Review and comparison of methodologies and tools to perform energy efficiency projects in public buildings in MED areas

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Abstract. The Energy Efficiency (EE) in buildings is one of the pillars for the climate change (CC) mitigation. There are several initiatives that are providing solutions to foster and accelerate the improvement of the EE in buildings. In particular, in the framework of the Interreg MED Programme, the Efficient Buildings Community (EB Community) has been created by the MEDNICE project (https://efficient-buildings.interreg-med.eu/) with the objective of sharing knowledge, practices and solutions for energy challenges in the MED area and creating synergies between similar initiatives. The EB Community collects the results of 10 Modular Projects (MPs) focused on the improvement of the EE in public buildings (PBs), in order to harmonize, systematize and capitalize their results and produce technical and policy recommendations to remove administrative, financial, legal or technological obstacles. The EB Community brings together local, regional and national stakeholders to exchange methodologies, experiences and tools. The MPs cover the improvement of EE in PBs from different perspectives and stages: characterization of the PB stock, planning, tendering and procurement of services, implementation of the building process, monitoring and use of the buildings, training and awareness of the different stakeholders and financing solutions. Most of the MPs have proposed methodologies to carry out the different stages of the EE projects, from a public administration (PA) point of view and providing tools and indicators to make decisions in each stage of the project. The purpose of the present paper is to make a review of the methodologies and tools proposed by the MPs. The study aims at establishing a common procedure to perform EE projects in PBs with special focus on MED areas; selecting common and relevant KPIs to be used during the whole value-chain of a project (energy, sustainability, cost and financial, environmental comfort, among others); evaluating the main target group of each tool and the stage of the process that is addressed; and identifying the main gaps of the methodologies and tools, as well as their usefulness to overcome the main barriers identified within the EE projects.
1. Introduction
Nearly 40% of Final Energy (FE) consumption in Europe is in houses, offices, shops and other buildings, therefore buildings are a priority for Energy Efficiency (EE) policy. Moreover, there are also important co-benefits from making buildings more energy efficient, including job creation, fuel poverty alleviation, health improvements, improved energy security and better industrial competitiveness.

While the Energy Performance of Buildings Directive (EPBD [1]) sets minimum energy performance requirements for all buildings that undergo major renovation, Article 5 of the Energy Efficiency Directive (EED [2]) sets a binding renovation target for public buildings (PBs) and imposes related obligations.

In this context, the MED Efficient Buildings Community [3] (EB Community), established by MEDNICE Project within the Interreg MED programme framework [4], was created precisely to support this transformation in PBs, specifically in the Mediterranean region. The EB Community brings together local, regional and national stakeholders to exchanges methodologies, experiences and tools, and collects the results of 10 Modular Projects (MPs), which are financed by the MED programme and concern with the topic of EE in non-residential PBs though 3 main topics (Financing, School Buildings and Tools and Strategies).

MEDNICE Project aims to systematize knowledge from the 10 MPs, represented in Figure 1, and to help find technical answers to common identified crosscutting priority issues.

Since the EED asks Public Administration (PA) to play an exemplary role when it comes to EE, it is expected the realisation of projects, mostly renovations, and plans aiming at improving the energy performance of PBs and public infrastructure. Nonetheless, the implementation of these actions is not always easy, since every decision-making requires setting clear and assessable objectives, having the needed knowledge, using proper tools, obtaining funding, addressing the appropriate target groups and correctly implementing and following the designed plan, also after its realisation. That is why PAs, in particular those with fewer resources, need effective methodologies, quantifiable indicators, benchmarking systems, decision support tools, addressed training and tailor-made guidelines.

2. Methodologies for the implementation of public Energy Efficiency projects
The results of MEDNICE 10 MPs can address a particular kind of intervention (new construction or refurbishment), a specific project stage (from conception to usage), a different use of the building (educational, administrative…), or even a part of larger actions such as urban planning of neighbourhoods or joint Sustainable Energy (Climate) Action Plans (SEAP/SECAP) for a group of municipalities.
From there, the results will be showed and classified according to the different stages of EE projects, in order to facilitate their comprehension and to increase their usefulness. From the introduced structure of some of the MPs and other initiatives, it has been decided to establish the 11 stages, based in the CESBA Building Life Cycle approach [5] and considering a circular stage approach, as shown in Figure 2.

![Figure 2. Building circular stages (source: own elaboration)](diagram)

This approach is also pertinent for existing buildings, since within the “Monitoring and Usage” stage may appear needs that require new interventions, i.e. returning to the “Purpose and Target” stage.

2.1 Purpose and Target
The “Purpose and Target” stage would be described [6] as a stage to define the targets of the EE project, where is important to include aspects of sustainability from the very beginning. On this regard, this first stage is seen as an important one by the EB Community, since 7 out of the 10 MPs have elaborated results aiming at supporting the actions of PAs from different perspectives. The MPs’ results demonstrate that a SEAP is a very useful plan that include actions improving EE at municipal level. MPs results could help municipalities to implement this kind of plan or could improve the SEAPs that are already in progress. Besides, the analysis of the MPs’ results highlights that PAs need a clear picture of the state of the art of their PB stock through the definition of the different PBs’ typologies, and require also definitions of scenarios and criteria to make decisions. All this adapted to the context of each administration level and their ambition, possibilities and capacities.

It is particularly worth emphasizing the proposed six key steps for the decision-making process [7], the singular approach for joint SEAPs [8] and the inclusion of environmental issues beyond the Energy [9].

2.2 Energy Audit
There are several official definitions but in general, an energy audit could be defined [10] as an examination of a building for EE improvement purposes. Through analysis of energy usage, building characteristics, weather data and the typical usage of the building, an energy audit uncovers energy conservation opportunities. These measures are then assessed to identify savings, improve the quality of life within the building and provide environmental benefits.

Several projects, initiatives and standards at national and European level have already defined energy audits [11] and developed methodologies to implement them. Therefore, many bibliographies already exist on this issue, nonetheless the use of one methodology rather than another has to be evaluated by the corresponding PA according to their objectives, sources and possibilities. In this sense, MPs have given it a more oriented approach to the typology of the Mediterranean PBs.
From the MPs results, it has to be underlined the 5 key aspects to be taken into account when implementing an energy audit [10] and the identification of the most recurrent EE interventions that can be proposed already in the Energy Audit stage [12].

2.3 Stakeholder involvement
The engagement of stakeholders is the practice of interacting with and influencing project stakeholders for the overall benefit of the project and its supporters [13]. The different MPs outline the relevance of the stakeholders’ involvement for the success of a project, since it is highly dependent on the people interested in its subject or affected by the results of the proposed changes. The analysis and involvement of stakeholders could be a long process but most of the work done could be reused for further interventions. Nonetheless, the different technics or channels for the involvement will depend on the EE intervention degree (from building level to town) and also the local characteristics and references. In this stage, it can be highlighted a proposed methodology to map the stakeholders through the identification, analysis, mapping and prioritization of the stakeholders and their objectives [8], as well as 9 key steps to engage them [13].

2.4 Financing
Based on the results of the energy audits, a financial and economic simulation uses to be done to verify the feasibility of the investment plan [14]. This means to estimate the potential of savings and the investment volume. The limitation of public debt, in particular for municipalities, makes necessary to find the most appropriate way of financing the project. The consideration of key aspects is needed for the selection of best financial options case by case, and the detailed establishment of the identified conditions is fundamental for the overall process success. The results of the MPs for this stage are mainly focused on supporting PA in financing Energy Performance Contracting (EPC) projects. It is noteworthy the analysis of conditions for economic sustainability of an EPC Project [8] and the methodology to estimate a subsidy needed from the PA to make an EPC project enough attractive for the market [15].

2.5 Design tendering
Design tendering is an important phase to clearly define the goals of sustainability for the participants within the call for a public tender. Only with a detailed predefinition of the framework conditions, all submitted concepts will be sustainable. The criteria should not constrain the innovation. The main goal of the competition is to find the best solution for a special project, while following national and regional standards [6]. According to the findings of MPs, introducing publicly the evaluation criteria and the process awarding makes the project clearer and transparent, and benefit the success of the overall procedure. Nonetheless, the standard procedures are probably not the most appropriate options when multiple energy-saving solutions are possible and some measures have not been selected. Among the results of MPs in this stage, it is remarkable the approach proposed for the consideration of a threshold in the tender [10], either an economic or energy indicator, or 5 main requirements to ensure the feasibility of the Energy Conservation Measures (ECM) [15].

2.6 Planning
Planning a building or a set of buildings project in detail with the appropriate measures is a crucial factor for the sustainability in the subsequent life Cycle stages. Many parties are involved in this stage: public decision makers, administrative staff, building engineers, architects, technical planners, energy experts and others. These parties should meet regularly during the planning stage to minimize defects during construction and find the most suitable architectural solutions. For refurbishment projects, measures that increase the sustainability of the building should be taken into account, to be carried out during the refurbishment process. The better and more detailed the planning of a project is, the less can go wrong in the end [6].
Many EE measures are already proposed and described in several bibliographies, but the specific measures to be implemented will mainly depend on the applicability of the building, the choice of the Energy Service Company (ESCO) or the imposition of the PA, and the ambition of each singular project, which is defined in a scenario. It is especially relevant for an EE project the identification of 4 possible retrofit scenarios (minor, medium, major and deep) [16].

2.7 Procurement
Public procurement refers to the process by which PAs, such as government departments or local authorities, purchase work, goods or services from companies [17]. On this regard, EU law sets out minimum harmonized public procurement rules, which organize the way PAs can purchase goods, works and services.

The legal relation between PAs and other third parties has to be well defined to avoid possible future disputes, as it has been well documented in several MEDNICE MPs. It is noticed that the size, typology and number of buildings to be renovated by a PA will be determinant for selecting the type of contract. In any case, the standardisation of the documents and processes can strongly support PA in the implementation of this kind of scheme for PB renovation.

There could be different possibilities for approaching the procurement process of EE projects. MPs focus and provide information on EPC contracts. On this regard, it can be remarked the description of three possible procurement options when contracting an ESCO [8], a list of recommendations for an EPC contract [8], and the facilitation of EPC models which could be valid for any EU country ( [18] and [19]).

2.8 Implementation
After the planning and procurement stages, the EE project has to be implemented in the target building. The details for its implementation are described in the Planning documents and drawings, and the construction company and craftsmen are responsible for its proper construction, respecting quality, safety and time-schedule.

Despite the relevance of the implementation steps, in order to close the gap among theoretical analysis and scopes and real results, no specific results of MPs have been focused on the implementation stage, but only its relevance. Nonetheless, for the accomplishment of a good EE project it is highly recommended to implement a holistic approach considering all stages and to enhance communication with all actors involved. In particular, in this phase, problems and delays may occur due to unforeseen aspects in the building site.

2.9 Commissioning
When the construction process is finished, most of the involved actors (engineers, architects and construction companies) leave the building site. After that, building end users are in charge of the using phase. Therefore, a knowledge transfer and a correct commissioning are needed to use properly the building and its components, in order to obtain the expected performance. This process can last more than a year considering all seasons, specially heating and cooling seasons.

It is mentioned that in the case of the commissioning stage for an EPC project, not only the building users but also the ESCO is also involved in the operation and maintenance (O&M) phase. According to the results, it is highlighted that most ESCOs establish a training schedule for O&M coinciding with the commissioning of the ECMs and it is advised that the ESCO involve the Public Body (end user) in the commissioning process and use this as a part of training. Moreover, third parties involved in the maintenance may also participate in the training during the commissioning [10].

2.10 Awareness, training and communication
This stage could be considered a continuous process chronologically allocated in the whole building life cycle. Even so, in this report it has been allocated before the “Usage and Monitoring” stage, in-line with some MPs established ranking, due to the relevance impact of the human behaviour in the achievement of the expected energy savings of an EE project. This step could be placed too from the beginning of the overall process.
Several studies have proven that the behaviour of the building users can have a very negative impact on the energy performance of the building. On the other hand, this fact stands out that awareness, training and communication campaigns have a great potential in increasing energy savings at a low cost. Moreover, these campaigns are already being used in the private sector, in particular in buildings where the user is not in charge of the energy costs (e.g. office buildings). In some cases, the campaigns have to be implemented regularly due to the staff renewal.

From the MPs’ results, It can be highlighted some affirmations about the positive aspects of improving user behaviour [20] and the reasons why training can improve morale and job satisfaction [10].

2.11 Monitoring and Usage

This is the last stage of the Building Life Cycle and it is also a stage with high relevance for the MPs, since 5 out of the 10 MPs have provided abundant results for this chapter.

In this stage, the building user and the building manager are in charge of the correct use of the building and its technologies.

In many cases, there is a deviation between the expected and the real performance of a building or technology. This issue could appear because of several reasons like bad quality of design and construction, unexpected performance of a technology, but also due to an inappropriate use.

MPs demonstrate that the monitoring of a building is crucial to identify the existence and the reasons of the possible deviations, to calibrate technologies, to identify anomalies and to correct and improve the user behaviour. For this reason, it is recommended the elaboration of a Measurement and Verification (M&V) plan. Besides standards, protocols and trained staff, PA also needs user awareness and utilization of new approaches and technologies like Building Energy Management Systems (BEMS).

From the MPs results, it can be emphasized the relevant information provided on the International Performance Measurement and Verification Protocol (IPMVP [21]) [10], the description of an Energy Team (ET) to collect data and ensure the right performance of the building [12] and the main considerations on centralized energy management and ICT [22].

3. Overview of Indicators to implement public Energy Efficiency projects

When it comes to EE projects, there are innumerable list of indicators produced by research projects and other initiatives. In this context, selecting the most appropriate ones and using them properly become a real challenge for the PAs who want develop EE projects in the most effective way and for the different process steps (as shown in the previous chapter).

In the analysis of the 10 MPs here implemented, 151 indicators were identified as possible useful indicators. Some of they were recurrent among the stages of the projects.

It is recommended for PAs with low resources and availability of data to select adequate Key Performance Indicators in order to find the right balance between importance and effort.

3.1 Type of indicators

In order to classify the 151 MP final indicators in line with the main topics of the MPs, 4 categories were defined, as shown in Graph 1:

Graph 1. Indicators by category of issue (source: own elaboration)
In the case of the Energy indicators, they can be included within the category of Environmental indicators, but a separated category has been created due to its relevance within the MPs. For the different categories of indicators, in order to be more precise, other subcategories are possible as shown in Graph 2, Graph 3, Graph 4 and Graph 5.

Concerning the subcategories, it can be noticed that some of them collect a relatively large number of indicators. More concretely, in the Energy issue there are numerous indicators for the different energy uses, thermal comfort and Renewable Energy production. Concerning the Environmental issue, most of the indicators are related to Indoor Environmental Quality (IEQ) and CO\textsubscript{2} emissions. While in the Financing issue, it is relevant the large number of indicators allocated in costs savings and energy costs. Sometimes, especially in the main categories, the indicators are equivalents but they are given with different procedure of calculation (e.g. annual consumption versus daily consumption).

### 3.2 Recurrent indicators

From the previously introduced, there are 13 indicators that are mentioned at least by 4 MPs and, because of that, should be specifically emphasized. These are:

- **Energy:**
  - Annual final energy consumption for heating
  - Annual final energy consumption for cooling
  - Annual electricity consumption
  - Annual consumption of fossil fuel
  - Annual generation of Renewable Energy

- **Environmental:**
  - Total annual avoided CO\textsubscript{2} emissions
• Economic:
  o Annual savings of total energy-related operational cost
  o Annual electricity cost savings
  o Annual fossil fuel cost savings
  o Simple Payback period for each renovation scenario
  o Electricity price
  o Natural Gas price
  o Total investment cost for each renovation scenario

Heating, cooling and Electricity consumption (Energy), and their equivalent indicator on costs (Economic) are clearly particular matters taken into account by the MPs. Besides, in the Environmental category, it appears the CO\textsubscript{2} emissions, which actually is a mandatory indicator when implementing a SEAP or SECAP and is usually the key indicator for the building certification mandatory procedures. On the other hand, it could be strangely noticed that the indicator of Primary Energy (PE) is been mentioned but it is not among the most mentioned ones, even it is a compulsory indicator used in the national transposition of the EPBD for the definition of nearly Zero Energy Buildings (nZEB).

Other recurrent indicators, but not included in this list were related indoor comfort.

3.3 Lack of indicators

Looking at the different EE project stages, it is evidenced in Graph 6, the lack of indicators for “Stakeholders’ involvement”, “Procurement”, “Implementation”, “Commissioning” and “Awareness, training and communication”.

![Graph 6. Indicators by building stages (source: own elaboration)](image)

For some cases (procurement and commissioning), these lack of specific indicators would be mainly due to the MP reference on existing and well-established methodologies (i.e. the IPMVP protocol), which introduce their own indicators. Nevertheless, for some other steps (Stakeholders’ involvement, Implementation and Awareness, training and communication), the lack of introduced indicators could become a real constrain on these steps implementation, and could result in a real delimitation of the overall process. Because of this, it is strongly recommended to define too, for these steps, specific indicators that help to establish reliable goals and monitor the success.

4. Overview of tools to implement public Energy Efficiency projects

The implementation of the above mentioned stages of an EE project by a PA requires guidelines and detailed methodologies, staff with the right capacities and effective supporting tools. Regarding this last aspect, the 10 MPs have elaborated several tools aiming at helping PA in implementing their EE projects. The following 15 tools elaborated by the MPs are free and cover 6 out of the 11 stages of EE Projects:
### Table 1. Tools elaborated by Modular Projects covering building stages (source: own elaboration)

| Name of tool, project and description of the tool. | Purpose/Target | Energy audit | Stakeholders’ involvement | Financing | Design tendering | Planning | Procurement | Implementation | Commissioning | Awareness/Training/Communication | Monitoring/Usage |
|-----------------------------------------------------|----------------|--------------|---------------------------|-----------|-----------------|---------|-------------|----------------|--------------|-----------------------------|-----------------|
| **MyGIS** [23] (IMPULSE): Two web applications to assist and to map the PBs typologies and energy profiles. |               |              |                           |           |                 |         |             |                 |              |                             |                 |
| **Building typologies and performance indicators platforms** [24] (IMPULSE): Excel platform for buildings’ classification and estimation of energy performance indicators. |               |              |                           |           |                 |         |             |                 |              |                             |                 |
| **Networking Forum** [25] (IMPULSE): Forum aiming at supporting stakeholders, creating community and promoting IMPULSE events. |               |              |                           |           |                 |         |             |                 |              |                             |                 |
| **Financial scheme evaluation tool for gradual building energy renovation planning** [26] (IMPULSE): Tool to stimulate possible financing of renovation plan. |               |              |                           |           |                 |         |             |                 |              |                             |                 |
| **Analytic Database** [27] (PrioritEE): Compilation of technological solutions to improve EE and renewable generation in Municipal PBs. |               |              |                           |           |                 |         |             |                 |              |                             |                 |
| **Decision Support Tool** [28] (PrioritEE): Tool to help authorities to evaluate possible energy savings by applying EE measures in PBs. |               |              |                           |           |                 |         |             |                 |              |                             |                 |
| **EduFootprint Calculator** [29] (EduFootprint): App for students and teachers to experiment with the evolution of the schools’ CO₂ footprint and parameters of energy and resources’ consumption. |               |              |                           |           |                 |         |             |                 |              |                             |                 |
| **EduFootprint Platform** [30] (EduFootprint): Platform that collects best practices of energy management and reduction of carbon footprint. |               |              |                           |           |                 |         |             |                 |              |                             |                 |
| **Pre-audit web tool and Best Available Techniques Database** [31] (TEESCHOOLS): Set of a simplified energy and environmental audit tool and best available techniques for efficient buildings. |               |              |                           |           |                 |         |             |                 |              |                             |                 |
| **NEW FINANCE Platform** [32] (NEW FINANCE): Platform with good practices of innovative financial models for EE measures in PBs and with the networking area. |               |              |                           |           |                 |         |             |                 |              |                             |                 |
| **SISMA SET TOOL** [33] (SISMA): Innovative tool to quickly perform the energy and economic-financial assessment of energy savings measures. |               |              |                           |           |                 |         |             |                 |              |                             |                 |
| **EPC Simulation Tool** [34] (STEPPING): Tool to find different investment scenarios that would balance the public and private interest in making the investment. |               |              |                           |           |                 |         |             |                 |              |                             |                 |
| **Funding Tool** [35] (SHERPA): Tool to analyse and identify the best financial possibilities of Energy Renovated Building projects. |               |              |                           |           |                 |         |             |                 |              |                             |                 |
| **Information System Tool** [36] (SHERPA): Tool to provide a common Information System for the collection and analysis of building data of PAs. |               |              |                           |           |                 |         |             |                 |              |                             |                 |
| **Web Platform** [37] (ENERJ): Web platform to support authorities and enterprises being aware of the energy characteristics of the local PBs and actions to be included in the SEAPs. |               |              |                           |           |                 |         |             |                 |              |                             |                 |

In the case of tools developed by the MPs, the uncovered stages are Design tendering, Procurement, Implementation, Commissioning, and Monitoring and Usage. Beyond that for some stages it would be comprehensive the inexistence of new MP developed tools (considering the scope or the market existing ones), it should be emphasized that Procurement and Commissioning are the two stages in which no indicator or tool has been mentioned or elaborated.
5. Conclusions
The present analysis has been done to collect and analyse results of 10 MPs. The MPs are focused on the topic of EE in PBs and their results aim at finding answers and supporting PAs when implementing EE projects.

To gather these results, it has been followed the Building Life Cycle approach, in which 11 building stages are proposed. The importance of each stage can vary from project to project, but the first aspect to take into consideration is the importance of the process as a whole, recognizing the particular relevant stages for each project, which can have a crucial impact in the final aim of the project. This holistic approach has to be considered by PAs from the very beginning.

Following this first consideration, the implemented analysis aims at finding the results of MPs covering these stages for new and retrofit projects, or even plans considering broader infrastructure levels (e.g. neighbourhoods). In order to find these answers and overcome existing barriers (e.g. technical, financial, knowledge…), MPs have elaborated several results like methodologies, tools and indicators. The consortium of MPs usually includes research centres, universities, network associations, energy agencies and PAs, which really know the problems to be faced in their daily work and know well the existing lack of supporting material.

The analysed methodologies in some cases are already well known, but the added value can be the contextualisation to the Mediterranean territory, the application in the public ownership and the holistic vision. In addition, some methodologies propose new ways of solving the barriers (e.g. joint SEAPs). The identified and analysed methodologies within the study cover most of the building stages, but some of the stages appear to be neglected and with a lack of results. This is the case of the “Implementation” and “Commissioning” stages, which for several analysis and real cases have been demonstrated their relevance. On the other hand, other stages like “Energy audit”, “Design Tendering”, “Procurement” or “Monitoring and Usage” have several methodologies, which can be overlapping or complementary, approaching the issue from different perspectives.

Other aspect to be stressed after the analysis is the special focus on EPC projects. Many results, especially the results of those projects treating the financing topic, provide methodologies and guidelines to implement EPC projects. In a first study within the MEDNICE project, it was noticed that most of the pilot projects and best practices of financing schemes within the MED programme were EPC projects. This financial scheme is not always easily applicable for PA, but it is frequently used in pilots of research and cooperation projects. These projects offer the possibility to learn how to apply these schemes, to elaborate tools and methodologies supporting its dissemination, and to learn from other experiences. EPC is especially interesting for PA with a lack of cash flow because the initial investment has to be done by a third party.

Concerning the use of indicators, it is recommended for PAs with low resources and availability of data to select adequate Key Performance Indicators in order to find the right balance between importance and effort.

Some stages have a big number of indicators and some of them are recurrent and are mentioned by several projects. These recurrent indicators like Total annual avoided CO₂ emissions are compulsory for certifications or plans (e.g. SEAP). Besides, various indicators are covering many aspects and stages, thus allowing a more holistic vision. However, it is needed to deselect the appropriate ones depending on the type of project and resources.

The analysis on the indicators shows clearly that here there is also a lack of indicators for some stages, in particular in “Stakeholders’ involvement”, “Procurement”, “Implementation”, “Commissioning” and “Awareness, training and communication”. The reason behind this lack could be the existence of well-established methodologies, like in the “Procurement” stage. Nonetheless, in other stages, like “Stakeholders’ involvement” or “Awareness, training and communication”, the lack of introduced indicators could become a real constrain.

The MPs have elaborated 15 tools, which are free and available online. These tools can be very useful in some stages for the implementation of public EE projects. Besides, several indicators are integrated in the tools, thus allowing the joining of different stages in a continuous process.
Tools were analysed, but only 6 out of the 11 building stages are covered by the usefulness of the tools. Nevertheless, these can support PA in specific cases, like analysing the PB stock, engaging stakeholders, assessing the needed sources to finance EE projects, or listing possible EE measures to be implemented in PBs.

Lastly, it has to be underlined that specific stages have a clear lack of methodologies, tools and indicators. Specially the “Implementation” and “Commissioning” stages. This could cause that some PAs may have difficulties when following the construction works in the building site or in the acceptance certificate of the building after the finalization of works. Nevertheless, the lack of tools for specific stages is not as relevant as the lack of indicators. Not all the stages could require supporting tools, but the indicators and methodologies are needed to approach properly the stage and to assess the success of the objectives. Concluding, it is recommended to highlight the achievements of the MPs and to ensure the use and accessibility of these results to their potential final users, i.e. PA.

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