Multiple benefits of energy efficiency

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1. The M-Benefits conceptual approach

The goal of the M-Benefits project has been to train and build the capacity of energy efficiency experts to evaluate the multiple benefits (MB) of industrial and building/tertiary sector focused energy efficiency projects (i.e., industrial production sites, administrative and commercial buildings), not only the energy savings-related benefits. Such training and capacity building is necessary to enable energy professionals to communicate projects in strategic terms to companies' top management, thus increasing the attractiveness of energy efficiency projects and the likelihood of project implementation. This work, in turn, has contributed to the reduction of the energy efficiency gap identified by research.

Figure 1 illustrates the multiple benefits approach needed in order to successfully "sell" energy efficiency projects in companies. This approach takes into account three pillars that are critical to upper managers when considering project investment: 1) contribution of energy efficiency projects to cost reductions (beside energy costs), 2) the impact on and improvement to value proposition, and 3) risk reduction. Projects that can contribute positively to value, risk reduction, and cost reduction generally align with top management's interest.

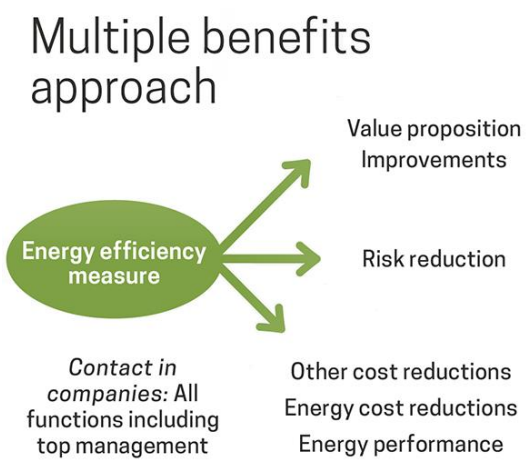

Figure 1: The multiple benefits approach to energy efficiency measures

The overarching objective of M-Benefits has therefore been to provide energy experts with a set of tools to enable them to apply the approach to evaluate and communicate the benefits of energy efficiency in a way that resonates with companies' needs and practices. Such tools would allow energy managers and practitioners to improve the business case of energy efficiency projects. Thanks to this broader approach, the contacts and champions of projects in the examined companies have cut across all company functions, including top management.

This project has filled an important gap identified by the G20 report (2017 22) with respect to the mechanisms necessary to "support energy-efficient investment choices and improve awareness of the value of energy efficiency investments with key decision-makers" and to "build a pipeline of bankable and replicable energy efficiency projects".

More specifically, the M-Benefits project has pursued the following main objectives:

- To provide a robust conceptual base for the development of tools related to MB evaluation and communication, customised to the needs and practices of companies on the energy demand side.
- To create a harmonised approach and methodology for energy managers and project developers to include MBs in project analysis, in order to identify, categorise, and assess them ex ante (i.e. at the conception stage/beginning of projects) and to communicate them within project proposals in technical, operational, strategic, and financial terms.
- To collect energy efficiency measures and business activity data and develop case studies, enabling business decision-makers across sectors to account for multiple benefits in investment and business activities based on consistent and comparable methods and evidence.
- To develop customised approaches to communicate MBs to relevant stakeholders. This implies considering the different perspectives and sought incentives of different key actors as well as communicating MBs in strategic terms to companies' upper management.
- To train the "efficiency providers" inside and outside companies, including energy efficiency engineers in charge of conceiving, "selling", and managing energy performance projects.

2. Main M-Benefits results and policy conclusions

2.2 The M-Benefits methodology

The M-Benefits methodology to identify and assess the multiple benefits of energy efficiency measures or projects at company level is an assessment process which takes place in five analytical steps. Each step concludes in a milestone (i.e. the intermediate results produced by each step), which is important for the compiled assessment of multiple benefits within companies:

- Step 1 - Business model & decision-making context
  → Milestone: Kick-off meeting
- Step 2 - Energy & operational analysis
  → Milestone: Energy efficiency measures (EEMs) identified
- Step 3 – Value-Cost-Risk analysis
  → Milestone: EEMs categorised and valued in strategic & monetary terms
- Step 4 - Financial analysis (NPV-IRR-PB)
  → Milestone: EEMs evaluated in financial terms
- Step 5 - Synthesis & conclusions
  → Milestone: Presentation of the project to the Investment Selection Committee

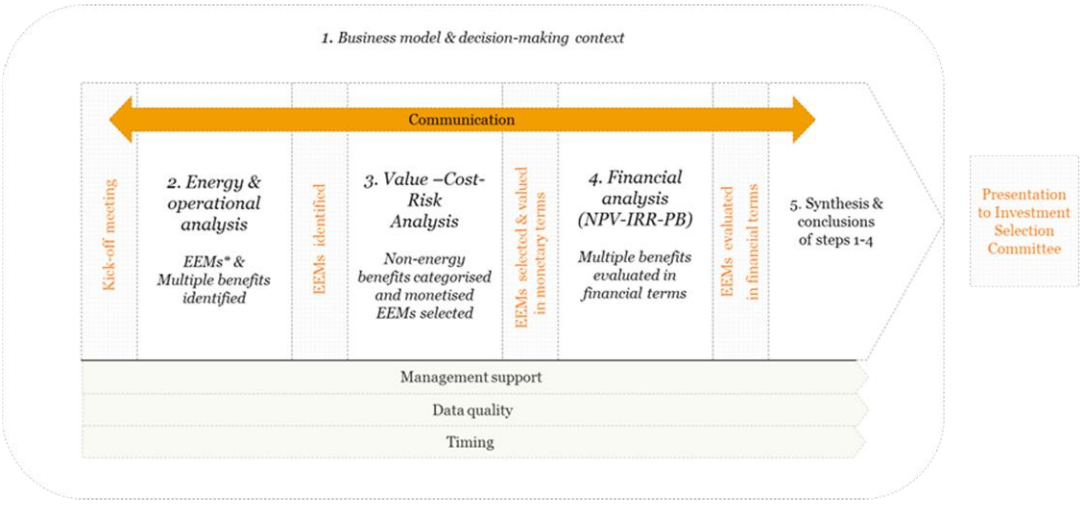

Figure 2: Methodology (Toolkit) to identify, categorise, evaluate, and quantify the multiple benefits of energy efficiency projects

The M-Benefits methodology is summarised in Figure 2 above. Step 1 includes an analysis of the company's business model and investment decision-making drivers, which is intended to provide an understanding of the overall context in which the energy efficiency project is supposed to take place. The goal of Step 2 is to identify the energy efficiency measures capable at the same time of securing or improving the company's processes and of decreasing its relative energy consumption within a predefined boundary. Multiple benefits at the energy measures and energy services level are analysed in Step 3. The associated Value-Cost-Risk analysis for the different multiple benefits aims to quantify and monetise various important multiple benefits, while their financial effect is evaluated in Step 4. In particular regarding Steps 2 and 3, the M-Benefits methodology often overlaps with current energy audits performed by energy consultants and managers in most EU countries, building upon these results for the case study analyses.

The goal of the M-Benefits evaluation process is to develop a pitch capable of convincing the top management of a company to approve an energy efficiency investment project presented by the energy manager (or team) or the energy auditor. Approval does not automatically occur at the end of the evaluation, since multiple projects often compete for resources and approval in companies. Thus, key aspects such as communication, management support, data quality, and timing play a central role with regard to approval chances of energy efficiency measures.

WP4.1	EVALUATION TOOLKIT	
	Summary of M-Benefits methodology	PPT
	User Manual on Evaluation	Pdf
	Resources (generic check-lists - questionnaires)	Excel
	Case Study Analyses (results)	Excel
	Monitoring & Control tool (ex-post MBs checking)	Excel
WP4.2	COMMUNICATION TOOLS	
	Tips and Solutions for an Effective Communication	Pdf
WP4.3	TRAINING MATERIALS	
	User Manual on Evaluation (same as WP4.1)	Pdf
	Course material (for teaching the main concepts and tools underlying MB Toolkit in training sessions (WP5)	PPT Excel
WP4.4	SERIOUS GAME	
	Software platform	

Figure 3: M-Benefits Toolkit documents

In order to support the methodology, a toolbox has been developed, composed of the following documents:

- **Evaluation toolkit:** The key concepts (1. key resources to the analytical and decision-making process; 2. analytical steps & 3. milestones) which make up the evaluation methodology are described in the User Manual on Evaluation (PDF), which is summarised in a PPT presentation. Questionnaires to collect and answer questions related to the evaluation of multiple benefits in energy efficiency projects are available in the form of two spreadsheets (Documents "Resources" and "Case Study Analyses").
- **Communication tools:** Tools useful for an effective communication of energy efficiency projects are described in this document.
- **Training materials:** The User Manual (same as that of the evaluation toolkit) and the summary of its presentation are the first developed training materials. They are completed by course materials, a presentation describing in more detail the key concepts composing the M-Benefits methodology and a financial spreadsheet preformatted to perform investment calculations.

2.3 The M-Benefits Trainings

The task of training the relevant energy managers to consider and quantify multiple benefits when assessing energy efficiency measures fell to the national partners. In order to enable them to do so, a train-the-trainer event has been carried out in Frankfurt in May 2019. Thereby, all the modules of the training for implementing partners have been absolved and discussed in depth.

Thereupon, trainings for implementing partners have been performed in Austria, Germany, Greece, Italy, Poland, Portugal, and Switzerland. Each implementing partner has participated in a training program comprising at least 2 trainings, based on the training scheme developed within the M-Benefits project and essentially consisting of:

- The Serious Game (available on wegas.albasim.ch), an online game simulating the process of convincing a company's top management to implement energy efficiency measures by researching and emphasising relevant multiple benefits.
- The User Manual to facilitate comprehension and use of evaluation and communication tools by practitioners.
- A master presentation on the introduction and explanation of the multiple benefits approach.

A theoretical part comprising the principle and the process of multiple benefits including all partial process steps has laid the fundament. Then, the "Multiple Benefits Toolkit" as well as basic concepts of business analysis have been presented and explained. To complement the theoretic input, a Serious Game has been played in teams of 2-5 players, in order to apply the basics conveyed in theory directly in practice.

The Serious Game is a training tool that uses game mechanics for achieving the training purpose. It is based on a mix of virtual activities (software simulation) and real activities (teamwork and oral presentations). It is aimed at an already highly qualified audience of energy professionals. Its intention is not to communicate the importance of energy savings, but the need to take strategic,

financial, organisational, and human factors into account, in order to expedite energy efficiency projects' approval by top management. Thus, the game trains participants to adopt a systemic perspective in order to obtain high-level support for energy efficiency projects.

At the end of a training session with the Serious Game, participants are able to:

- Explain the M-Benefits Methodology
- Identify and evaluate in operational, financial, and strategic terms the multiple benefits of energy efficiency projects
- Use the evaluation and communication tools to present their energy efficiency projects

The Serious Game culminates in a presentation of possible solutions by the project teams to a virtual decision-making committee. The presented solutions are then discussed in the entire group and tested for their relevance.

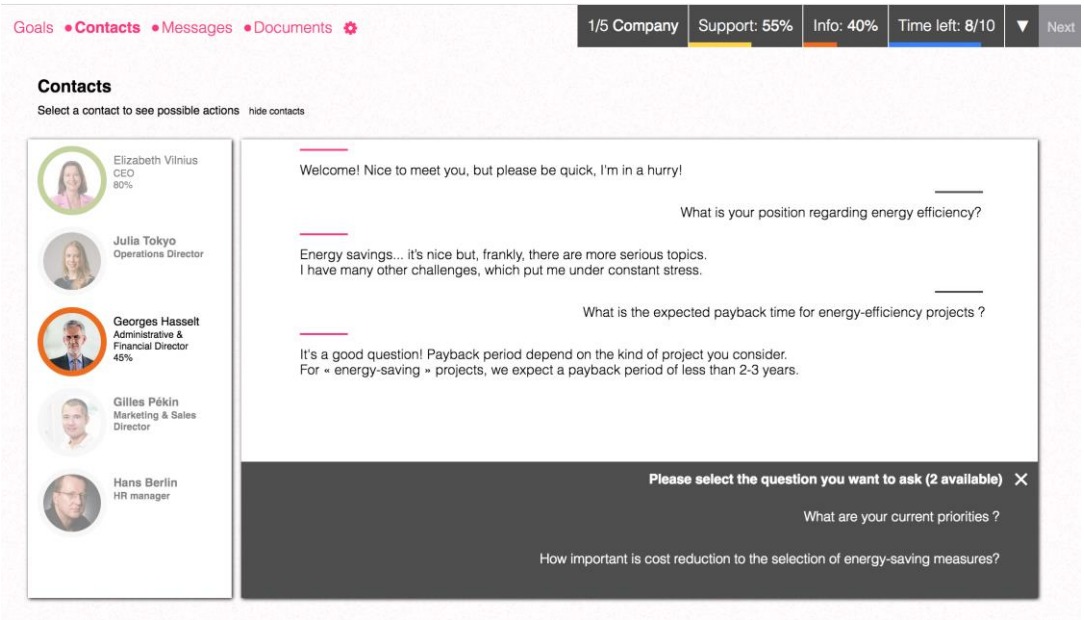

Figure 4: A virtual discussion with key actors from the company's top management within the Serious Game.

All trainings have been performed in national language and followed a basic concept that envisaged a duration of 1½ days. Very soon, it became clear that it would be challenging to find training participants in companies for such a lengthy training, so a few partners implemented an alternative model, introducing a combination of a webinar-course and an on-site presence course. In the end, two types of trainings have been carried out:

- Training courses with full on-site-presence for 1½ days
- Training courses with preparatory web courses on the theoretical parts and with on-site presence for the Serious Game and the team presentations

Overall, the training courses have been receiving overwhelming positive acclaim, inter alia emphasising the entertaining and informative character of the Serious Game.

2.4 The M-Benefits Pilots

A central element of the project has been the implementation and validation of the M-Benefits Methodology within pilot projects. The collection of evidence-based information on the impacts of energy and non-energy benefits (multiple benefits) has been an important input for the development of the toolbox as well as for the energy managers in industrial and service sectors when evaluating energy efficiency measures.

The main objectives of the M-Benefits pilots have been:

- Creation of exemplary real-life case studies in the framework of pilot project cooperations in Austria, Germany, Greece, Italy, Poland, Portugal, and Switzerland, where implementation partners were located.
- Building-up of an evidence base and a know-how on non-energy benefits and on the process of data search and implementation of the M-Benefits approach within companies.
- Evaluation and validation of the M-Benefits Methodology at the participating companies involving the energy manager and other management level employees. The robustness, adaptability, acceptance, and usability of the method have been assessed.
- Implementation of possible methodological improvements during the pilot phase.
- Encouraging the further use of the M-Benefits tools in these companies for future energy efficiency investments.

The pilots have been conducted in companies of very different types and sizes. While about half of the participating enterprises can be ascribed to the food and the retail sectors, the remaining companies are split among a variety of other sectors, inter alia life sciences, energy supply, and aluminium production. This has led to a similar disparity regarding companies' staff, ranging from 12 to over 100 000 employees. The pilot projects in the different countries have been conducted at different speeds and with different challenges, influenced mostly by the pandemic situation. Nevertheless, the participation of several companies in almost all countries has been observed and 24 exemplary pilot projects have successfully been conducted.

Figure 5: An overview of the M-Benefits Methodology and the steps in the pilot projects

In some cases, it was new for the energy managers to extend their technical analysis of the measure towards a broader understanding of their company's activities and relationship to major customers. These aspects have been covered within the implementation of the business canvas model to describe company activities. Furthermore, the coupling of the energy efficiency measures to the delivered energy services and their company's production as well as to the relationship to production requirements has been expedited. In this respect, this has proven to be a useful step towards understanding energy efficiency measures in more detail, while highlighting the measures' impact on critical aspects for production, such as safety, product quality, time-to-markets, and costs. Overall, considering that the application of the methodology has been a time-consuming process, high levels of commitment were required and have been shown by most companies' management teams to ensure successful implementations.

This has also been reflected in the feedback, in which company representatives have been asked to answer a series of questions and to rate different statements about the project. Overall, the participation as pilot companies has been perceived as useful for energy managers evaluating energy efficiency investments for their employer. The methodology has expanded their perception of and perspective on these investments with respect to strategic impacts and has made them more aware and sensible of other internal stakeholders and interests. This has led to an advantage by increasing knowledge and expanding insights, in particular regarding the future evaluation of energy efficiency measures and their associated multiple benefits. Furthermore, the participants have highlighted the benefit of now having a systematic approach to quantify multiple benefits, generally enabling new

perspectives on energy-related projects. The participants agreed that the benefits linked to the participation in the project justified the associated effort.

"The extensive 'Multiple Benefits' analysis convinced us to modernise our domestic hot water system and invest in solar thermal collectors. The impact of multiple benefits – especially time savings – was a key factor. By including these benefits we reduced the simple payback by 9 times!"

"The most valuable lesson learned/result was to reduce the amount of time our qualified staff spent operating the boiler during the summer. This aspect is essential and the most impactful from the strategic and the financial point of view."

Maciej Wielk – Owner, Dekor Meble

"Our cooperation with the National Technical University of Athens in the 'Multiple Benefits' project provided us with the opportunity to learn the methodology. Now we have the right tools to support our management decisions and implement energy efficient measures."

Georgios Karampatos – Energy and New Technologies Supervisor, AB Vassilopoulos

"The most valuable take-away is that compressed air impacts competitiveness in many ways – from safety to comfort to productivity to cost savings."

"We realised so many benefits from the project that we are investing in a whole new line of business – to help our customers and industry optimise their compressed air systems!"

Giangiacomo Mussa – CEO, Perardi e Gresino (PeG)

"The pilot project increased the relevance of energy efficiency measures and could improve the process and the decision-making for the implementation of energy efficiency projects in our company."

Domenico D'Acierno – Energy Efficiency Manager, ENI

"The 'Multiple Benefits' methodology allows us to approach energy efficiency projects with a holistic view. We are able to consider key operational aspects from an early project development phase and improve the sustainability of our company."

Marco Ferrari - Energy Senior Specialist & Company representative, ENI

3. Conclusions and Outlook

The M-Benefits project: Valuing & Communicating the Multiple Benefits of Energy Efficiency has aimed at creating a framework for the inclusion of the multiple benefits of energy efficiency in investment assessment and decision-making of companies and relevant stakeholders. This overall goal has been achieved through the combination of research activities and the development of a robust methodology to assess and quantify non-energy benefits and their effect on the financial investment evaluation.

This has been expedited through trainings performed by the project's national partners in seven countries (Austria, Germany, Greece, Italy, Poland, Portugal, and Switzerland). These were targeted at potential implementing companies and received generally positive acclaim, inter alia thanks to the use of the created Serious Game. Thereby, companies were convinced to participate in the following pilot phase. As a result, 24 companies have been accompanied along the implementation process of their energy efficiency measures.

Despite the variety of sectors, quantified multiple benefits, and implemented energy efficiency measures, a significant impact of multiple benefits for companies' decisions has been observed throughout the project. On the one hand, financial benchmarks have drastically improved for all projects when non-energy benefits were taken into account, in particular regarding measures' net present values. Many projects' payback periods have diminished significantly after consideration of co-benefits. Yet, for several enterprises, aspects beside profitability have proven to be more central to the decision in favour of energy efficiency measures.

Thus, the project M-Benefits has shown the relevance of co-benefits and companies' increased willingness to decide in favour of energy efficiency measures when multiple benefits are taken into account. This conclusion can be used to improve energy consultations in order to better promote energy efficiency measures.

In the future, a slightly less sophisticated and thus complex version of the employed methodology could help to broaden the target group of enterprises, thereby offering more obvious and relevant examples to a wide variety of companies from different sectors considering energy efficiency measures. This would enable in particular smaller companies without designated energy manager to participate in this project, an underrepresented type in this study with nonetheless significant potential for exploitation of multiple benefits.