Multiple Impacts Calculation Tool

Beyond energy savings – quantifying the multiple impacts of energy efficiency improvements

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Why MICAT?

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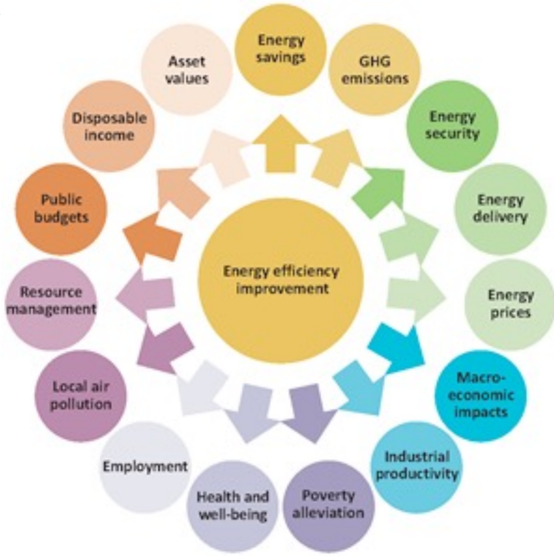
Multiple Impacts Calculation Tool

„Multiple Impacts“ of energy efficiency : Co-benefits, non-energy benefits (NEBs), multiple benefits (MBs), or impacts (MIs)

- Provide additional arguments to implement EE measures;
- Explicitly mentioned in EC regulations , e.g. EPBD (in the context of the long-term renovation strategies), National Energy and Climate Plans (NECPs): MSs required to report MIs;
- Insufficiently integrated into decision-making processes;

➔ Needs to develop methods and tools to quantify and monetize these impacts



source: IEA,2014

Objectives

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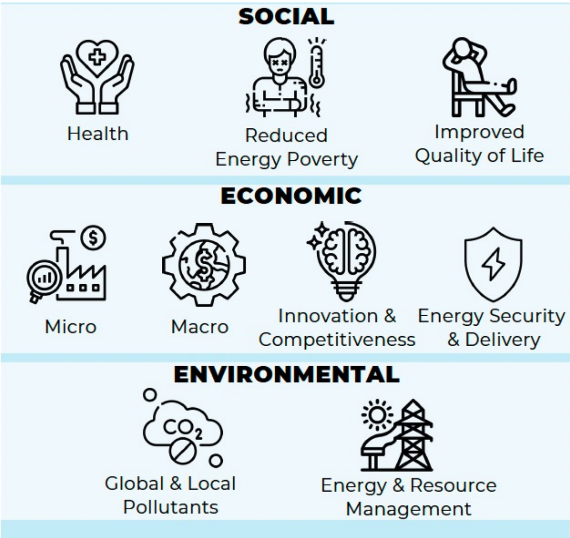
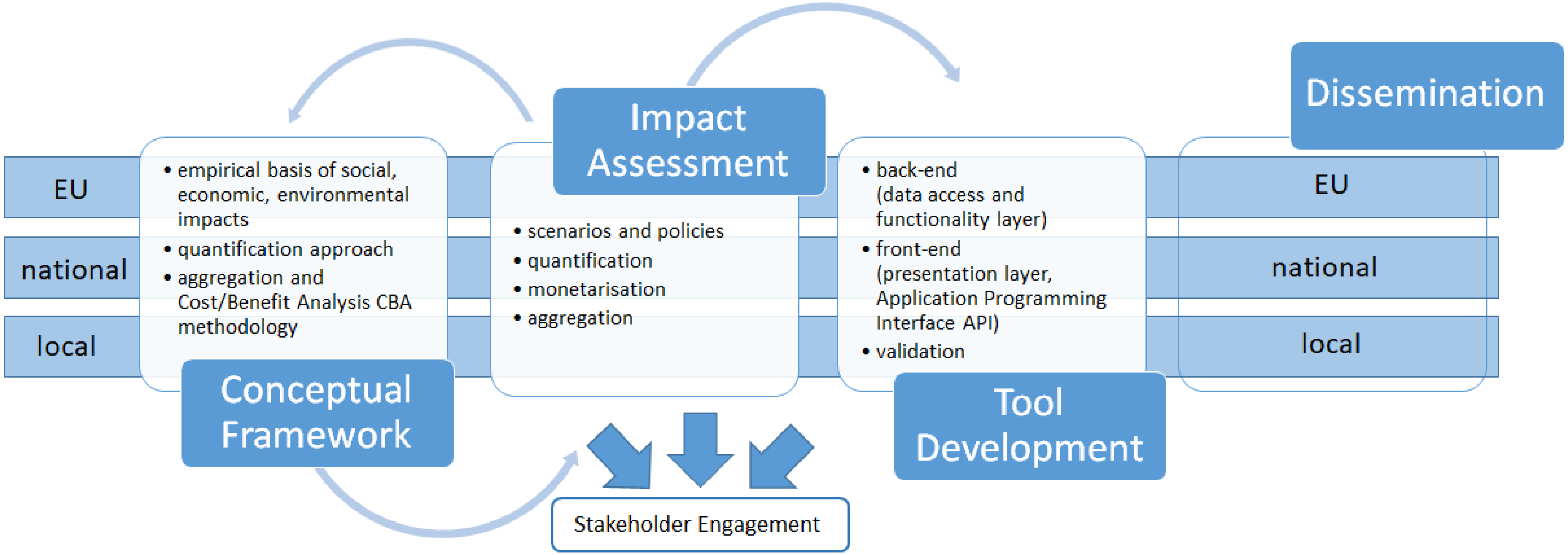


MICAT: **M**ultiple **I**mpacts **Ca**lculation **T**ool

To develop a comprehensive approach to estimate multiple impacts of energy efficiency by providing a free, publicly available, easy-to-use and scientifically sound online tool.

- **Improve scientific knowledge and methods** to quantify multiple impacts
- **Facilitate assessment of MI** of policies at EU, national and local levels
  - Cover several **key scenarios,** allow evaluation of customized scenarios and policy measures
  - **Maximize usefulness** for a large target group and cover a wide range of use-cases
- Establish a culture of **underlining the importance of MIs** in policy evaluation

CONCEPTUAL APPROACH OF THE MICAT PROJECT



- EU: reporting on target progress
- National: Integrated National Energy and Climate Plans (NECP)
- Local: Sustainable Energy and Climate Action Plans (SECAPs)

Overarching quantification concept

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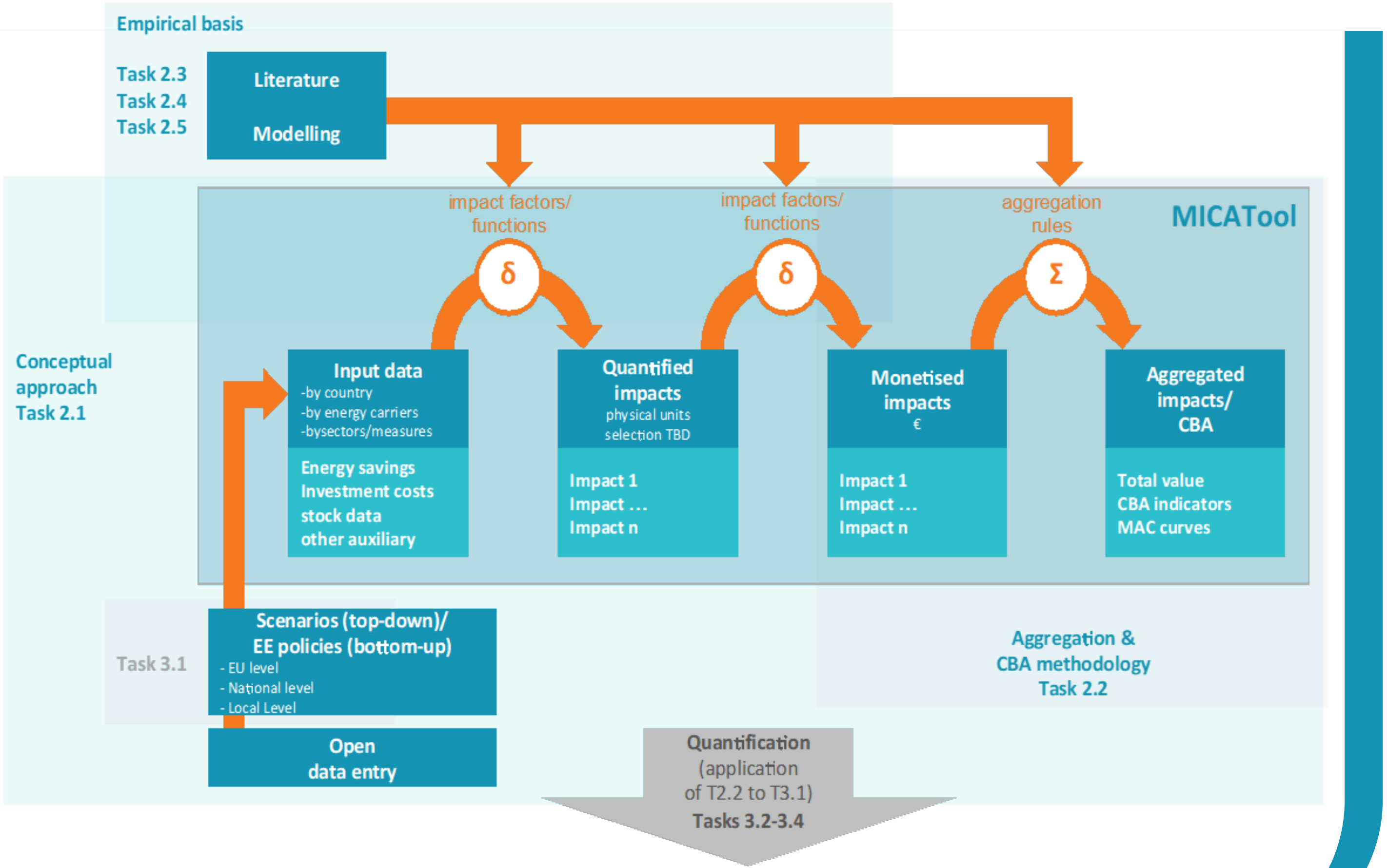
- Quantification chain: from input data to impact quantification, monetization, aggregation and CBA
- Ex-ante and Ex-post
- Impact factors ➔ high flexibility



Social impacts: energy poverty alleviation

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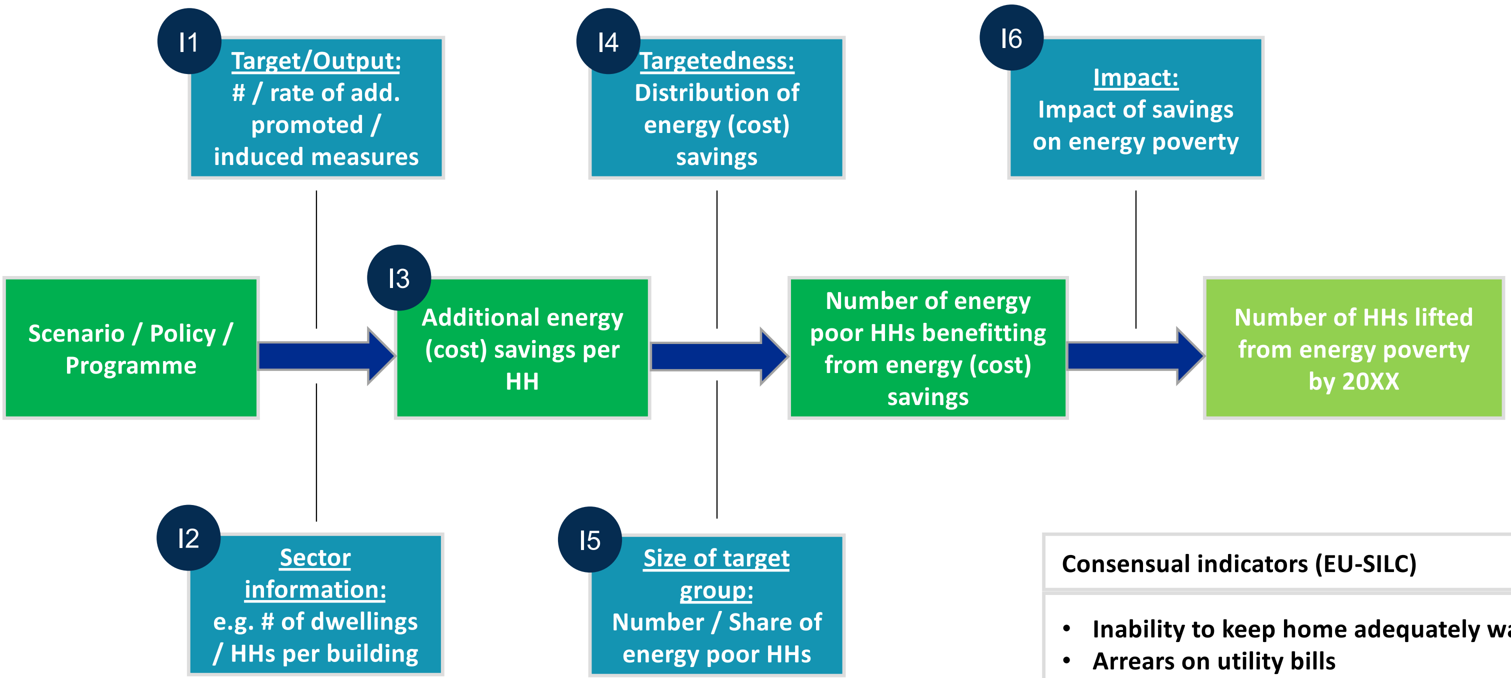


Consensual indicators (EU-SILC)

- Inability to keep home adequately warm
- Arrears on utility bills
- Presence of leak, damp or rot

Social impacts: energy poverty alleviation

Quantification:

$Energy\ Poverty\ Impact$ = Number of EEI actions **OR** Additional renovation rate x Number of dwellings/households x Policy Targetedness Factor x Energy Poverty Rate x Impact Factor x Average size of energy poor households

	Methodological challenges	Approaches
1. Data	Data availability at sub-national level	Use of proxy values from EUROSTAT data
2. Indicator	Base for assessment – which indicator/dimension of energy poverty? → defines the impact of which EEI actions may be sensibly quantified	*Presence of leak, damp or rot* (physical impact) → only (deep) building renovations; *Inability to keep home adequately warm* and *Arrears on utility bills* (financial impact) → all EEI action energy cost savings
3. Impact Factor	Distribution of building renovation energy (cost) savings in rented buildings strongly context and case dependent	Assume net savings for households **OR** User adjustable distribution factor (0-1)
	Translation of (cost) savings into actual relief ("How much is enough?")	User adjustable impact factor (0-1) ***OR*** relate to calculated Energy Poverty Gap

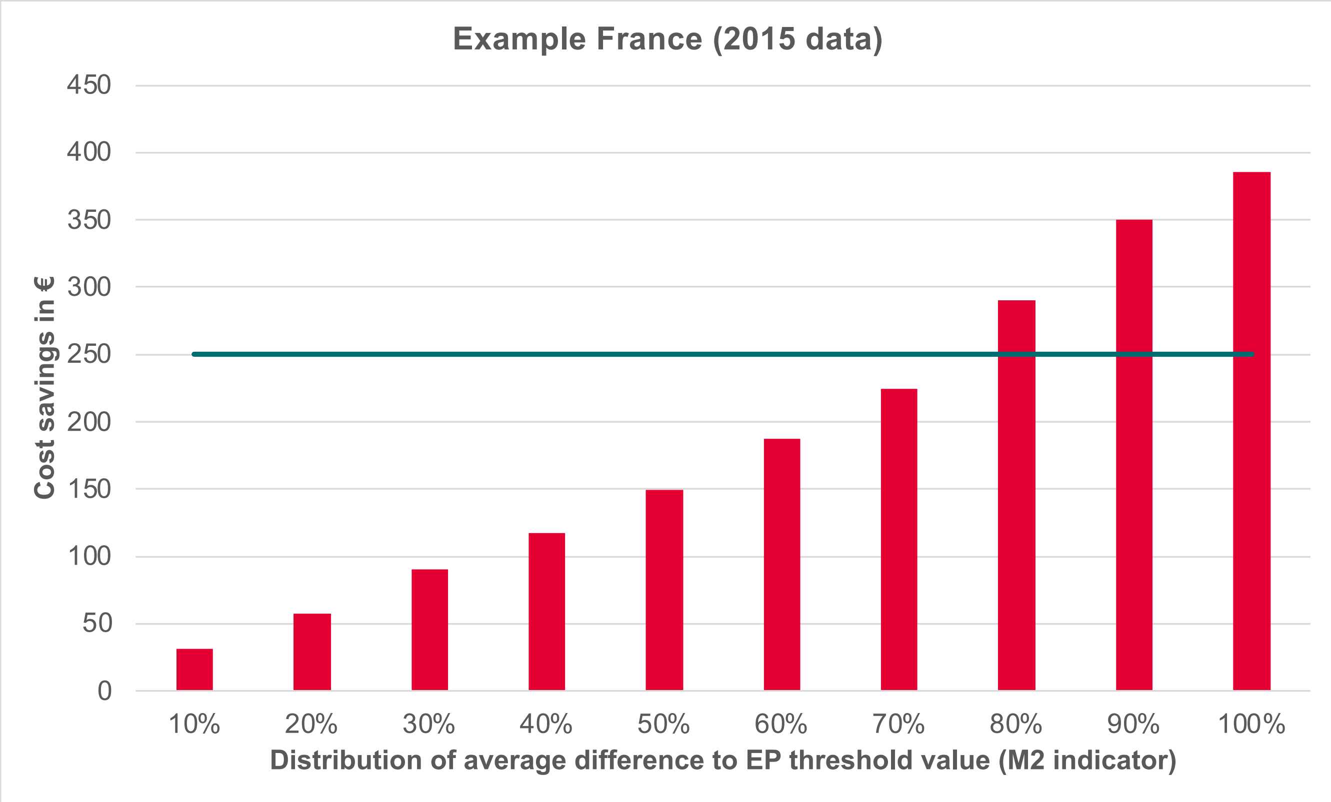
Social impacts: energy poverty alleviation

Energy Poverty Gap:

- Difference between household energy expenditure and M2 threshold value
- *M2* indicator: households whose income and expenditure is below national median values

Issues:

- Data rather old (2015) → overestimation of impact
- Uniform application at subnational level



Energy poverty-related indoor health impacts : Avoided asthma cases

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- Consistent association between indoor dampness/mould and asthma cases
- Water leakage ➔ indoor dampness/mould

12.7% of the total population in the EU27 countries lived in a dwelling with a leaking roof, damp walls, floors or foundation, or rot in window frames or floor (Eurostat, 2021).

- Quantification

Attribute asthma prevalence to the exposure to dampness:

Standard methods for assessing Environmental Burden of Disease (EBD):

➔ Population attributable fraction (PAF): proportion of the total disease burden ascribed to a specified risk factor.

$$PAFc = \frac{PDc \times (RR-1)}{PDc \times (RR-1)+1}$$

Impact factor

PDc = proportion of the population exposed (to dampness) in a specific country
RR = the relative risk for the condition in those exposed

Energy poverty-related indoor health impacts : Avoided asthma cases

- Quantification:

No long-term and large-size studies linking asthma morbidity and building energy performance ➔ assumptions based on expert judgement

Retrofits types	Indoor dampness reduction potential
Light	40%
Medium	60%
Deep	80%

Mzavanadze (2018)

$$\Delta PDc = \Delta Retro\mathrm{L} \cdot 40\% + \Delta Retro\mathrm{M} \cdot 60\% + \Delta Retro\mathrm{D} \cdot 80\%$$

$$\Delta ADc = \Delta PAFc \times Ac$$

ΔADc Reduced asthma cases due to reduced exposure to dampness

Ac population suffering from asthma

- Methodological challenges
  - Ideally, RR should be specific to different climate zones, different age groups, existing respiratory illness
  - The assumption between retrofit types and indoor dampness reduction
- Data challenges:
  - Data on different retrofit depth, house renovation technologies (with adequate ventilation?)
  - Symptoms-based self-assessment ➔ underreporting or overreporting

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Thanks for your attention!

Join our informal session to explore the tool!

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