A German, an Italian, a Polish, and an EU official walk into a stakeholder workshop: Supporting energy efficiency policies with the multiple impacts approach

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Keywords

multiple benefits, design process, stakeholder, operational tools, energy efficiency policy, policy-making

Abstract

The EU Commission's Fit for 55 package has outlined the need for increased emission reductions to comply with the Paris Agreement's 1.5 °C target. Incentivising more ambitious action, the multiple impacts approach emphasises co-benefits of energy efficiency, essentially increasing the cost effectiveness of related measures from a holistic perspective. Major EU projects such as ODYSSEEMURE and COMBI have expedited the knowledge base and methodology. However, in spite of significant benefits discovered and various tools created throughout these projects, the approach is hardly applied in policy-making, complexity and a limited applicability to new contexts being central inhibitions.

Therefore, central tenets of the Multiple Impacts Assessment Tool (MICAT) project are the consideration of European, national, and local levels and the involvement of relative stakeholders and policy-makers in the whole development process of the resulting MICATool, in order to better tailor it to their wishes and needs. The involvement will start right from the conception and design phase: in the course of three national and one EU workshops, as well as in an ongoing exchange with three pilot cities, the demands and requirements regarding the design of the tool, the inputs, and the form of the results are discussed with stakeholders and policy-makers - ranging from European Commission (EC) officials and experts working on climate and energy at EU level, to national officials working in Ministries and other relevant bodies, to local administrators. This will allow the project team to shape and tailor the tool to fit the policy-making process as seamlessly as possible, envisaging the objective to render the multiple impacts approach a paramount aspect of cost-benefit analyses, enabling more ambitious policies to comply with the omnipresent cost effectiveness criterion in EU legislation.

This paper examines how the multiple benefits approach and the MICATool need to be shaped in order to be highly policy-relevant and enable a seamless, ubiquitous, and impactful use in policy-making.

Introduction

On 9th July 2021, the European Parliament published its European Climate Law, entering into force 20 days later. Besides setting climate neutrality by 2050 as legally binding target, it introduces a reduction in greenhouse gas emissions of 55 % until 2030 into legislation, significantly raising the previous objective of 40 %. Thereby, the urgent need for increased emission reductions in order to comply with the Paris Agreement's targets of keeping the global temperature well below 2 °C and upholding the possibility of keeping it even below 1.5 °C has been emphasised. This highlights once more how the promotion of emission-reducing policies on European and national, as well as on regional and local levels is paramount to the objectives' achievement. As a result, the EU Commission's Fit for 55 package has outlined a roadmap to achieve the targets by proposing key measures in a variety of sectors. Inter alia, a measure package has been conceived regarding energy efficiency, involving a recast of the energy efficiency directive (EED) with more ambitious targets (European Commission 2021b). This includes a

raise in the member states' energy saving requirements under Article 7 (Article 8 in the recast) from previously 0.8 % to 1.5 % annually. In addition, the role of energy efficiency was further enhanced by proposing a new Article 3, which should ensure that energy efficiency is broadly considered in policy and investment decisions. This was accompanied by a formal recommendation to the Member States and detailed guidelines on the application on the energy first principle (European Commission 2021a).

However, several financially constrained member states are up in arms against the proposed readjustments in the directive. Invoking a lack of cost-effective energy efficiency measures, these countries are alarmed at the necessary expenses for support programmes with the aim to entice residents and companies to invest in pricier energy efficiency measures. On the one hand, the EU's focus on the promotion of cost-effective policies (for instance the cost-effectiveness criterion in the eco-design directive) has unambiguous merit in preventing excessive financial burdens on member states' residents. On the other hand, cost-effectiveness is merely assessed on the end-user level. Thereby, a wide range of further societal benefits whose consideration significantly extends the societally cost-effective potential is neglected. This is the case for energy efficiency, contributing to a gap between the implemented measures and the actual societally cost-effective potential of energy efficiency.

Energy efficiency measures have shown to create new employments and thereby reduce the burden on public budgets as well as stimulate the GDP (Campbell et al. 2014). In addition, they reduce the need for fossil fuels and, associated with it, countries' import dependency, thereby improving the EU's energy security (Reuter et al. 2020). Regarding environmental benefits, energy efficiency entails reductions in greenhouse gas emissions as well as in local air pollutants (Shnapp et al. 2020). Moreover, increased thermal comfort due to the insulation of buildings and a reduction in severe respiratory diseases linked to air pollution boost citizens' health and well-being, both aspects financially relieving national health systems (Campbell et al. 2014; Lelieveld et al. 2015). Furthermore, by tackling the issue of the "Sick building syndrome" associated with buildings deemed unhealthy and entailing health conditions, energy efficiency measures increase employees' active time and performance, thus ultimately their productivity (Shnapp et al. 2020). Retrofitting and insulating in the residential sector also tackles the issue of energy poverty, the financial inability of residents to heat their home to an adequate level (Reuter et al. 2020).

While these multiple impacts accrue on a societal level, the decision on whether to implement energy efficiency measures still predominantly lies with private actors. However, in the industrial as well as in the residential sector, these actors tend to mainly base their decisions on energy cost savings. This issue is similar to the larger topic of climate change mitigation co-benefits, as Karlsson et al. (2020) emphasise a lack of studies providing quantitative and monetised data, as well as related methodologies that decision-makers could use in climate change mitigation scenarios to make them more cost-effective.

Therefore, this setting constitutes a split incentive issue. The multiple impacts approach helps to quantify and monetise the societal benefits, enabling governments to share these benefits with end users in the form of subsidies for energy efficiency (Thema et al. 2019). The approach provides an instrument to assess the impact of subsidies and to significantly incentivise energy efficiency without spending more on than saving with it. Thereby, the split incentive issue can be alleviated and the promotion of energy efficiency stimulated.

Furthermore, the National Energy and Climate Plan (NECP) templates require member states to calculate macro-economic and, to the extent feasible, health, environmental, employment, education, skills, and social impacts including just transition aspects (in terms of costs and benefits as well as costeffectiveness) of the planned policies and measures described. This applies at least until the last year of the period covered by the plan, including a comparison to projections with existing policies and measures. This further enticed member states which were lagging behind to start reflecting multiple impacts of energy efficiency and brought the topic into the spotlight.

Major EU projects, such as ODYSSEE-MURE[1] and COMBI[2] have expedited the knowledge base and methodology, mainly relying on indicators describing the different multiple impacts of energy efficiency. However, in spite of significant benefits discovered and various tools created throughout these projects, the approach is hardly applied in policy-making, due to complexity and a lack of applicability to relevant contexts. This concerns in particular ODYSSEE-MURE and COMBI which have focused on the societal benefits of energy efficiency.

Therefore, the Multiple Impact CAlculation Tool project (MICAT[3]) aims at enabling policy-makers to use the gathered knowledge in an utterly simple way by quantifying and monetising multiple benefits resulting from given energy efficiency measures within a free, scientifically sound, and straightforward online tool. It will allow the quantification and monetisation of multiple benefits at the EU, national, and local level, as well as the assessment via cost-benefit-analysis. The tool will provide these results from a top-down and a measure-centred bottom-up perspective for time ranges in the past (ex-post) and in the future (ex-ante).

Nevertheless, there is no way around walking the fine line between extent and customisability of the produced results and outputs, accuracy and robustness of the tool, and simplicity, celerity and straightforwardness of the user interface. Naturally, an all-inone-solution is often sought, covering a wide range of indicators and all questions in relation to multiple benefits, with a variety of options. Then again, a certain accuracy and robustness of the tool is expected, in order to ensure that the results constitute more than mere ballpark figures. However, these requirements should not be at the expense of a simple and straightforward user interface without significant latency, accessible to experts in the EU commission as well as to potential laymen at the local level. Therefore, a sound balance between these three aspects is paramount.

This study describes how the assessment of previous projects and the involvement of potential future users have helped to shape the MICAT project closer to its target group's needs. By using that information, a fruitful balance between the three aspects mentioned in Figure 1 could be struck, ren-

1. ODYSSEE-MURE Multiple Benfits tool (MB:EE) (www.odyssee-mure.eu) .

2. Calculating and Operationalising the Multiple Benefits of Energy Efficiency (www.combi-project.eu).

3. Multiple Impact CAlculation Tool project (www.micat-project.eu).

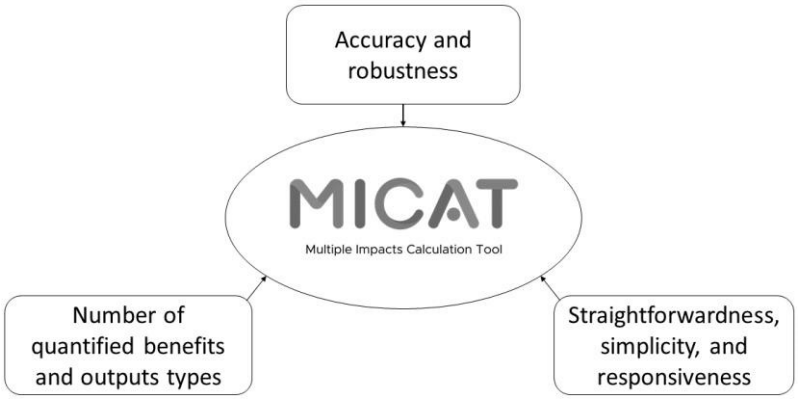

Figure 1. The three aspects to balance during the MICATool development.

dering the multiple benefits approach more policy-relevant. Thereby, it could support and promote expedient energy efficiency legislation at the European, national, and local level, which will be crucial to attain the targets set by the European Climate Law.

Methodological Approach

In order to balance these important aspects depicted in Figure 1, experiences, expertise, and preferences have been gathered from previous multiple benefits quantification projects and from potential users. In a first step, limitations and strengths of the previous projects have thoroughly been assessed to provide expedient improvements, while taking over and building on their fortes. Then, potential users from the EU commission, three pilot countries, and three pilot cities have been invited to workshops in order to elaborate, inter alia, potential application areas, indicator priorities, requirements for the tool, and further requests. As a result, the tool could be adapted to the needs of its users, ensuring its application and impact in the future.

ASSESSMENT OF PREVIOUS PROJECTS

While projects were never meant to be instruments to directly assess multiple benefits of specific energy efficiency measures, the analysis of COMBI and the ODYSSEE-MURE Multiple Benefits Facility (MB:EE) is an important starting point for the conception of a more policy-relevant tool. For example, although COMBI's results have been positively welcomed by EU Commission officials and widely promoted in international contexts regarding energy efficiency such as the Concerted Actions and other EU level conferences, the developed calculation methodology has neither been picked up systematically nor considered for future policies' impact assessments. Therefore, strengths and fortes but also weaknesses and limitations of the tools have been examined in order to map out the scope for improvements paving the way for MICAT. This has been done by researchers external to the previous projects as well as by members of their consortia and includes internal considerations and feedback voiced by stakeholders and users. Moreover, MICAT brings together the developers of both underlying methodologies, merging the expertise of both projects.

STAKEHOLDER WORKSHOPS

Contrarily to what had been done in previous projects, engagement of relevant stakeholders is a key component of the MICAT project, not only during the implementation phase of the tool, but also and most importantly during the development phase. However, these stakeholder workshops are special due to the direction of the consultation: unlike normal events of this kind, the government employees are consulting the research institutes. A similar setting has been described by Graymore (2014), showing the rationale and expediency of such a process in the creation of tools targeted at governments. In the course of the first round of workshops, the needs related to the monitoring of multiple impacts in the respective governance level's scenarios and policies were assessed. This includes collecting information on the available input data from the different involved governmental actors, which then determine the tool's potential outputs. Furthermore, the level of interest of the governmental actors in the proposed social, economic, and environmental MICAT indicators was identified.

In order to be as comprehensive and representative as possible, the engagement process has included three levels of action, the local, the national, and the EU level. The approach has lightly differed, due to the different familiarity with the topic on the different governmental levels.

EU-level workshop

As EU Commission officials are naturally an important target user group of the tool, the project team decided to split the workshop foreseen for this governance level in two sessions: the discussed session was dedicated to interested EC officials, while a second session will be targeted to other EU level stakeholders.

The workshop had an emphasis on orienting the tool to be a suitable instrument to support EU-policies. This included, inter alia, potential future reporting obligations regarding multiple benefits. This usage could be particularly fruitful due to the consistency of several datasets, scenarios, and models with the Commission's own impact assessments (e.g. MICAT uses the GAINS model for some of its indicators, on which the Clean Air Outlook is also based).

Furthermore, priorities regarding indicators were also identified. Participants were asked to rate their interest in the groups of indicators on a scale from 1 to 5 in the three categories used

Table 1. Stakeholders participating in the three national workshops.

MICAT MS	GERMANY	ITALY	POLAND
National expert team	PROGNOS	RSE	WISE-EUROPA
Participants	*Ministries:* Federal Ministry for Economic Affairs and Energy, Federal Ministry of the Environment, Federal Energy Efficiency Center; *National agencies:* Federal Environment Agency, German Energy Agency; *Other participants:* IIT Berlin, KfW, BiBB, Agora Energiewende, DENEFF.	*Ministries:* Ministry of the Ecological Transition – Energy Department; Ministry of the Ecological Transition – Environment Department; *National agencies:* ENEA, ISPRA; *Other participants:* GSE, Confindustria.	*Ministries:* Ministry of Economic Development and Technology, Ministry of Climate and Environment; *National agencies:* National Centre for Emissions Management, National Energy Conservation Agency; *Other participants:* Pro Akademia, University of Science and Technology.
Workshop date	31st November 2021	2nd December 2021	23rd November 2021

within the MICAT project: social, economic and environmental. This was carried out using Mentimeter[4].

National level workshops

On the national level, three European countries were selected to function as case studies for the development and validation of the tool, using detailed input data from the respective National Energy and Climate Plan. This involves using general energy-related data, such as consumption, fuel split, prices, and savings, as well as indicator-specific data, such as emitted air pollutants, employments per NACE-sector, symmetric IO-tables, and disposable income per income quintile. Germany, Italy, and Poland have been chosen due to their geographical distribution over Europe and their differences, inter alia regarding economic systems, energy policies and markets, climate conditions, and fuel mix.

In all three selected member states, the participants were relevant actors with an adequate level of knowledge in the energy domain, who could contribute to the tool development and would be potential end users of the tool. This included national ministries, national environment and energy agencies, and other key stakeholders, such as academia and research institutes, (public) finance institutions, trade associations, etc, as shown in Table 1.

In order to better approach the above mentioned stakeholders in each of the selected countries, a team of national experts have been included in the projects through subcontracts. Prior to the Polish and Italian meetings, participants were asked to cast their interest in the different indicators, while for the German workshop, Mentimeter was used.

Local level engagement and workshops

On the local level, the ambition has been to involve technical staff from municipal administrations and to respond to their needs in terms of energy and climate policy implementation and planning. In order to do so, a call for tender was launched to find well-suited candidates to join the project with both an interest in advising on the design of the MICATool (co-designing) and ultimately using it in their work. As a result, Vitoria-Gasteiz (Basque Country, Spain), Calvià (Mallorca, Spain), and Tartu (Tartumaa, Estonia) were selected. All three cities are in the process of writing their Sustainable Energy and Climate Action Plans (SECAP) as signatories to the Covenant of Mayors, a movement of cities committing to support and achieve the EU climate targets of a 55 % greenhouse gas-reduction by 2030 (Covenants of Mayors 2015).

The workshops on the local level were carried out as engagement processes, rather than unique meetings with all relevant stakeholders. We opted for a number of bilateral meetings, going into details and adapting the content to the cities' needs. The first phases were dedicated to gathering a common understanding of the tool and its approach, clarifying expectations on both sides of the table. This allowed us to balance expectations based on the experience with other pre-existing tools, which so far did not manage to fully grasp and cater to the local level's needs. Moreover, this allowed to find a middle ground between the two sides, agreeing on developing a tool which would be experimental, yet useful, robust, and relevant at the same time.

Local stakeholders were informed further through the distribution of a briefing paper, explaining the multiple impacts approach and the work carried out by the development team (e.g. the three categories of indicators). Participants were involved through interactive MIRO[5] sessions, which helped identify input data which could be locally collected and provided.

4. Mentimeter is an interactive presentation software allowing audience polls (www.mentimeter.com).

5. MIRO is an online collaborative whiteboard (www.miro.com).

Table 2. Context and workshops in the three selected pilot cities.

MICAT pilot cities	VITORIA-GASTEIS	CALVIÀ	TARTU
Inhabitants	250,000	52,000	95,000
SECAP	In progress (amendment from SEAP)	In progress (amendment from SEAP)	In progress (amendment from SEAP)
Workshops	Between May and July 2021		
Participants	Mostly city administration departments (all cities); an environmental association (Tartu), a regional energy agency (Tartu), a large local employer (Tartu), a business association (Calvia), regional government (Calvia)		
Focus	Alignment with SDG policy frameworks	Energy Efficiency in the tourist sector	Growing private sector and energy communities

Results

LESSONS FROM PREVIOUS PROJECTS

The ODYSSEE-MURE MB:EE and COMBI both assessed multiple benefits along two selected scenarios. While MB:EE compared the time range from 2000 until now with a counterfactual scenario without any energy savings, COMBI compared a business-as-usual with an environmentally more ambitious scenario (based on the EU EED impact assessment's EUCO+33 scenario, comprising more comprehensive energy efficiency policies). Thus, they have been crucial in showing the significant multiple impacts energy efficiency has entailed in the last two decades, as well as its potential in that regard in the future. Building on indicator approaches, both projects have been paramount by developing sound methodologies for the quantification of societal co-benefits of energy efficiency.

MB:EE, as a facility expanding the ODYSSEE-MURE project, has been able to rely on the underlying databases. This has allowed it to assess multiple impacts based on top-down data (ODYSSEE) as well as on measure-related bottom-up data (MURE). Furthermore, the methodology is relying on simple functional relationships to assess benefits in physical values (i.e. employments in full-time equivalents, health impacts in avoided deaths, reduced greenhouse gas emissions in tCO_2, etc.), thereby avoiding any modelling in the calculation. Thus, the approach is ideal for an online tool responding to user input and calculating results on the spot.

In contrast, COMBI as a standalone project has concentrated on a bottom-up approach based on 21 types of measures from all four sectors characterised in greater detail, allowing to quantify specific measures with superior accuracy. In addition, the tool allows the monetisation of certain co-benefits besides their quantification in physical values. Moreover, the tool provides the possibility for a cost-benefit-analysis and is subdivided into a simple 'standard' and a more advanced 'expert' mode with more options, enabling laymen as well as experts to easily access information on multiple impacts of energy efficiency. From these preceding projects, several fortes have been transferred to the MICATool, as shown in Table 3.

The methodology will build on MB:EE's methodology relying on comparably simple functional relations instead of modelling, while employing COMBI's approach using characterised measure (or end-use) types. It will provide the possibility to quantify indicators in physical as well as in monetary values and provide a facility for cost-benefit-analysis. Furthermore, the online tool's appearance will be building on COMBI's user interface. However, being outside the scope of both preceding projects, the possibility to assess specific energy efficiency policies and measures is the core improvement of the MICATool. This includes the option for users to provide their own data to increase the results' accuracy, while still keeping default values as fall-back, theoretically only requiring the projected energy savings. Thus, the range of application will significantly be expanded, allowing the assessment of all kinds of energy efficiency actions and the use of a variety of scenarios. This improvement has also allowed the project to evolve from the national and European level to include the local level as well as the opportunity to assess the multiple impacts associated with NECPs' envisaged energy savings.

RESULTS OF THE WORKSHOPS

As previously reported, multiple impacts are not merely a motivation for European policy action on energy efficiency but are also becoming widely aware to lower administrations, notably to national governments (Thema et al. 2019). However, the level of awareness diminishes on the way from the EU commission to the local level. In terms of operationalisation, the EU and the national governments are much more advanced than most municipalities.

Since the MICATool has the aspiration to be highly policy-relevant and directly involved in the drafting of energy efficiency legislation, it is to be tailored to the needs of its target groups, governments at the European, national, and local level. Therefore, extensive stakeholder engagement has been a central part of the project, encompassing several workshops on different governmental levels in order to adjust the tool to its users' needs and application fields. The first round of workshops has been a first occasion to test the waters at all three levels and adapt the overall direction of the tool. Below, we describe the findings and results for each of them.

Table 3. Similarities and differences of the MICATool to ODYSSEE-MURE MB:EE and COMBI.

	MB:EE	COMBI	MICATool
Calculation method	Functional relations	Modelling	Functional relations
Quantification method	Top-down	Bottom-up	Bottom-up
Quantification of benefits	✔	✔	✔
Monetisation of benefits	✘	✔	✔
Cost-benefit analysis	✘	✔	✔
Assessment of default scenarios	Ex-post	Ex-ante	Ex-post & ex-ante
Assessment of custom scenarios	✘	✘	✔
Assessment of custom policies	✘	✘	✔
Custom input of energy savings	✘	✘	✔
Custom input of tool assumptions	✘	✘	✔
Inclusion of the local level	✘	✘	✔
Integrable into other models	✘	✘	✔

EU level

The EU Commission's priorities regarding indicators is shown in Figure 2. It appeared evident that the macro-economic indicators are of central importance to EC officials: The European Green Deal (EUGD) levers on economic benefits deriving from the energy transition. Therefore, any contribution to this narrative in terms of multiple benefits allows to better cater to investors' needs. Environmental indicators were also high on the agenda, with emissions as a key centre of interest: carbon emissions are the driver behind the EUGD, therefore any additional quantification of their indirect reduction would be beneficial on the policy level. Moreover, measuring indirect reduction of NOx and SOx would be equally relevant, given that their removal from the atmosphere with other means than energy efficiency measures is extremely costly. Therefore, the MICATool could be an asset in advocating for the Energy Efficiency First principle in this regard. In terms of social impacts, it appeared evident that alleviation of energy poverty was by far the most interesting indicator for the EU agenda. As a general comment, it was highlighted that it would be interesting not only to think of non-energy benefits but also of nonenergy adverse impacts, which could also be positively used in sustainable energy policy (e.g. adverse effect of flat incentives on distribution of available income).

Concerning reporting obligations, the new Article 3 of the energy efficiency directive (EED) recast regarding the Energy Efficiency First principle (EE1) was a first clear reference. So far, multiple impacts have not been included in the calculations, however they could make a great difference in terms of the envisageable ambition level. In fact, the Energy Efficiency First guidelines clearly state that in the context of impact assessments, full reflection of the EE1st principle requires that *environmental, social, and economic impacts, including distributional impacts and the alleviation of energy poverty, should be part of the assessment, applying the Life Cycle Assessment (LCA) approach and proper carbon pricing assumption* (European Commission 2021a). The guidelines do not provide a specific methodology on how to properly quantify the aforementioned impacts and include them in the LCA's cost benefit analysis (CBA), creating a field of application for the MICATool. In terms of scope, the indicator assessing the alleviation of energy poverty could become extremely important for Member States in their reporting obligations on the "leaving no-one behind" principle. Finally, it was highlighted in the discussion how the MICATool should also be conceived as an instrument for financial actors to demonstrate their sustainable commitment, on top of its main role in facilitating policy decisions in the energy and climate domains.

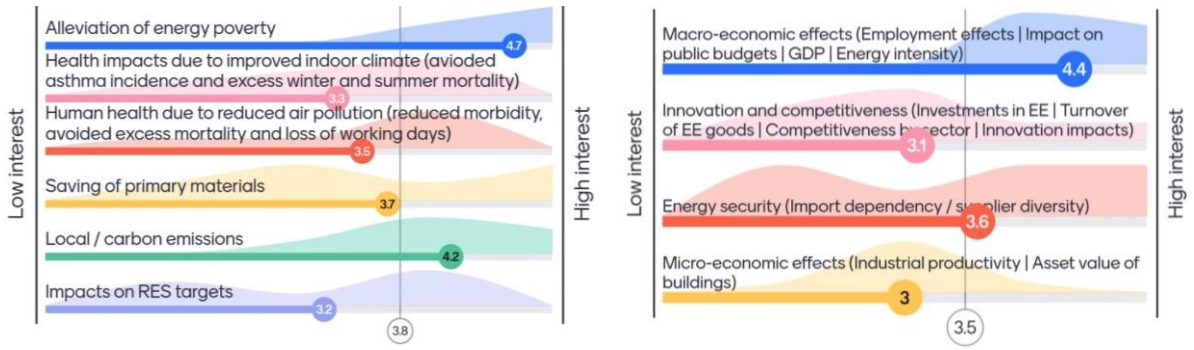

Figure 2. EU Commission officials' interest in social, environmental (both left), and economic indicators (right).

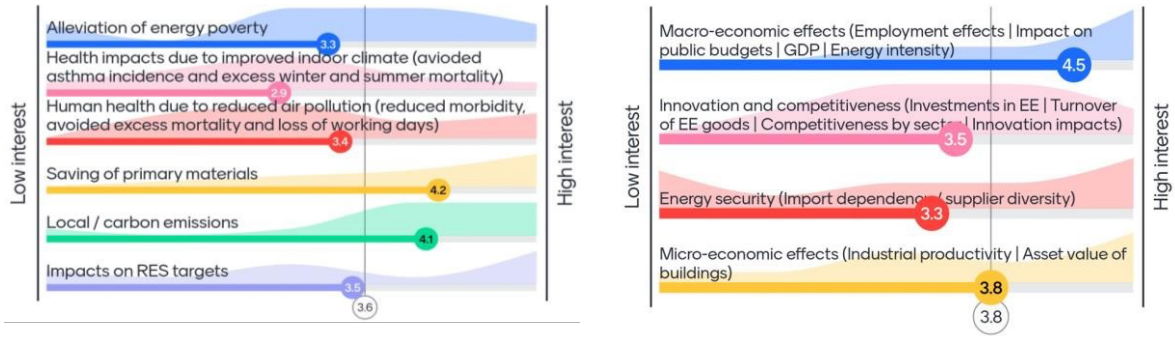

Figure 3. German stakeholders' interest in social, environmental (both left), and economic indicators (right).

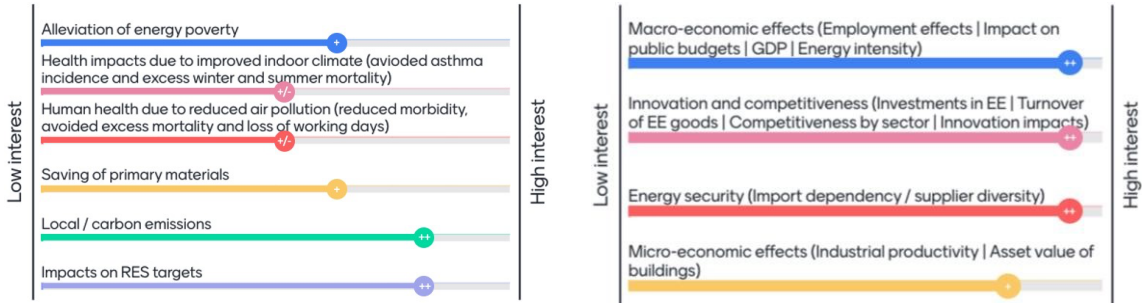

Figure 4. Italian stakeholders' interest in social, environmental (both left), and economic indicators (right).

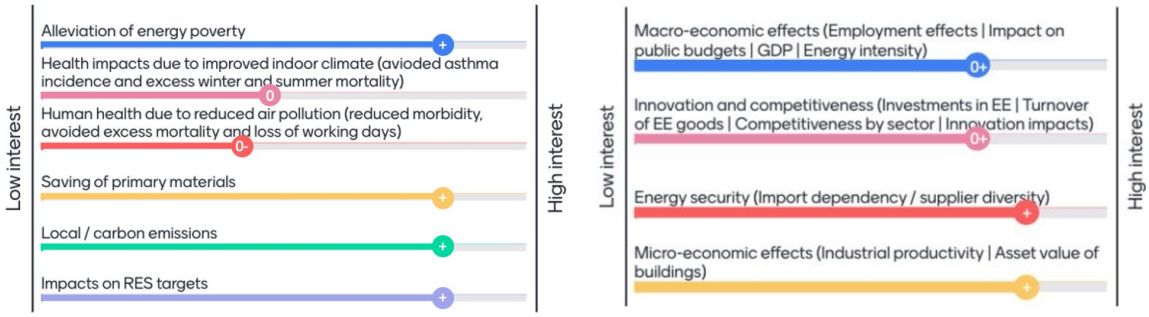

Figure 5. Polish stakeholders' interest in social, environmental (both left), and economic indicators (right).

National level

In all three cases, participants signalled a high level of interest for the subject and for the MICATool. The level of interest in the different set of indicators however varied amongst the three different countries. All countries showed a clear interest in environmental and economic indicators (both macro and micro), highlighting how the MICATool could also be used for assessment against the EU taxonomy. Concerning social indicators, Polish stakeholders showed high interest for energy poverty indicators, which are of outmost importance in the country as households tend to have comparatively high energy expenditures. Data-driven improvements of measures targeted at low-income households would be an asset, also considering support programmes, such as the Just Transition Mechanism. Slightly less interest for social indicators was shown in Italy and Germany: both countries, in fact, interpret energy poverty as a symptom of general poverty that is to be tackled using the tools of the welfare state, rather than a distinct form of deprivation requiring a dedicated approach. Nonetheless, an official from Germany explained that, in line with the European Union's definition, energy poverty was increasingly regarded as a separate form of deprivation in German ministries.

Discussion continued in all three workshops about the intended uses of the tool. The most important role proposed in all three MS would be as a gap filler for coming NECP updates foreseen for 2023 and 2024, since the previously required impact assessment is currently being questioned. Its omission could be cushioned by including results from the MICATool. Furthermore, due to extended reporting obligations associated with the new Article 3 of the Energy Efficiency Directive (EED), stakeholders saw the MICATool as an expedient instrument to support these processes. It was also proposed as a tool to assess measures' aptitude for the drafted EU taxonomy.

Finally, interest in the tool was also voiced as an asset for research purposes, notably by the Polish National Centre for Emissions Management planning on potentially integrating it in their currently developed energy demand model.

Local level

The main thrust on the local level was the difference between the MICAT indicators, mainly designed to cater to national economies' needs and to be assessed on such a level, and the list of measures and related data included in the cities' SECAPs. Due to the tight municipal budgets and workloads, there was no significant interest in an assessment of multiple benefits beyond their regular reporting obligations. Therefore, in order to keep a high concern in the project, it was important to act in their areas of interest laid down in the sustainable energy and climate plans, use relevant datasets, and derive results which can have an impact on local energy and climate policies. It became clear from the discussions that municipalities have a reasonable interest in a tool that supports them in assessing policy options with regard to energy efficiency and multiple impacts thereof. The challenge that surfaced after the first round of workshops was to identify further use cases, where the tool could actually be used. It is expected that the future collaboration will bring the issue further to the fore. This is the aim of the future work MICAT will continue to carry out with the local level in subsequent workshops.

Discussion and Conclusions

The methodology of work described above has and will further ensure that the project results are credible, robust, and relevant: the long engagement process will create a relationship of trust between the developers and the final users through a three-year co-creation journey. On top of enabling policymakers to get acquainted with the MICATool and learn how to best use it in a seamless way, the process has enabled the project team to readjust the potential target groups, the fields of application, and the concrete design and conception of the tool.

The results of the assessment of ODYSSEE-MURE MB:EE and COMBI as well as the stakeholder involvement process have pointed to new target user groups. Beside the European Commission and national governments, local level authorities have been added as important potential users. This complies with the need for climate action on all governance levels, unlocking considerable potentials for energy efficiency. The MICATool can support municipalities to draft expedient and cost-effective policies to promote climate action in spite of constrained budgets. Furthermore, it can support investors' decisions in favour of sustainable investments and help to demonstrate the sustainability of effected investments in energy efficiency. This is particularly interesting in light of the new EU Taxonomy for sustainable activities.

The stakeholder process has shown a central field of application in the examination of multiple impacts in NECPs and potentially as a substitute for the required impact assessment, which is currently being questioned. It could also support member states with the reporting obligations associated with the EED's new Article 3 regarding the EE1st principle. Moreover, it has been brought into play for the assessment of funding programmes' cost-benefit-ratio on national and local levels. Given the considerable magnitude of multiple benefits and their resulting cost-benefit-ratio, this could significantly boost the promotion of energy efficiency funding programmes (Campbell et al. 2014). Finally, the MICATool could feed into municipalities' SECAPs, thereby alleviating the associated workload and lowering the threshold for new urban areas to draft a SECAP.

While the research into the two preceding projects has shaped the overall design of the tool, the stakeholder meetings have provided an important input for expedient changes to the MICATool. The stated indicator preferences will ensure that central indicators will be calculated with more accurate and complex functional relations, such as energy poverty, global greenhouse gas and local pollutant emissions, and macro-economic indicators. In contrast, less important indicators will be designed more rudimentarily, enhancing the tool's celerity and reducing data needs. The results regarding the prioritisation of the indicators, with the differences between the cities, countries and on the EU level, have also proven the importance of the stakeholder involvement. Thanks to the involvement of stakeholders, the tool responds directly to the evaluated needs, enabling the robustness of the results. This is clearly visible from the differences in chosen indicators. Furthermore, the involvement of municipalities and investors as potential target group has emphasised the need for a straightforward tool accessible without compre-

hensive prior knowledge and access to a wide range of datasets. Furthermore, the MICATool allows a seamless integration into other models.

Yet, the analysis of ODYSSEE-MURE MB:EE and COMBI as well as the stakeholder involvement process have also revealed limitations of the MICATool. While it was clear from the onset that not all indicators could be calculated to the same high standards without raising data needs and jeopardising the tool's celerity, the discrepancy in indicator interests between different governmental actors will inevitably lead to the final implementation suiting some better than others. This is particularly the case for the local level, since most selected indicators were initially conceived and designed for assessments on a national economy level. However, a higher flexibility would come at the expense of a significantly higher tool complexity, which was criticised in other projects.

Through all these improvements and the expressed opinions, a balance between the three aspects described in Figure 1 can be struck. Thereby, the MICATool can assume a central role in guiding policy processes and energy efficiency legislation drafting, bringing the multiple impacts approach to the fore. Since energy efficiency mainly encompasses societal benefits, the MICATool can support and promote funding programmes, enticing private actors to invest in energy efficiency. Thereby, governments can share their incentive in favour of energy efficiency accruing from multiple impacts with actors from the residential and industrial sector in order to entice them to implement energy saving measures. This would expand the range of cost-effective measures without negatively impacting public budgets, due to the variety of accompanying co-benefits and their monetary impact. But most importantly, the tool could enable the conception of more ambitious energy efficiency legislation. As one EC official put it, "the European Commission cannot draft ambitious legislation without ensuring that the member states have the instruments to comply with it. The MICATool can be exactly that."

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