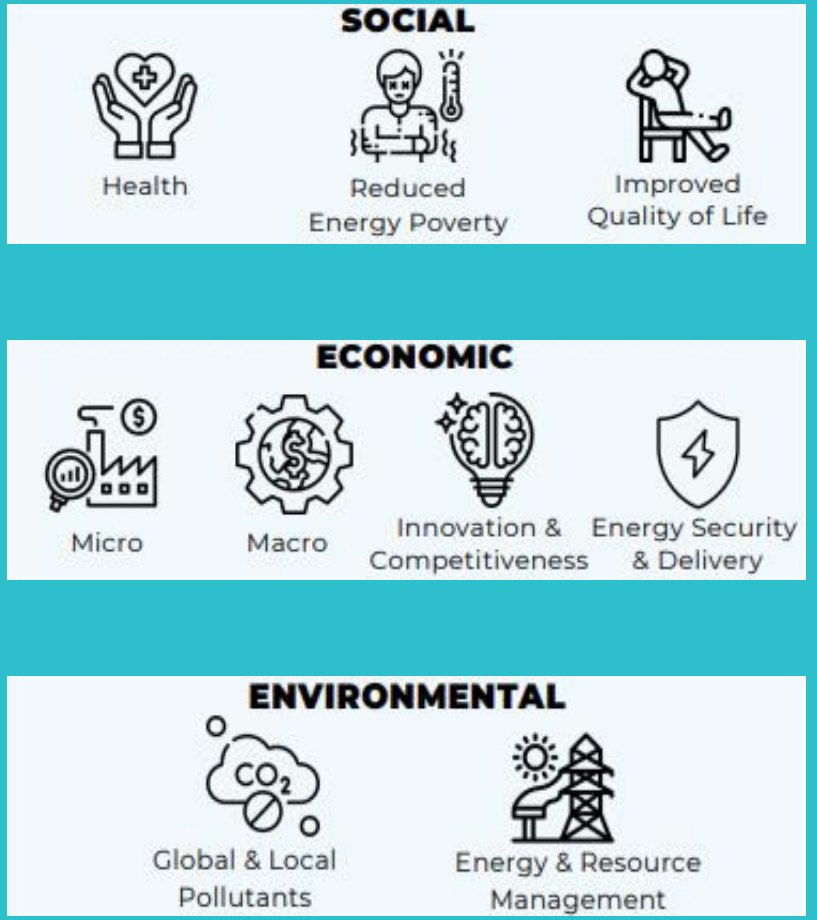
Monetisation of impacts:

- Conversion of MI into monetary values (€): to compare their magnitude, for aggregation and integration into CBA
- Monetary value of MI: often higher than energy cost savings → MI can significantly change the results of a CBA
- Aim: gain a more complete overview of the real value of energy efficiency

MICAT approach:

- Applying **monetisation factors** to physical values, e.g. societal costs of carbon, Value of Statistical Life (VSL), value of a work day
- Provision of **default values** for monetisation factors in the tool; modification by tool users possible



Impact aggregation and Cost-Benefit Analysis in the MICATool

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Impact aggregation:

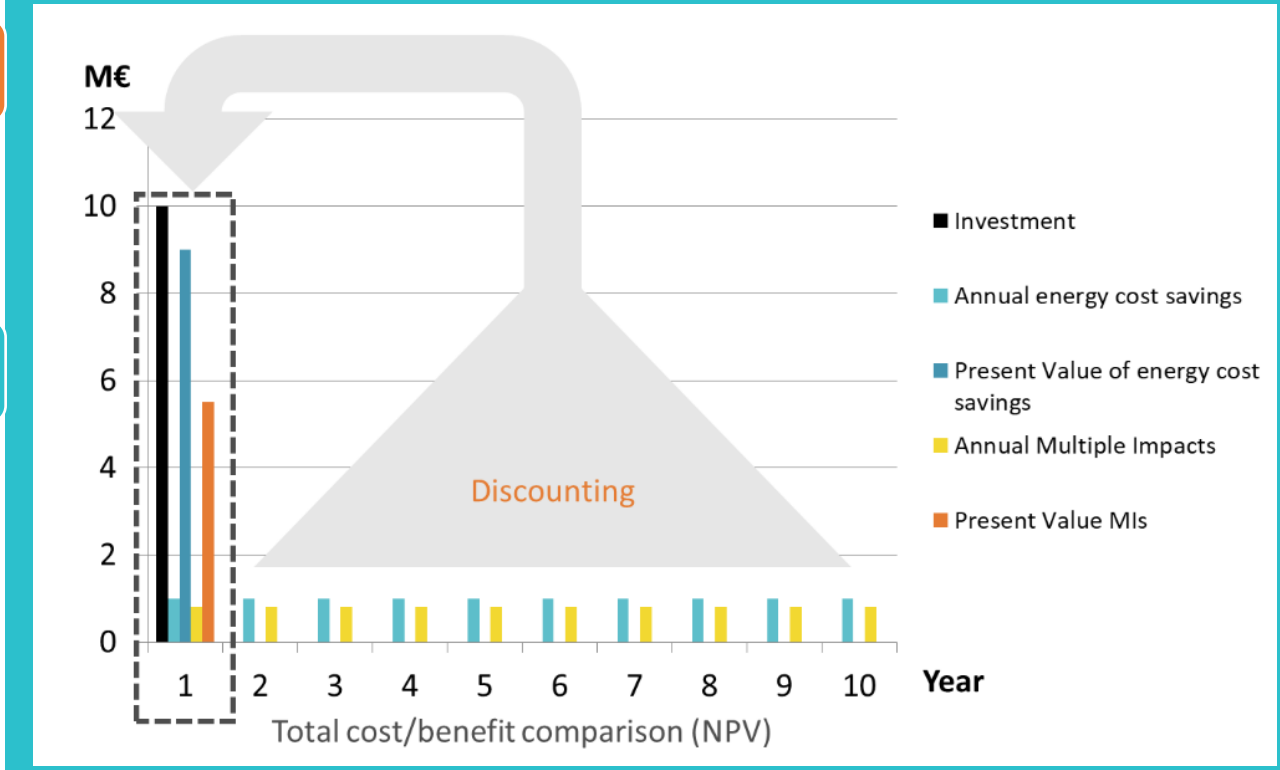
- Monetary impacts only aggregated and included in the CBA, when there is **no risk of double-counting** (conservative approach)
- Some monetary impacts: not aggregated due to double-counting, i.e. only presented in the monetary tool mode (e.g., GDP, public budget)

Included impacts in the CBA mode:

- Energy cost savings
- GHG emission reductions
- Impact on RES targets
- Avoided investments in additional energy supply capacity
- Additional work days due to reduced air pollution
- Reduced mortality due to reduced air pollution
- Reduced mortality due to improved indoor climate
- Avoided asthma cases due to improved indoor climate

Sensitivity analysis by adjustment of

- Discount rates
- Energy prices
- Investments
- Monetisation factors and lifetimes (via optional parameters)



CBA indicators in the MICATool:

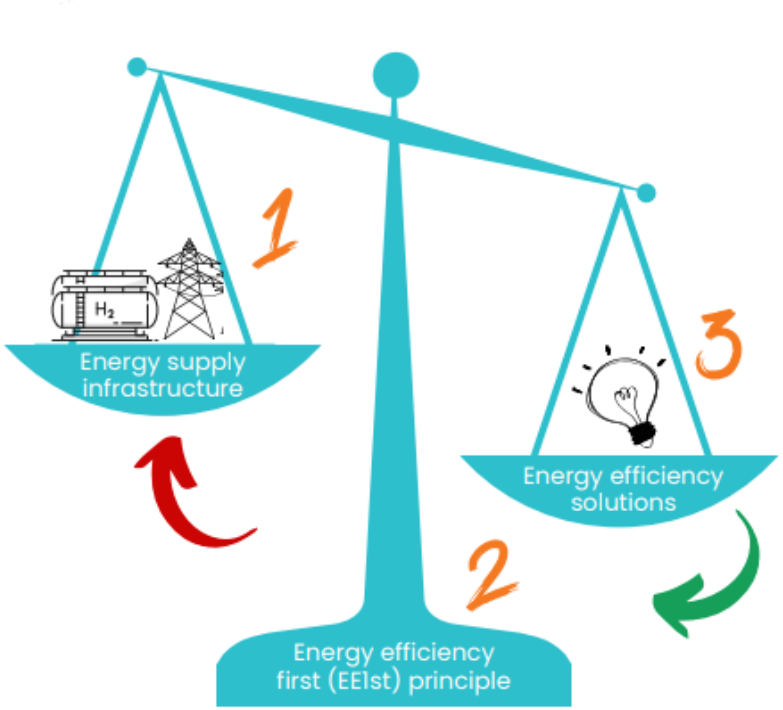
- Net present value (NPV)
- Benefit-cost ratio / cost-benefit ratio
- Annuity
- Levelised costs of saved energy (€/kWh) / GHG emissions (€/tCO2)
- Marginal cost curves

A brief tour of the MICATool

[MICAT - Multiple Impacts Calculation Tool (micatool.eu)]

Current status vs. planned status?

- **Status Quo:** Currently only the assessment of energy efficiency measures possible
- **But:** The EE1st principle calls for a fair comparison of supply-side and demand-side solutions in energy-related decisions
- **Next step**: Extending the tool and the methodology to integrate the assessment of supply-side measures (renewable energy sources)
- **Aim:** Offer the possibility to directly assess and compare different supply-side with demand-side measures



→ Support different governance levels to find the most beneficial climate neutrality pathways for the whole society!

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Dive into the

MICAT Community

& elevate your journey with us towards energy efficiency

JOIN US NOW!

https://ec.europa.eu/eusurvey/runner/SEED_MICAT_Community

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THANK YOU!

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Fraunhofer ISI

IEECP INSTITUTE FOR EUROPEAN ENERGY AND CLIMATE POLICY

RSE Ricerca Sistema Energetico – we move research

ISINNOVA research innovation sustainability

IIASA

Wuppertal Institut

SEVEn

ENEA Italian National Agency for New Technologies, Energy and Sustainable Economic Development

E3Modelling Energy Economy Environment

Back-up slides – MICATool screenshots

(preliminary results, may contain errors!)

MICATool - Entering basic informations

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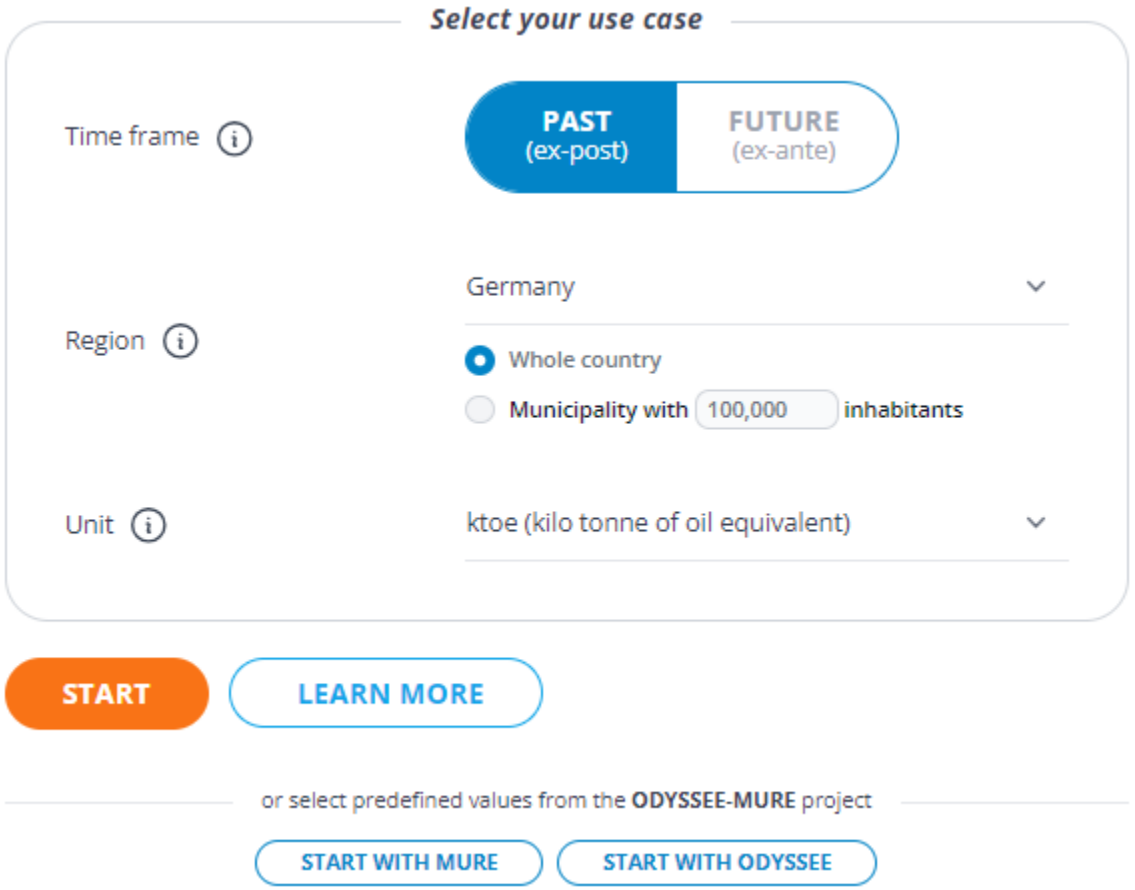
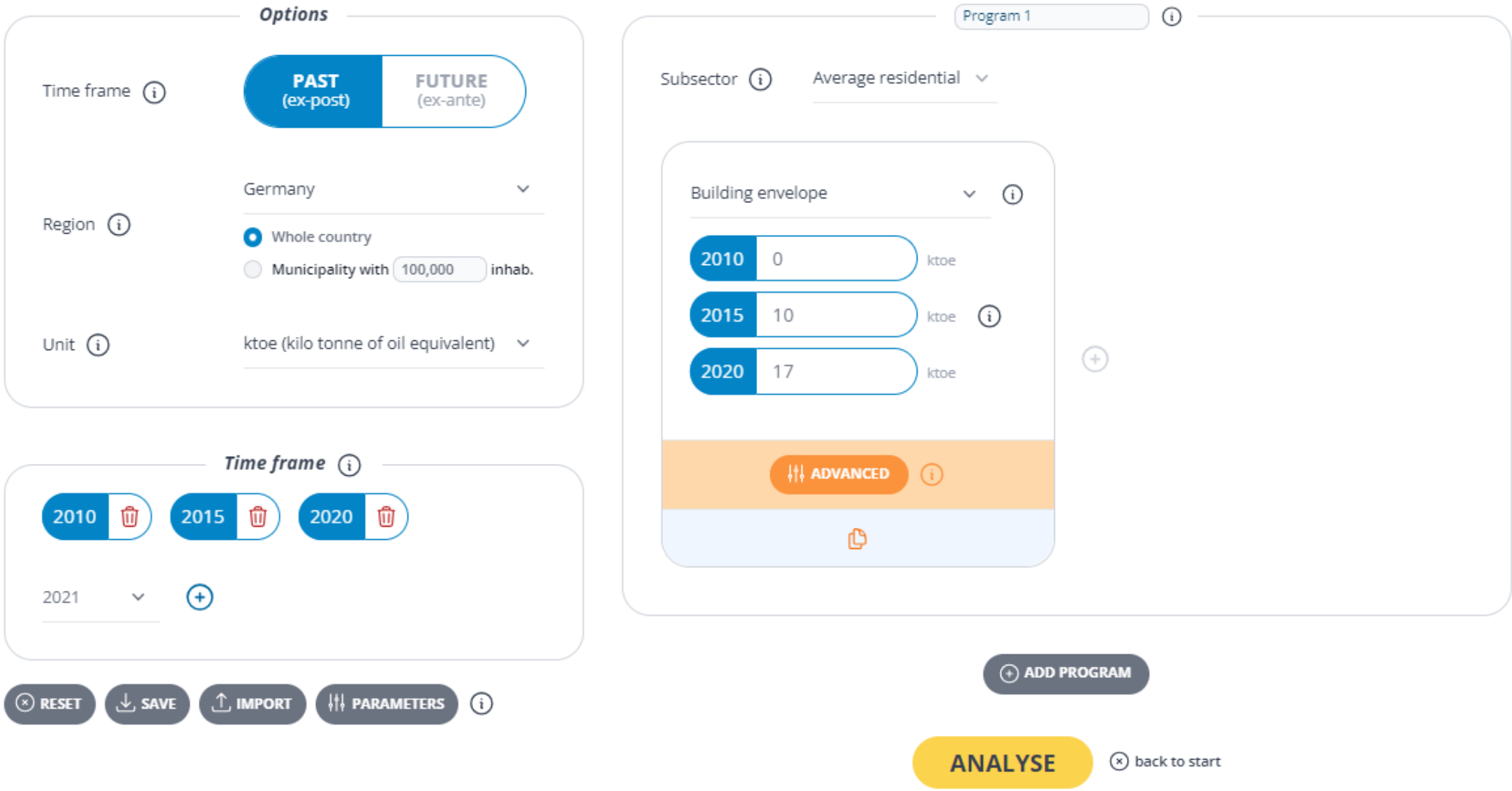
Assess the impacts of energy efficiency projects

Select a suitable scenario from the world of energy efficiency, optionally add your own values and receive a comprehensive analysis for your region.



MICATool - Entering the expected total annual savings



MICATool - Results: social indicators

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MICATool - Results: economic indicators

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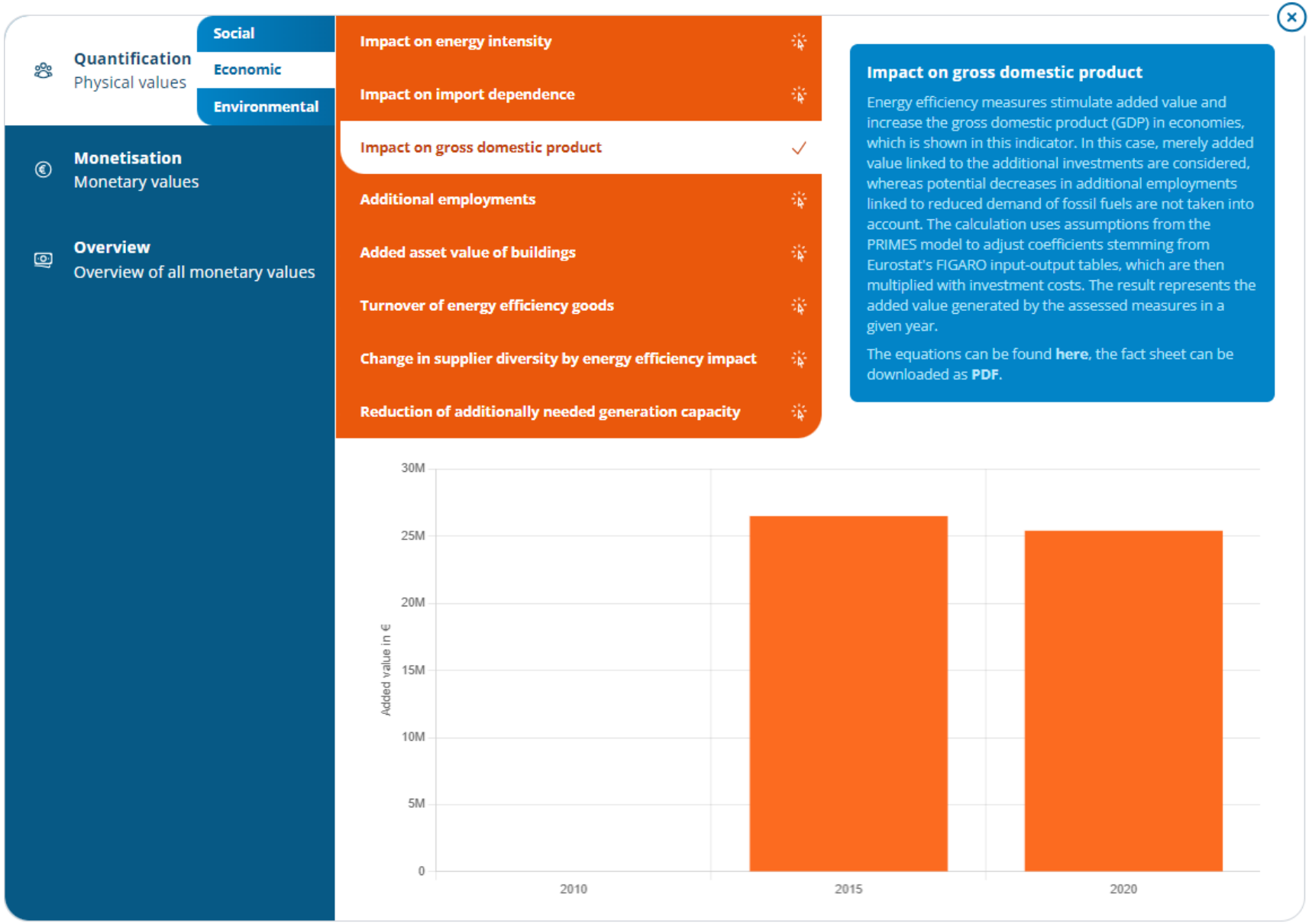

MICATool - Results: ecologic indicators

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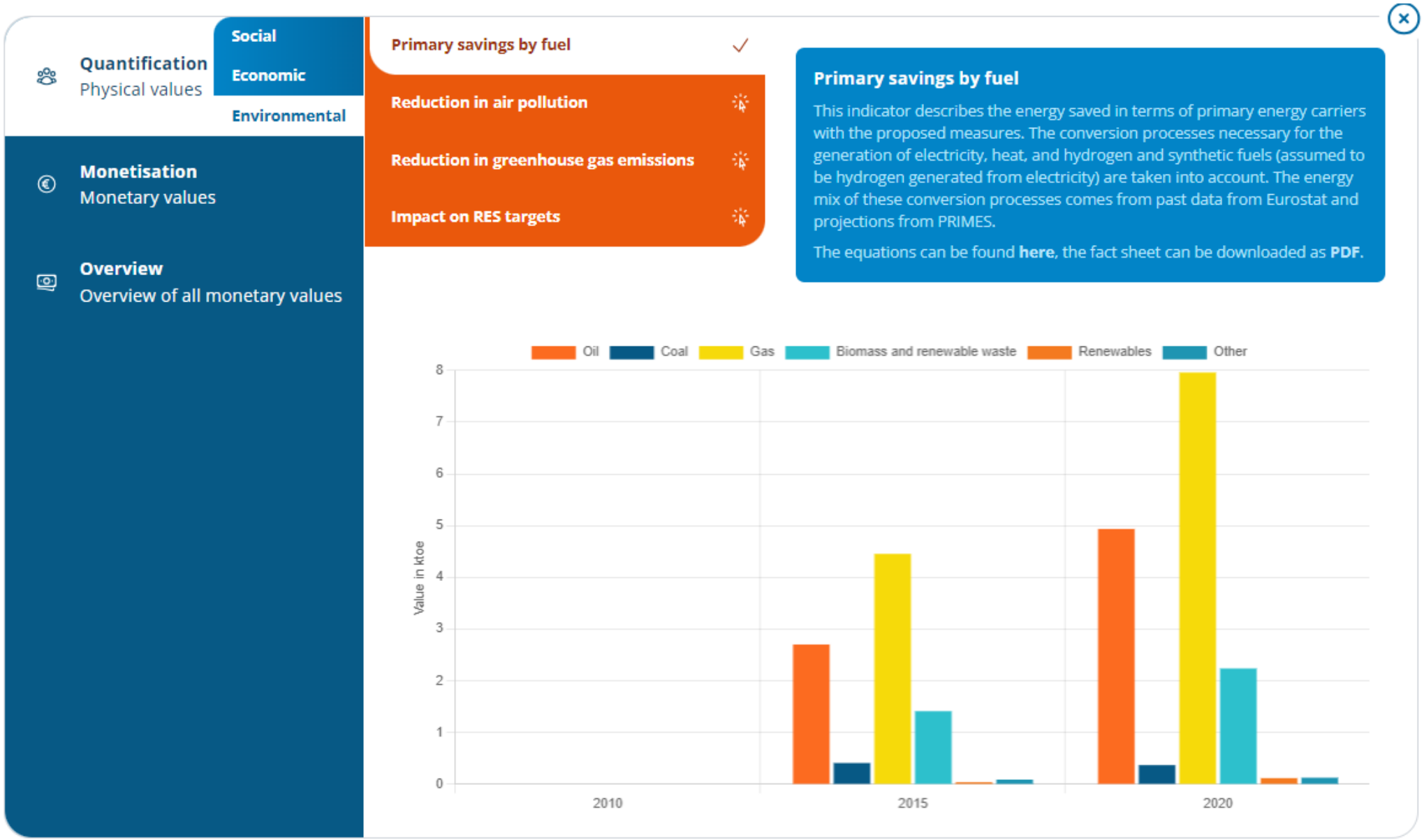

MICATool - Results: monetisation

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MICATool - Results: Overview

Support Energy Efficiency Deployment with the Multiple Impacts CAlculation Tool

Quantification
Physical values

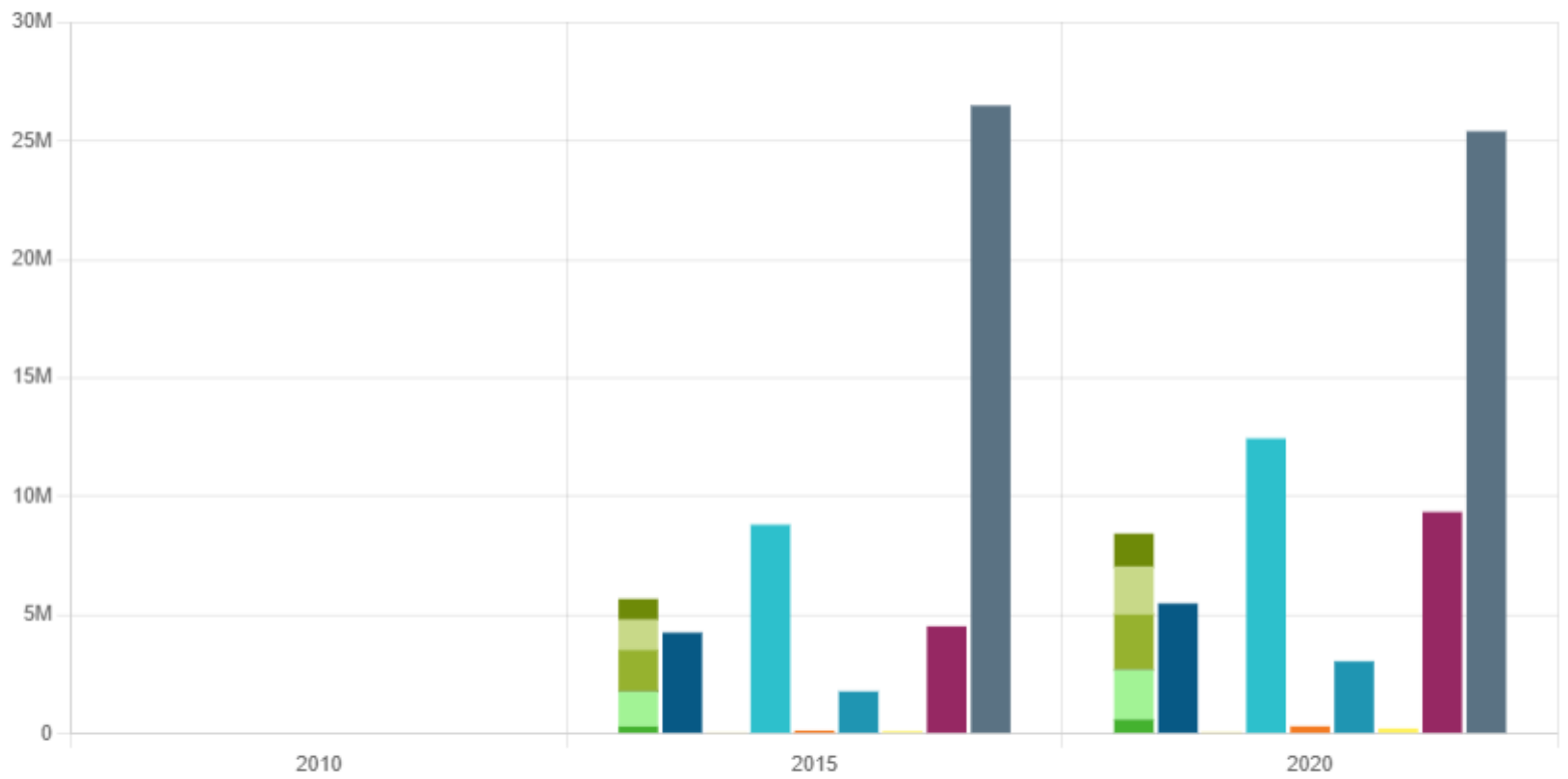
Social
Economic
Environmental

Monetisation
Monetary values

Overview
Overview of all monetary values

Overview

This tab shows an overview of the monetised indicators for the selected years. All values are in €.



MICATool - Results: CBA (currently in works)

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MICATool – The link to ODYSSEE-MURE

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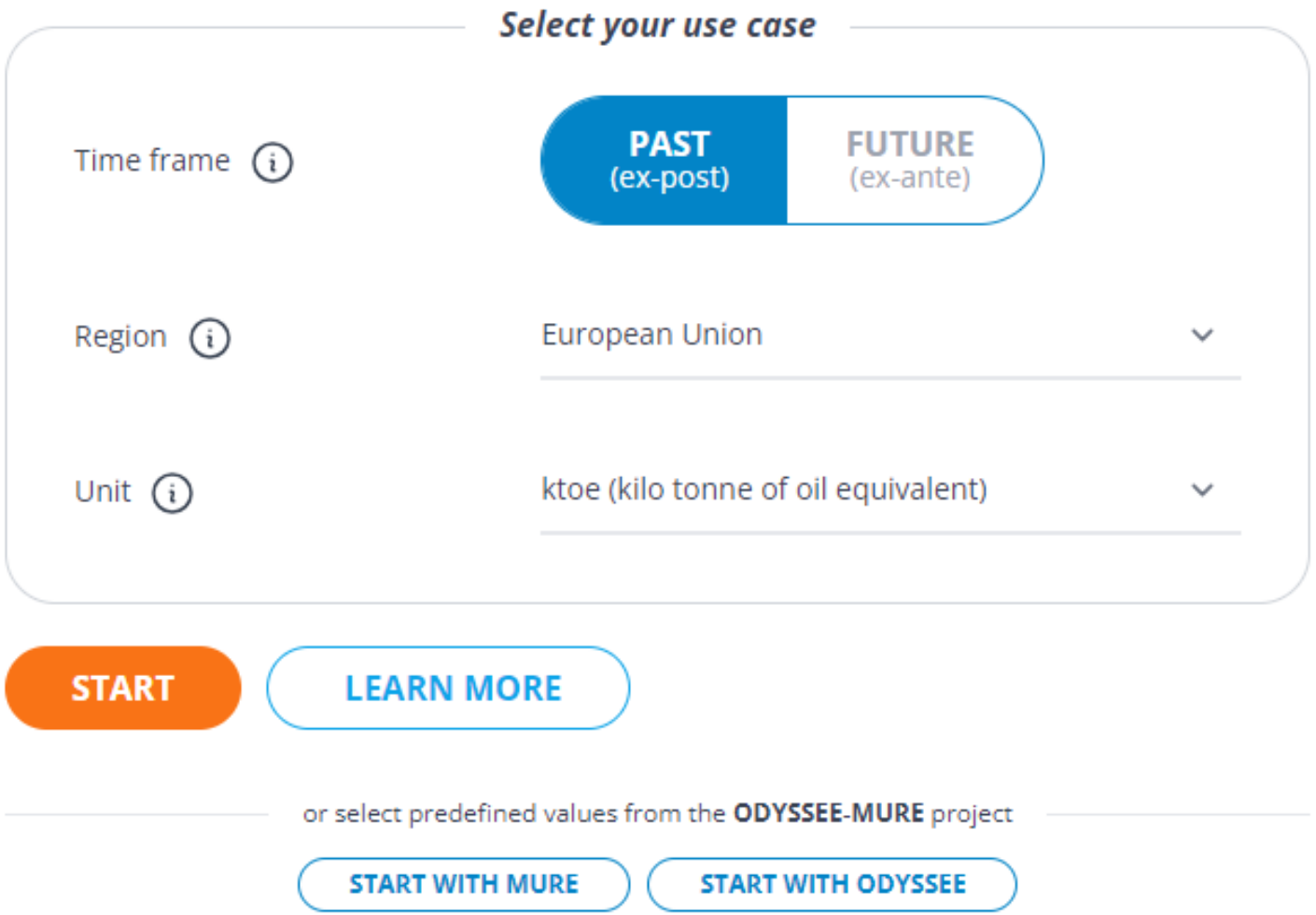


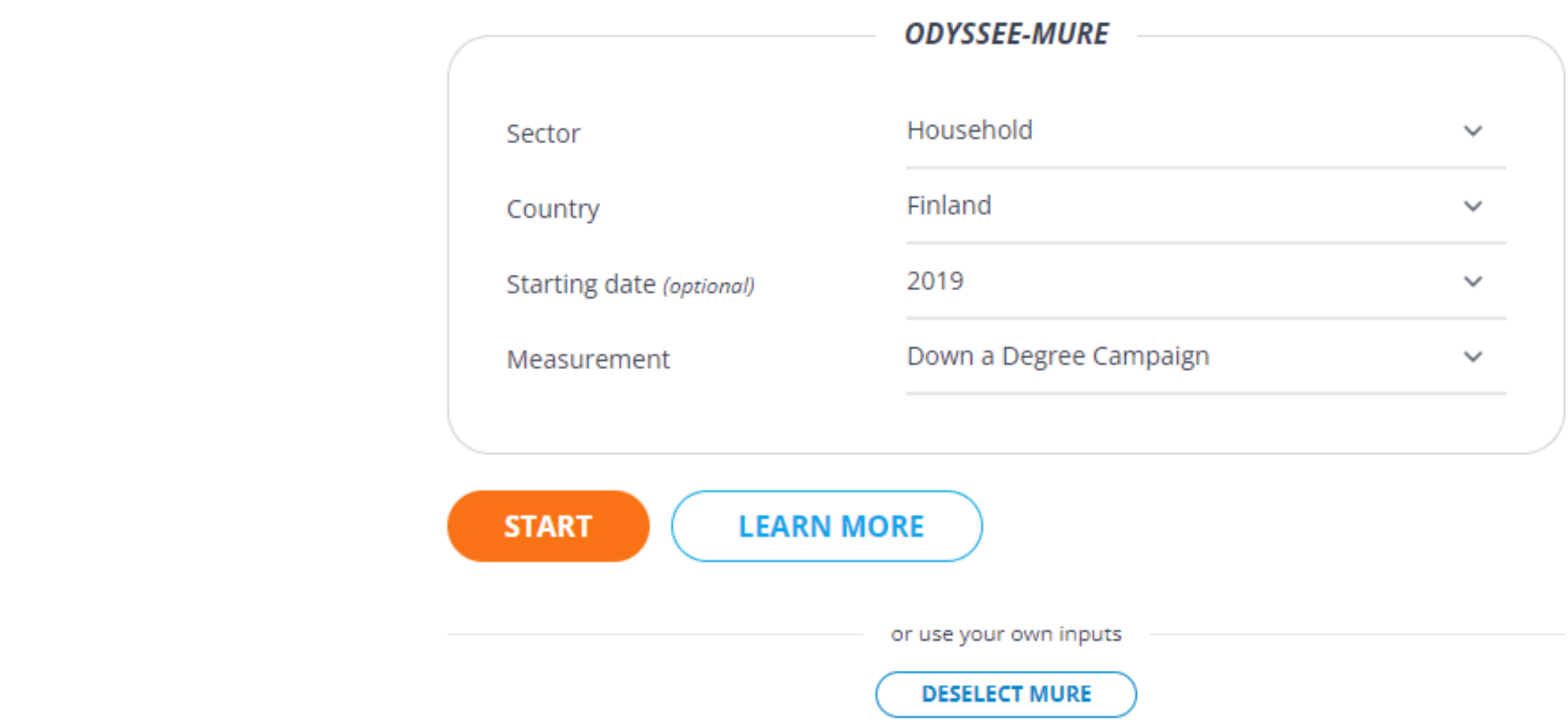
MICATool – Link to MURE

The link between the MURE database and the MICATool

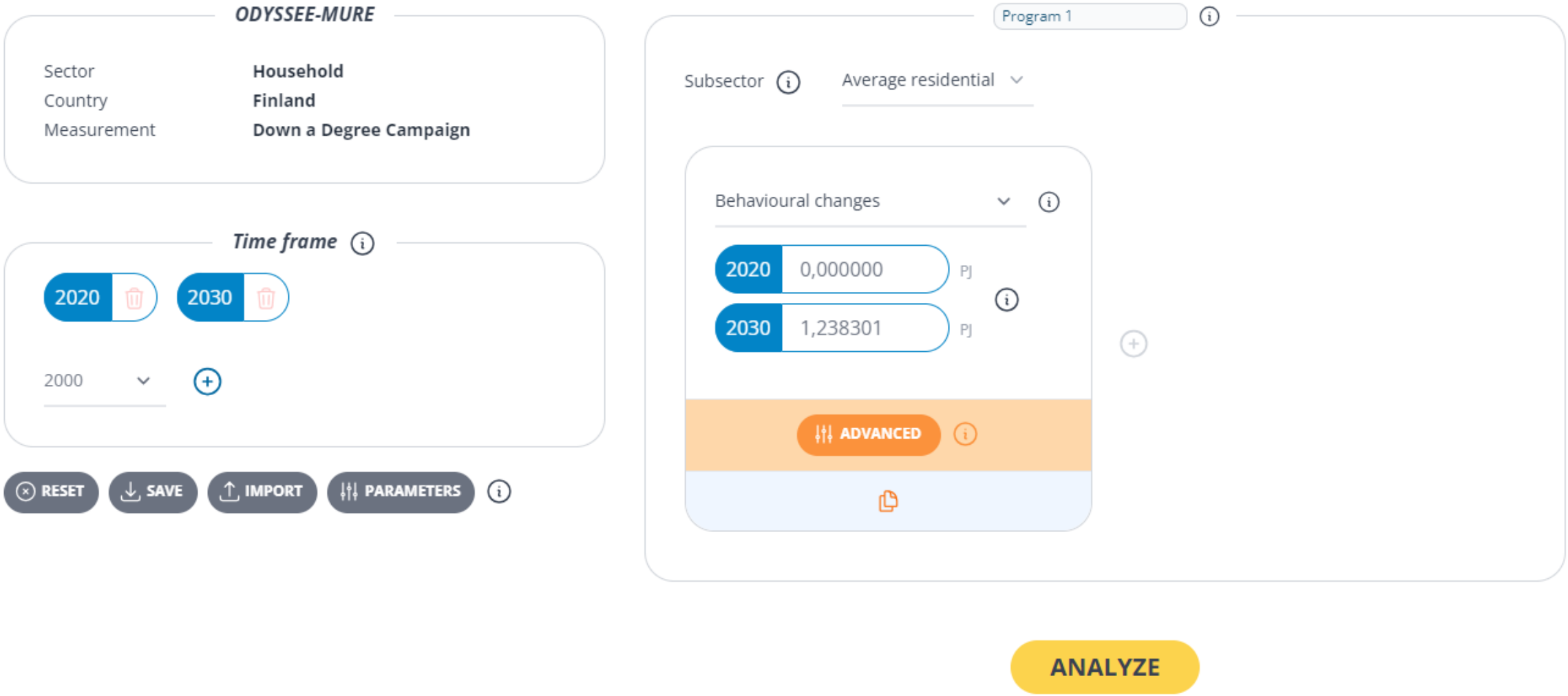
Analysis of the Multiple Impacts of the energy savings of specific energy efficiency measures (“bottom-up”).

- *link to the MURE API*
- *all measures with a quantitative impact*

MICATool – Link to MURE



MICATool – Link to MURE



MICATool – Link to MURE

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ODYSSEE-MURE

Sector	**Household**
Country	**Estonia**
Measurement	**Renovation of apartment buildings 2014-2020**

Time frame

2016 2017 2018 2019 2020

2000

RESET SAVE IMPORT PARAMETERS

Results are ready.
Click here to open the results again.

Program 1

Subsector: Average residential

	Building envelope	Energy-efficient heating
2016	0,014700 PJ	0,006300 PJ
2017	0,056000 PJ	0,024000 PJ
2018	0,118440 PJ	0,050760 PJ
2019	0,193690 PJ	0,083010 PJ
2020	0,207900 PJ	0,089100 PJ
Percentage distribution	70 %	30 %

ADVANCED ADVANCED

ANALYZE

MICATool – Link to MURE

Support Energy Efficiency Deployment with the Multiple Impacts CAlculation Tool

Quantification
Physical values

Monetisation
Monetary values

Overview
Overview of all monetary values

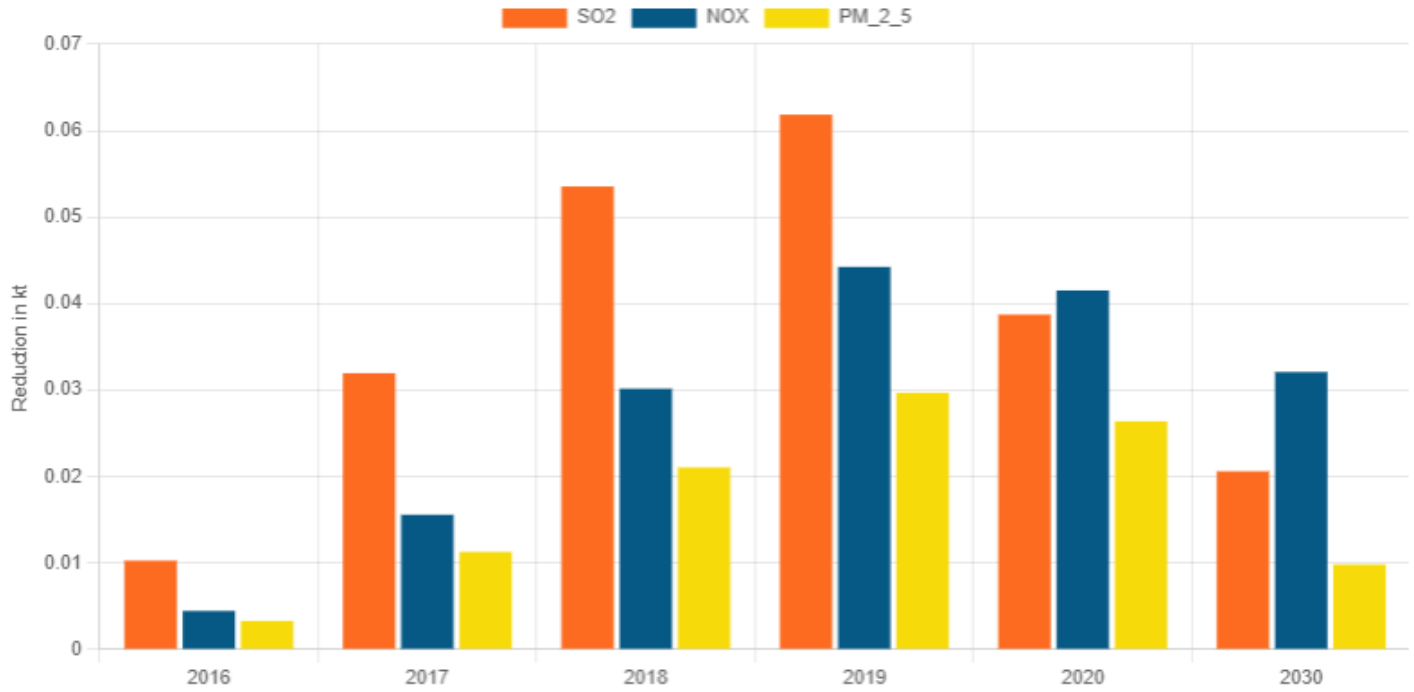
Social
Economic
Environmental

Primary savings by fuel
Reduction in air pollution ✓
Reduction in greenhouse gas emissions
Impact on RES targets

Reduction in air pollution

This graph shows the reductions in air pollutants due to energy efficiency measures. The calculation uses coefficients originating from IIASA's GAINS model, taking into account the specific emissions of energy carriers in different sectors and subsectors.

The equations can be found **here**, the fact sheet can be downloaded as **PDF**.



MICATool – The link to ODYSSEE

The link between the ODYSSEE database and the MICATool

Analysis of the Multiple Impacts of the ODYSSEE energy savings (based on indicators; “top-down”):

- *link to the energy saving tool of ODYSSEE*
- *analysis of the savings by sector (and country)*

MICATool – Link to ODYSSEE

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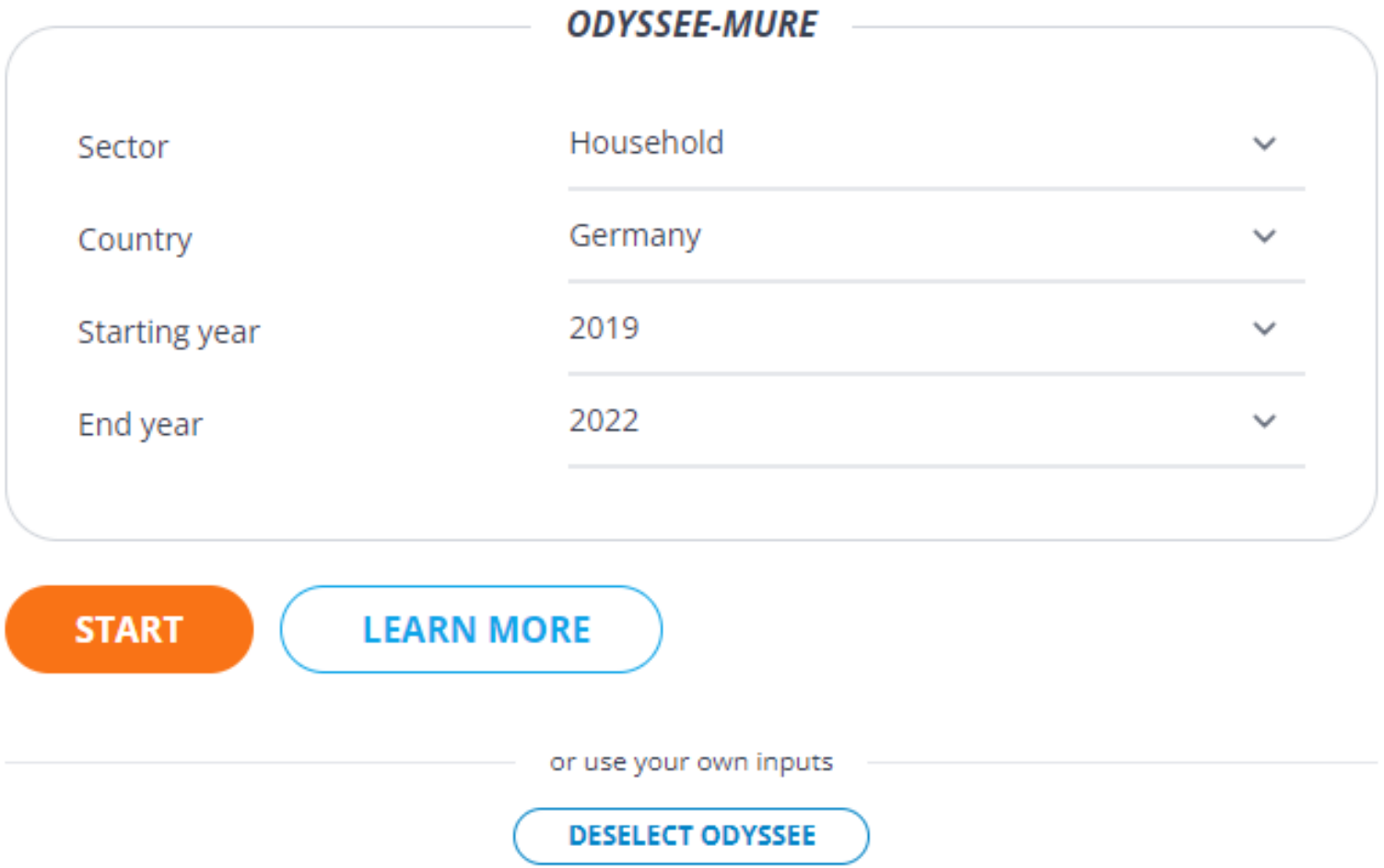

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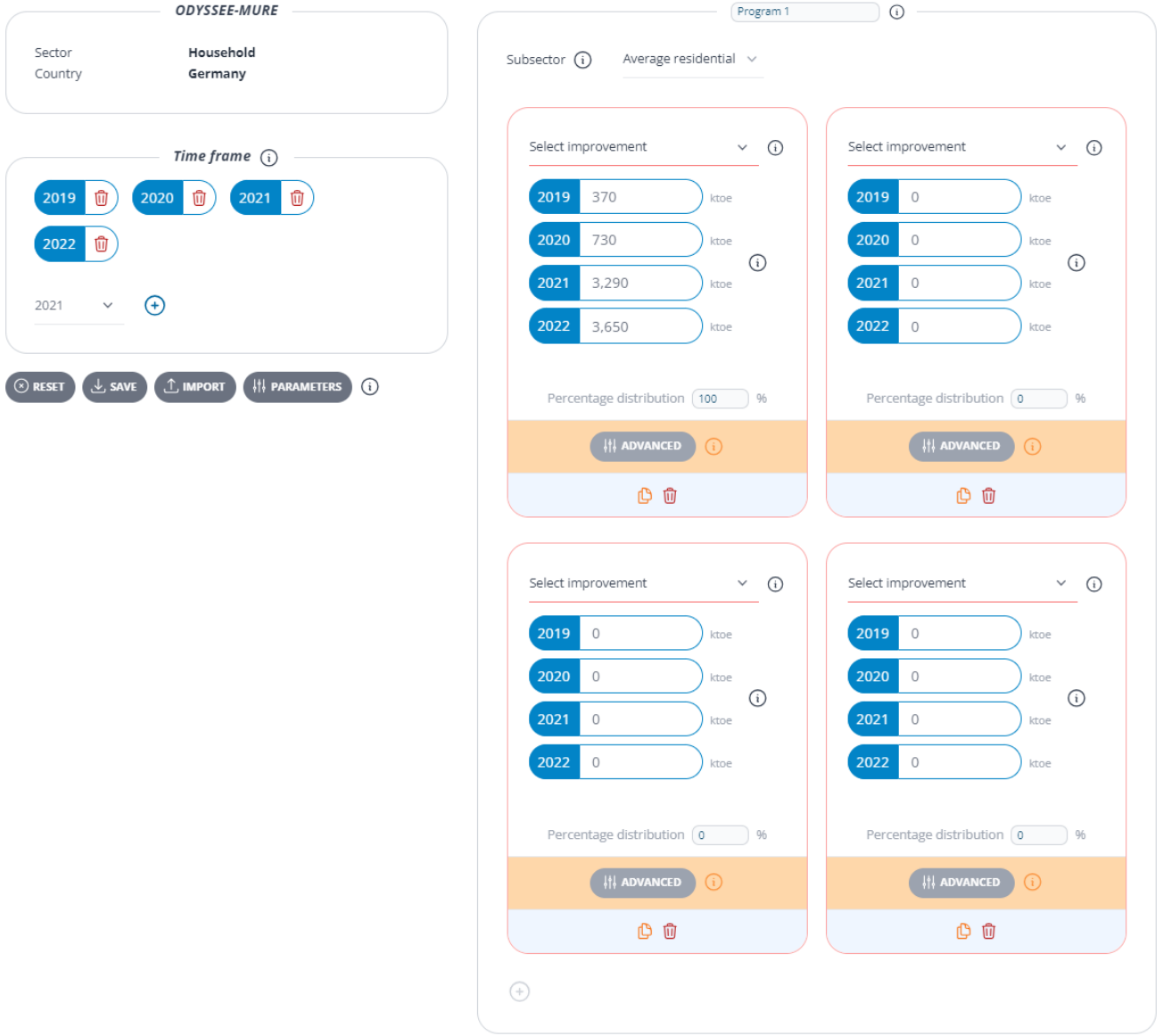

MICATool – Link to ODYSSEE

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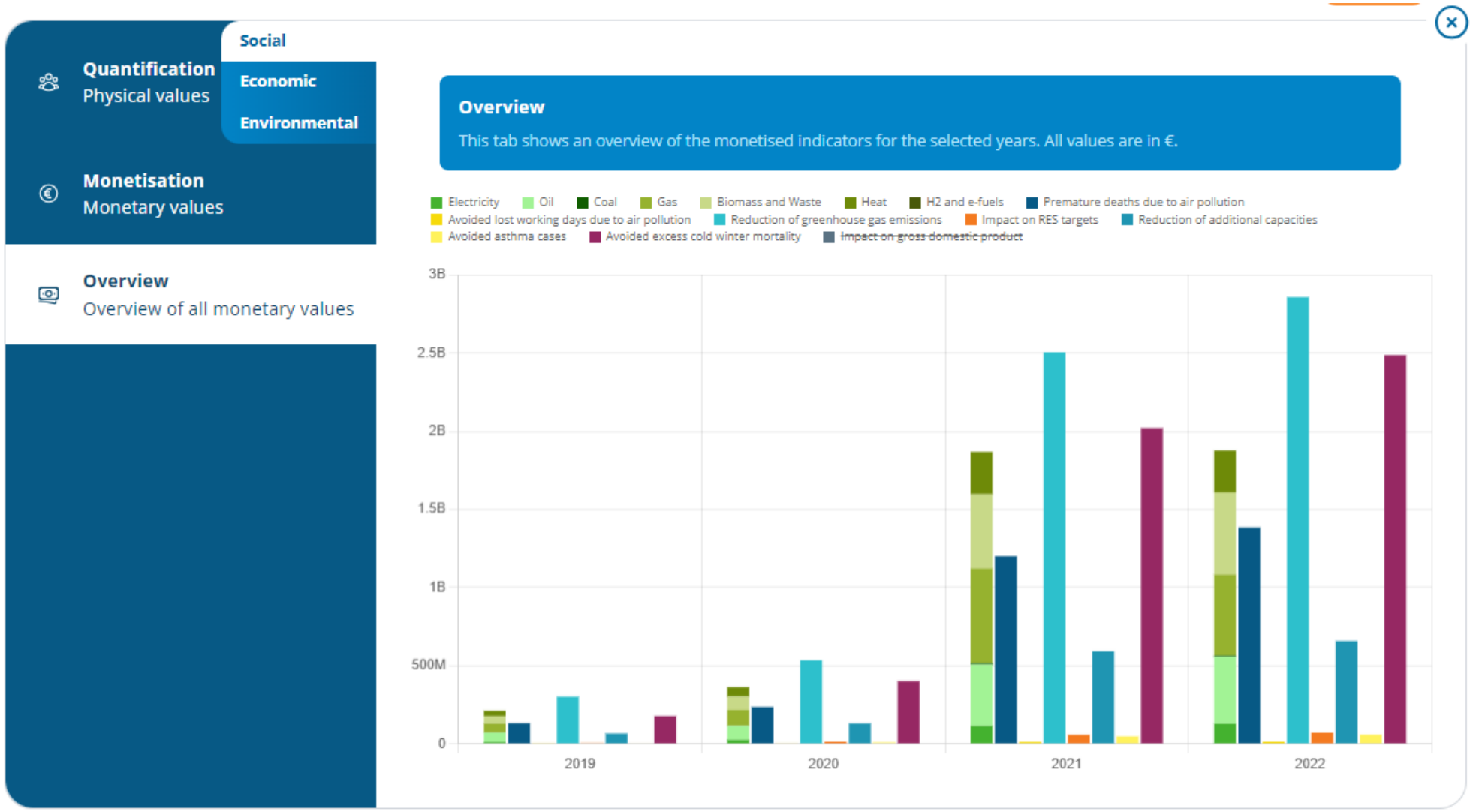

Join the

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https://ec.europa.eu/eusurvey/runner/SEED_MICAT_Community

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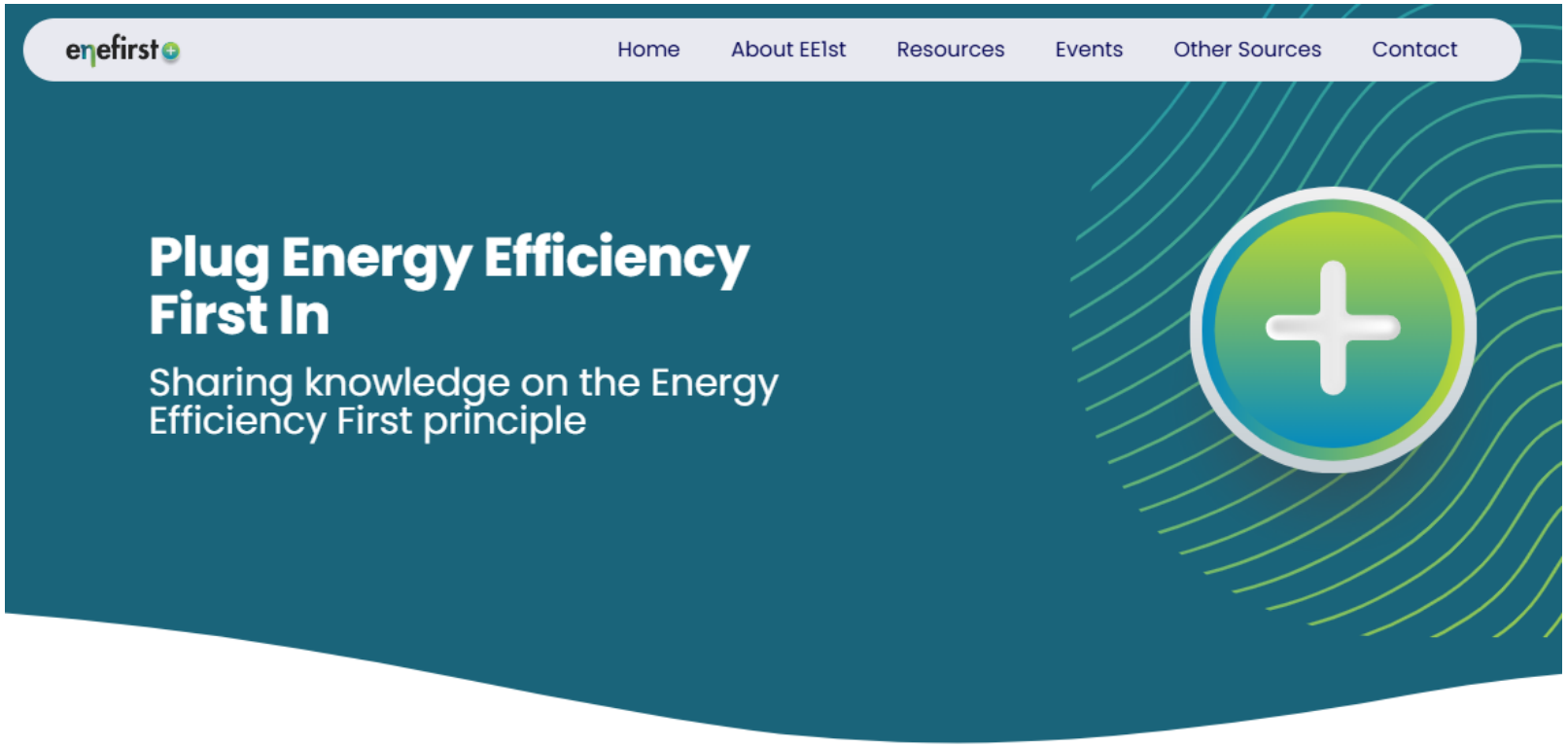
New knowledge hub on EE1st: https://ee1st.eu/



- ✓ Links to the Commission's guidelines
- ✓ Resources from European projects (enefirst, enefirst+, regio1st, …)
- ✓ Calendar about events dealing with EE1st
- ✓ Zotero library of references about EE1st

New contents added regularly

Suggestions of contents always welcome!

+ online workshops to come soon