MEDNICE
MED programme Network for an Innovative Cooperation Energy Efficiency

D. 4.3.1 Technical paper and lessons learned report – MED Lessons learned

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Deliverable D.4.3.1 Technical paper and lessons learned report – MED Lessons learned

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PP5	Region of North Aegean – RNA

Disclaimer

This report considers a survey implemented to the Modular Projects and the Modular Projects' deliverables available on-line up to June 2019.

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List of Abbreviations

EB Community – Efficient Building Community
EE – Energy Efficiency
EED – Energy Efficiency Directive
EPBD – Energy Performance of Buildings Directive
ESCO – Energy Service Company
FE – Final Energy
MoU – Memorandum of Understanding
MP – Modular Project
PA – Public Administration
PP – Project Partner
PB – Public Building
SEAP – Sustainable Energy Action Plan

Executive Summary

Ten Modular Projects (MPs) within the Efficient Buildings Community have elaborated a large number of results aiming at supporting Public Administration (PA) in the implementation of Energy Efficiency (EE) projects. These results approached the challenge from different perspective like overcoming the lack of supporting material and tools, facilitating the financing of the projects or focusing on specific type of buildings (schools).

During the project implementation these results, which can be tools, methodologies or guidelines, have been tested with the realization of pilots in order to assess and improve the results. In this way, after the implementation of projects and the pilots, some important considerations from the MPs' coordinators have been collected in a survey, and main conclusions have been drawn in this report.

Chapter 1 has been focused on giving an overview of the main MPs' outcomes, which were previously analyzed in MEDNICE Technical Papers. In particular, the chapter shows main results on the topic financing, like financing barriers, stakeholders, financing schemes and best practices, and results on the topic of tools and methodologies, like the supporting material elaborated to guide PA in the different circular project stages, starting from the first stage (Purpose and Target) to the final one (Monitoring and usage).

In chapter 2, the 14 main reference pilots, which were identified by 7 MPs' coordinators (survey in Annex I), have been mapped and shortly described. Besides, this chapters collects the impact of the MPs in the MED area by some key indicators like total number of pilots, total surface of refurbished PBs, annual primary energy savings o signed agreements between projects or administrations.

Chapter 3 collects main considerations from the MPs' coordinators and previous technical papers regarding the MPs' strengths, weaknesses and achievements. These aspects have been analyzed and showed according to two main categories: 1) tools and methodologies to implement EE projects, and 2) financing EE projects. Here it has been remarked the strong points of the tools like flexibility and accuracy, and also their lacks like limitations and unclear compatibility with other softwares. Other remarkable considerations in this chapter is the lack of financing schemes, data, knowledge and awareness, existing barriers and differences among the different countries, and also the positive impact of some results in the territory.

The conclusions chapter merges the main considerations of previous technical papers with the opinion of MPs' coordinators, taking into account a final global vision of their projects and the remaining needs in the MED area.

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 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. It also stresses that governments shall undertake an exemplary role in the energy retrofit of their countries' building stock. Moreover, it has been mentioned in several occasions that lack of knowledge is one of the main barriers for the uptake of EE projects. This is considered a general issue, but it becomes especially relevant for the Public Administration (PA), which has to be seen as a referent for the society.

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 and for PA, who define EE policies and strategies, specifically in the Mediterranean region. The community has defined and implemented several training activities aiming at sharing the required knowledge, improving capacities and increasing awareness of key stakeholders.

The Activity 4.3 *"Convergence of EEB MED outputs through technical papers and lessons learned reports"* (Analysis and harmonization) of MEDNICE Project aims to systematize knowledge from the ten Modular Projects (MPs) (Figure 1) and to help find technical answers to common identified cross-cutting priority issues.

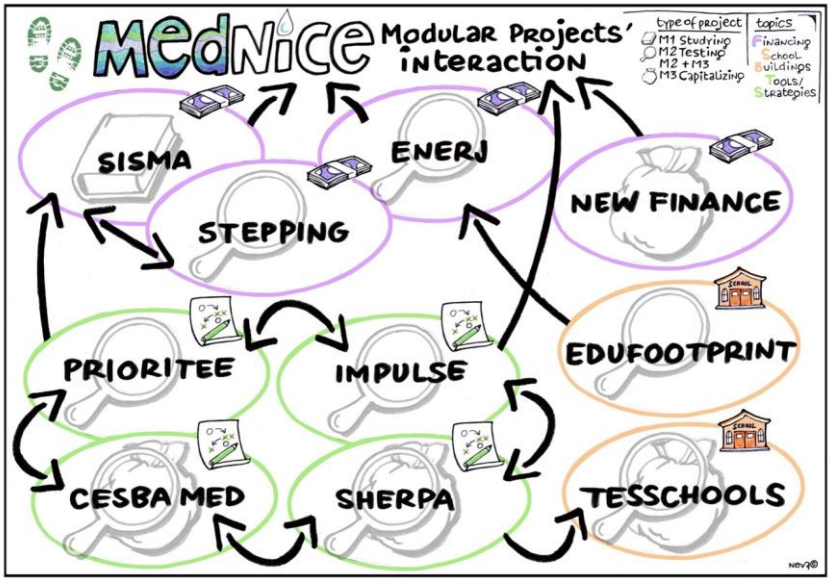


Figure 1. MPs under the umbrella of MEDNICE Project (Source: MEDNICE Project)

In order to achieve the objectives of the Activity 4.3, it is foreseen the elaboration of several reports which will collect EE challenges and obstacles in the Mediterranean PBs and will provide solutions and identified gaps.

The present report (D. 4.3.1. Technical paper – MED Lessons learned) is focused on the conclusions obtained after the implementation of the projects' pilots, in which the generated outputs of the MPs were proven. Thereby, this documents provides the main difficulties found by the MPs' partners, the main achievements and the remaining needs to replicate these pilots. Besides, the report shows main figures of representative pilots.

For its realization, it has been considered the results of a survey on the pilots' implementation answered by 7 out of the 10 MPs (Annex I). Moreover, it has been provided an overview of the main MPs' results, which were analyzed in previous technical papers, and these have been considered to identify the lessons learned after the implementation of the MPs.

1. MED Modular Projects' outcomes

As mentioned above, the MPs have elaborated several results addressing several issues related with the topic of EE in PBs. These results have been systemized, capitalized, analyzed and harmonized in the present technical papers.

On the background, and as summarized in the technical paper on topic of Financing EE[1], the following MPs' results related to financial topic have been achieved:

- Detection of different financial barriers to EE, including structural, technical, knowledge or other barriers.
- Identification and analysis of stakeholders in six main categories (Energy policy makers and planners, Suppliers of energy related services, Energy users, Experts, Civil society organizations and Citizens), according to four types of objectives (Economic, Environmental, Social and Political).
- Summarized information on available financial schemes at European level:
    - European Structural and Investment Funds (ERDF, Cohesion Fund).
    - European Funding Programmes (LIFE, Horizon2020…).
    - European Project Development Assistance (ELENA, JASPERS, etc.).
    - Financial Institutions Instruments (EFSI, EEEF, etc.).
    - Energy Service Contracting (Figure 2) (Energy Performance Contracting, Energy Supply Contracting, etc.).
    - Alternative Financing Schemes (Crowd-funding, On Bill Financing, Green Municipal Bonds, etc.)
- Summarized information on available financial schemes at regional and national level.
- Definition of best practices for financing EE, including case studies and dissemination material.

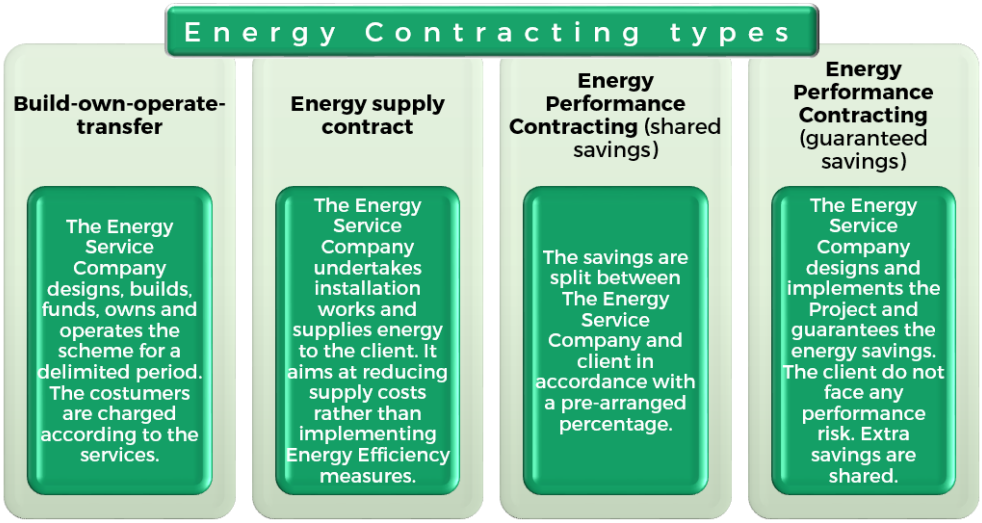


Figure 2. Different energy contracting types (source: MEDNICE)

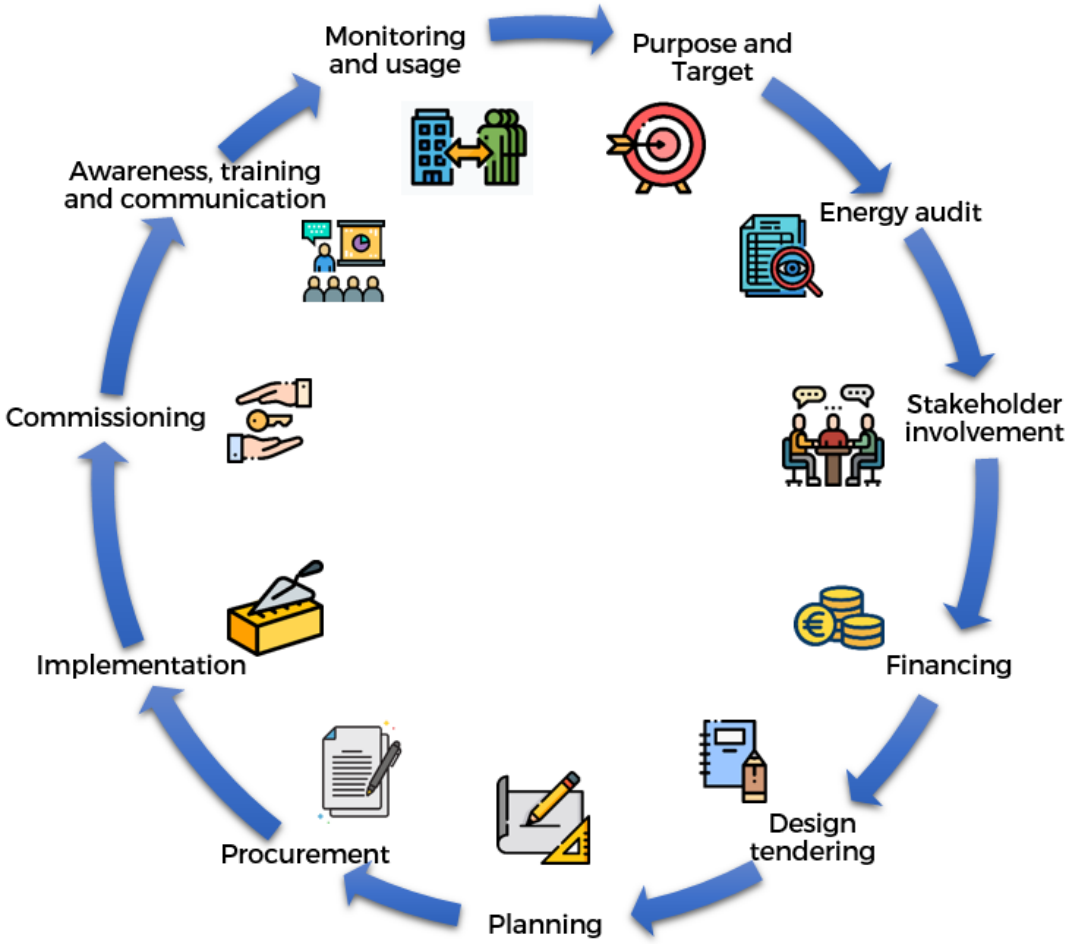
[1] D4.3.1. Technical paper and lessons learned report – MED Financing schemes and barriers. https://efficient-buildings.interreg-med.eu/fileadmin/user_upload/Sites/Efficient_Buildings/horizontal_project/Deliverables/4.3.1_Tecnical_paper_and_lessons_learned_report_Financing_EE_01.PDF

At the other hand, and regarding tools, methodologies and indicators developed by the 10 MPs, results were analyzed and classified in a circular approach according to 11 established stages for EE projects[2]:

1. Purpose and Target, to define the building project and the energy targets of the building project.
2. Energy audit, to stablish the current conditions and the best refurbishment options.
3. Stakeholder involvement, to detect main stakeholders and ensure participation to gather information, increase support and reduce resistance.
4. Financing, to find and adapt available sources, funds or models for financing EE measures.
5. Design tendering, to clearly define the framework conditions of the call.
6. Planning, to define the future EE project and minimize defects during the construction and usage phase.
7. Procurement, to find and agree the terms of services, goods or works under national, regional and/or local regulations.
8. Implementation, to ensure the proper construction of the sustainable requirements described in the planning.
9. Commissioning, to prepare the building or interventions for a correct operation and ensure the defined goals accomplishment.
10. Awareness, training and communication, to prepare and teach actors involved in the building life cycle, from technicians and politicians to users.
11. Monitoring and Usage, to ensure a correct user behavior and to detect malfunctioning systems reducing the efficiency of the building.

From there, different tools have been developed by the MPs, which aim at supporting the PA in the implementation of EE projects. The Catalog of Tools provides a short description of 15 tools elaborated by the MPs and identifies the different projects stages, in which the tools can provide a support to the PA, as shown in Figure 3.

[2] D4.3.1. Technical paper and lessons learned report – MED Tools, methodologies and indicators. https://efficient-buildings.interreg-med.eu/fileadmin/user_upload/Sites/Efficient_Buildings/horizontal_project/Deliverables/4.3.1_Tecnical_paper_and_lessons_learned_report_MED_Tools__Methodologie....pdf



IMPULSE – MyGIS
IMPULSE – Building typologies and performance indicators platform
IMPULSE – Networking Forum
IMPULSE – Financial scheme evaluation tool for gradual building energy renovation planning
PrioritEE Analytic Database
PrioritEE – Decision Support Tool
EduFootprint –Calculator
EduFootprint –Platform
TEESCHOOLS – Pre-audit web tool and Best Available Techniques Database
NEW FINANCE – Platform
SISMA – SET TOOL
STEPPING – EPC Simulation Tool
SHERPA – Funding tool
SHERPA – Information System tool
ENERJ – Web platform

Figure 3. Tools developed by Modular Projects by project stages (source: MEDNICE)

Some of the above mentioned methodologies and tools were tested by the MPs in pilot territories to verify the usefulness and applicability of the projects' outcomes. On this regard, a survey answered by 7 MPs show a detailed description of the tested outcomes, in Annex I. In particular, the 7 MPs tested the following 3 methodologies and 4 tools:

- IMPUSE Project: Transnational methodology for the fast and easy development of affordable EE action plans for PBs.
- SHERPA Project: Transnational, holistic and peer-to-peer methodology to work on the main barriers related to Energy Renovation of Buildings strategies in PBs.
- STEPPING Project: Common methodology for EPC implementation in MED Area local administrations.
- PrioritEE Project: Set of tools developed to support local administrations in managing energy consumption in municipal PBs.
- EduFootprint Project: Calculator assessing the footprint of schools considering direct and indirect consumption and identified possible solutions to reduce it.
- TEESCHOOLS Project: Web tool for conducting simplified energy audits and checked the economic feasibility of refurbishing to nZEB level existing schools.
- ENERJ Project: Web platform for local authorities and enterprises to check up on the energy characteristics of the local PBs, and the actions to undertake.

2. Pilots implementation in the MED area

2.1. MED reference pilots

The MPs have tested some of their outcomes in various territories of the MED area. By answering a survey, 14 of the most representative pilots and best cases of 7 MPs are described below with detailed information in Annex I and mapped in Figure 4.

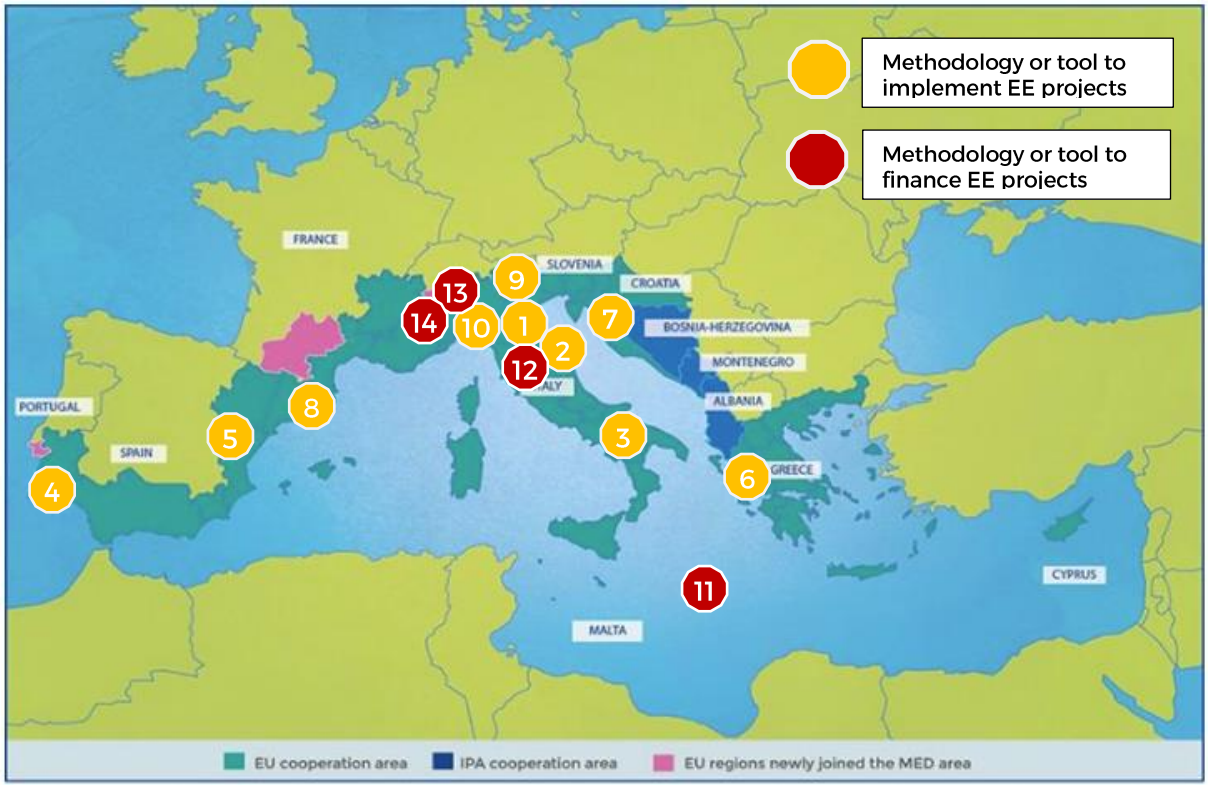


Figure 4. Best cases of 7 Modular Projects in the MED area.

As described in the Table 1, 10 out of the 14 most representative pilots were supporting the PA in the implementation of EE projects (yellow circle) by specific tools addressing one or various project stages, while 4 of them were focus on supporting the financing of these kind of projects (red circle).

Table 1. Main features of reference Modular Projects' pilots

No.	Project	Type of PBs	Main objectives of the pilot	Main Measures
1	IMPULSE	Gym of School	Improve EE of the building by testing the IMPULSE KPIs' platform.	- Replacement of lighting and sensors, - Dimmer system.
2	IMPULSE	Gym of School	Improve EE of the building by testing the IMPULSE KPIs' platform.	- Replacement of lighting and sensors, - Dimmer system.
3, 4, 5, 6 and 7	PrioritEE	Municipal PBs	Capacity building and support tools to identify EE measures, by workshops, local living labs and training on PrioritEE toolbox.	No physical measure was implemented, but identified: - Envelope renovation, - Window, cooling and heating replacement, - Integration LED, PV and Solar thermal.
8	SHERPA	School building	To elaborate a feasibility study for energy renovation.	No physical measure was implemented, but proposed: - Replacement of lighting, - Improvement of heating, - Use of Renewable Energies.
9	EduFootprint	15 Schools	Test an integrated energy strategy with a LCA approach, consisting in the elaboration and implementation of EE practices in Sustainable Energy Action Plans (SEAPs).	No physical measure was implemented.
10	TEESCHOOLS	5 Schools	Test and validate a tool for simplified energy audits, calculate ecological footprint, develop energy supply models, implement renovation plans, design e-learning platforms, support municipalities to obtain funding to implement energy improvement actions.	No physical measure was implemented.
11	ENERJ	N.A.	The Pilot is still in the implementation phase. At this point, data are being uploaded to the web platform and results will be available in later months.	A description of the Web Platform features: General data, geometric data and technical data, and SEAP actions.
12, 13 and 14	STEPPING	Schools, offices, gyms and research center	Intensive Energy refurbishment with EPC tender.	- From new systems to envelope insulation interventions, - Energy management system.

As detailed in the Annex I, in the selected 14 best pilots, the total number of buildings with estimated or implemented physical measures is 313 buildings, for which it was foreseen a total investment of about 25 Million €. This makes an average amount of about 80.000 € investment per building. Moreover, the average percentage of energy savings after the realization of EE measures is about 53% per building. Nonetheless, looking at the detail, it can be noticed that the magnitude of interventions can vary a lot from one to another.

2.2. Key Impact Indicators of Modular Projects

In the previous section, the 14 most relevant pilots implemented by 7 MPs according to a survey were introduced. Nonetheless, other pilots were implemented in the MED area, from which no detailed information has been provided in this report. Nevertheless, these are having a great impact in the territory, either through the refurbishment of PBs, generation of clean energy, agreements with the municipalities or involvement of stakeholders in activities.

The global impact of the overall pilots of the 7 MPs is reported with some main indicators in Table 2.

Table 2. Key Impact Indicators of Modular Projects

Indicator	Units	IMPULSE	PrioritEE	SHERPA	EduFootprint	TEESCHOOLS	ENERJ	STEPPING
		Value	Value	Value	Value			
Number of Pilots implemented within the project	n.	6	5	100 (viability studies)	60	35	1 Web platform	158 buildings
Total square meters refurbished	m^2	-	Not applicable	1.370.229,22				256.549
Total investments in EE projects achieved	€	Approx. 240.000	129 58 512	53.479.149,45				17,4M
Total annual avoided CO_2 emissions	$Kg/m^2/year$	Approx. 35%	Not available	11,88				About 1.600.000
Total Annual Primary Energy savings	$KWh/m^2/year$	Approx. 35%	Not available	45,26				167
Annual generation of Final Renewable Energy	$KWh/m^2/year$	14.500	Not available	9,08				
Number of stakeholders participating in training activities within the project		Approx. 180	256	156	1.646	160		Not yet available
Number of signed Memorandums of Understanding (MoUs) or agreements with other projects or institutions within the project		2	0	(3 projects + 50 municipalities)	28			(1 project + 67 municipalities)
Other relevant indicators: _____				150 (Observers)			40.000€ (creation)	25%

3. Strengths, Weaknesses and Achievements of Modular Projects and pilots' implementation

The MPs are addressing specific issues in the implementation of EE public projects, through the development of tools, methodologies or financial schemes, regarding to the different detected phases for EE implementation actions. In detail, the Project Partners (PPs) of the MPs are realizing numerous activities like developing tools, indicators, methodologies, guidelines, technical and policy recommendations, workshops with experts or training events. Besides, as already underlined in this report, several MPs' outcomes have been tested in order to assess and improve them. The tests of these outcomes is not always an easy task due to unexpected problems or barriers, internal or external to the project itself that PPs did find.

By the implementation of addressed surveys to 7 MPs' coordinators and conclusions of previous MEDNICE technical papers, in this chapter, the strengths, the weaknesses and the achievements of the MPs are jointly analyzed from a global perspective as Efficient Building Community and according to two main topics (Methodologies and tools, and Financing schemes and solutions).

The main objectives of this section is to make weak and strong points visible, for potential replications in future projects, and to give advice to PAs willing to implement and use these results in their territory, thus avoiding same mistakes and enhancing the benefits. From there, in the following tables 3 and 4, the different detected Strengths, Weaknesses and Achievements are summarized.

As described in Table 3, the introduced new tools seem to be useful, easy to use, accurate and flexible, and provide great variety of measures, but having some limitations like difficulties introducing some technologies or compatibilities with other softwares. Besides, update and maintenance is needed.

In some cases, it has been noticed lack of building data, knowledge and awareness among PAs, with the exception of the school community.

Other points to be stressed could be the big amount of results for some projects' stages, positive contribution to the implementation of SEAPs, but also language and legal barriers between the different countries and high cost of some interventions.

Concerning the results supporting the financing of EE projects shown in Table 4, it can be underlined the big efforts done to increase knowledge and awareness of stakeholders about financing schemes, and EPC in particular, as well as the interesting approaches that have been used like bundling buildings for EPC projects. Nonetheless, finding and combining available financing options is still a barrier and there is a need of a common MED EPC model and standardized alternatives.

Lastly, several investment plans have been elaborated and best practices disseminated, and information of schemes, tools and models are available.

Table 3. Strengths, weaknesses and achievements of Modular Projects' tools and methodologies to implement Energy Efficiency projects.

Strengths, Weaknesses and Achievements - Methodologies and tools to implement EE public projects	
Strengths	Weaknesses
Tools implementation: - Support PAs in their EE action plans by provision of tools and platforms. - Advanced decision-making tools which support policy and decision makers in the prioritization of EE projects for buildings and drive investments. - Tools are relatively easy to use, flexible, quick, open source and provide accurate results with provision of technical data of PBs. - Benchmarking of interventions or measures, and variety set of options. - Some projects have been able to produce tools to meet the arisen needs. - Partners were finally able to insert reliable data on the web platform. Awareness and knowledge: - Elevation of the knowledge and skills of public technicians and energy managers to manage large samples of buildings for EE action plans. - Interest and involvement of the school community. - In schools, existing awareness on the environment preservation and impact of our actions, and support given by school managers. Other: - Projects including different profiles of institutions like PAs, energy agencies, universities and research centers. - The methodologies cover most of the building stages of EE projects. - Some project stages have several methodologies, which can be overlapping or complementary, approaching the issue from different perspective. - Big amount of indicators covering many aspects and project stages, thus allowing a more holistic vision and joining different stages. - Positive impact of cheap and easy to apply energy solutions. - Multinational energy baseline. - Alignment of project with local SEAPs.	Tools implementation: - Limitations of the tools, like mixed technologies for same building, and unclear compatibility with other softwares. - Update and maintenance of tools and methodologies after project conclusion. Data and information: - Lack of data of buildings, hard-to-find it, high amount of input information is required for the tools, lack of FAQ section in tools. - Some user's guides of the tools are only in English language and there is language limitation among pilot's territories. - Lack of detailed user's guides for tools, some are complex and require previous knowledge, and visualization could be improved. Awareness and knowledge: - Low familiarization of authority partners with typologies of PBs. - Diverse level of expertise and know-how across the PAs in the pilots. - Social aspects and indicators are not considered enough. - Initial resistance of municipal technicians, lack of human resources to EE management and difficulties to contact building managers. Other: - Administrative delays of procurements and pilots implemented in later stages. - National legal frame of each involved country. - Technical interventions are sometimes expensive or the building too old. - Selected buildings are not always representative of the building park. - A few project stages have been neglected with lack of results, like "implementation" and "commissioning" stages. - Lack of indicators for some project stages, which are needed to fix and assess objectives.

Strengths, Weaknesses and Achievements - Methodologies and tools to implement EE public projects
Achievements
Implementation of EE projects and plans: - Big amount of energy savings thanks to EE interventions. - Improvement of adopted levels of retrofit. - Development of local action plans. Knowledge and awareness: - Promotion of energy conservation and EE behaviors. - Enhancement of competence of municipal technicians. - Agreement among municipal officers on the great potential of the developed tool. - Training system to improve the knowledge of EE in buildings of the people responsible of the energy management of buildings. - Inclusion of aspects beyond the energy issue. - Many municipalities expressed interest in continuing using the developed tools. - Schools have identified most relevant areas to improve with a life cycle perspective and have learned to plan some actions to reduce footprint. - Positive social-economic impacts like sustainable governance for policy making, support for the growth of local communities (involvement of students, teachers and other stakeholders), awareness of climate change, strengthening of the education community. Other: - Adoption of an additional common methodology to produce realistic baseline energy performance of PBs. - In-depth characterization of energy consumption of PBs. - Methodology based upon a dual approach, where theoretical knowledge is combined with a more practical approach. - The pilots contributed to standardize the methodology for making energy audit and to align the tool results with the energy audits. - The developed tools respond to the weaknesses in the system regarding the production of Energy Renovation projects by PAs. - The web-platform as a useful tool for municipalities to have a real picture of energy conditions of their buildings, with up-to-date information and therefore decide the priorities of energy refurbishment and the appropriate financing sources.

Table 4. Strengths, weaknesses and achievements of Modular Projects' results on financing Energy Efficiency projects.

<table>
<tr><th colspan="2">Strengths, Weaknesses and Achievements - Financing EE public projects</th></tr>
<tr><th>Strengths</th><th>Weaknesses</th></tr>
<tr><td>Knowledge and awareness:
- Training courses and meetings with stakeholders contributed to raise the competences on EPC.
- Involvement of authorities by signing MoU o letters of agreement.
- Public procurers and market players beyond the MED area have also been reached,
Other:
- In some more mature contexts bundling buildings of several Municipalities was an affordable option
- A common step by step procedure to guide the PP in setting up the conditions for EPC investments was a valuable and effective result.
- EPC is not a frequently used scheme in MED area, thus these projects offer the possibility to learn about these schemes and to elaborate results supporting its dissemination.</td><td>Funds, subsidies and incentives:
- Finding the necessary funds to implement the projects at a later stage due to budget constrains in many EU countries.
- National incentives and subsidies conflicting with EPC have been made available, making EPC less attractive for municipalities.
Financing models and standardization:
- Barriers to work out and adopt a "common MED EPC model".
- Need for the development of standardized financing alternatives.
- Different stage of EPC market experience in partner's countries.
- Different legislative and framework conditions of each region, also with standard documentation.
Other:
- Lack of data of buildings and financing sources.
- Lack of awareness and knowledge concerning EPC, existing ESCOs, savings guarantees and energy supply market.</td></tr>
<tr><th colspan="2">Strengths, Weaknesses and Achievements - Methodologies and tools to implement EE public projects</th></tr>
<tr><th colspan="2">Achievements</th></tr>
<tr><td colspan="2">Implementation of EE projects:
- 16 Investment Plans were delivered, 2 EPC tenders have already been achieved and other 3 are expected to be launched.
- Positive numbers will be even higher as some activities are still running.
- Dissemination of best practices for financing EE projects.
Tools and methodologies:
- Web-platform for municipalities to have a real picture of their buildings, with information to select measures and financing sources.
- Tool and methodology able to assess the needed sources to finance EE projects or make EPC more attractive to the market.
- Methodology for the identification and mapping of stakeholders need to finance EE projects.
- Description of different financing schemes at EU, national and regional level, as well as alternative financing schemes like EPC.
- Dissemination of 2 EPC models.</td></tr>
</table>

Conclusions

As introduced in the MEDNICE Technical Papers, the MPs have elaborated important results. Some of them have be tested by project partners, but mainly PAs. These institutions are aware of the main barriers to implement public EE projects, therefore their involvement and collaboration in the project is crucial. Nonetheless, after the project implementation, there are still some remaining needs and barriers to overcome. Some main achievements have been already reported and remarked in this report and other MEDNICE technical papers, but the real and full impact of some projects in the territory will require more time to be recognized.

In general, the developed tools and methodologies have been successfully implemented, as remarked by project coordinators. Some of the methodologies and tools are seen as fast, user-friendly, easily replicable and accessible. Besides, it has been also highlighted that the usefulness of some tools requires accurate, complete and reproducible data collection, as well as an active involvement of the actors. Furthermore, and as remaining needs in MED area, it has been highlighted the need of common methodologies and tools, the translation of results in all MED languages, the inclusion of social aspects, the implementation of local EE policies, adequate and simple tools for local decision makers, support in capacity building for some public stakeholders, especially for small local authorities, characterization of municipal public stock and involvement of stakeholders, which is especially crucial. Besides, it is needed an update and revision of the developed tools, explanations on their use, their extension to other kind of buildings and territories, and replication of experiences.

Concerning financing EE projects, which is one of the biggest barriers for the PAs, even so a huge effort have been made to develop specific models and to feature existing mechanisms, there are also some remaining needs to be faced, like the combination of technological solutions with finance advice, the financing schemes able to make PBs refurbishment to nZEB standard economically convenient, the stable legal framework for EPCs, the reduction of complexity of EPC and increase of skills, the pooling small projects to gain interest of the EPC market or the highlight of the social benefits of rehabilitations, which maybe are not interesting for the market. Moreover, it is remarked the need of raising EPC awareness by campaigns, creation of EPC technical assistance for public sector and make accessible the combination of subsidies with European funds.

Finally, it must be said that, even the achieved results here mentioned are very relevant to facilitate the transformation of PBs in more efficient buildings, there is still a lack of results for some specific projects' stages, availability of financing and adequate training for stakeholders. It is especially remarkable too, the need of visualization of the achieved results and their capitalization and transferability beyond the pilot territories.

References

[1] E. P. a. T. C. o. t. E. Union, *Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings,* European Parliament, 2010.

[2] E. P. a. t. C. o. t. E. Union, *Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency,* European Parliament, 2012.

[3] E. R. D. Fund, "Efficient Buildings- Interreg MED," [Online]. Available: https://efficient-buildings.interreg-med.eu/. [Accessed 3 June 2019].

[4] E. R. D. Fund, "Interreg MED," [Online]. Available: https://interreg-med.eu/. [Accessed 3 June 2019].

Annex I – Pilot Survey for Modular Projects

Lessons Learned of Pilots' Implementation in the Modular Projects

The following questionnaire has been developed within the task 4.3 (Analysis and harmonization) of MEDNICE Project and its purpose is to capitalize the experiences of Modular Projects and to evaluate their impact by means of main indicators.
The results of the questionnaire will be visible in a technical report and other communication channels. In this way, with a small contribution on your part the answers will contribute to jointly disseminate the Modular Projects' results, thus increasing their impact.

LESSONS LEARNED FROM THE PILOT IMPLEMENTATION

1) Please fill in the following table with main conclusions of the implementation of the pilots in your project.

What kind of MP result (tool, methodology, indicator...) was tested in the pilots?
Which are the main difficulties that the project found during the pilots' implementation? What are the strengths and weaknesses of the tested results?
Which are the main achievements of the pilots?
What are the main conclusions after the pilots' implementation?
What are the remaining needs that must be overcome to replicate the pilots without difficulty?

2) Please fill in the following table with main information of at least one of the most representative pilots of your Project. Answer the questions in an oriented way according to the pilot type.

Brief description of the pilot (Type of building affected, surface (m²), affected surface (m²), year of construction...)		
Location		Pictures of the Pilot
Objectives		
Physical measures (if implemented)		
Actions related to the Modular Project implementation (physical measures directly linked to the project development, methodologies implemented, training sessions, etc.)		
Estimated Annual Savings (€, Final Energy and emissions)		
Real Annual Savings (€, FE and emissions)		
Investment (€)		
Other information		

KEY INDICATORS OF THE EFFICIENT BUILDING COMMUNITY

3) Please fill in the following table with the value of the indicators and comment if needed.

Indicator	Units	Value	Comments
Number of Pilots implemented within the project			
Total square meters refurbished	m^2		
Total investments in EE projects achieved	€		
Total annual avoided CO_2 emissions	Kg/m^2/year		
Total Annual Primary Energy savings	KWh/m^2/year		
Annual generation of Final Renewable Energy	KWh/m^2/year		
Number of stakeholders participating in training activities within the project			
Number of signed Memorandums of Understanding (MoUs) or agreements with other projects or institutions within the project			
Other relevant indicators: _____			

IMPULSE PROJECT

The following questionnaire has been developed within the task 4.3 (Analysis and harmonization) of MEDNICE Project and its purpose is to capitalize the experiences of Modular Projects and to evaluate their impact by means of main indicators.
The results of the questionnaire will be visible in a technical report and other communication channels. In this way, with a small contribution on your part the answers will contribute to jointly disseminate the Modular Projects' results, thus increasing their impact.

LESSONS LEARNED FROM THE PILOT IMPLEMENTATION

Please fill in the following table with main conclusions of the implementation of the pilots in your project.

What kind of MP result (tool, methodology, indicator…) was tested in the pilots?
The main objective of the pilot activities across the partner Countries was to introduce and test a transnational methodology (associated with practical computational tools) for the fast and easy development of affordable energy efficiency action plans for public buildings, in compliance with the European directive for energy efficiency 2012/27/EE. The approach involved the testing of the following aspects: - Management of large samples of public buildings by means of grouping into representative typologies based on technical characteristics that affect the energy performance. - Projection tools for extrapolating energy performance indicators from representative buildings to the whole initial sample of public buildings. - Multi-criteria decision analysis (MDCA) methods for prioritizing public buildings and energy-upgrading projects. - Geo-informatics utilities for the cartography of indicators and retrofit scenarios at city level. - The positive impact of low-cost energy interventions through small-scale projects across partner Countries.
Which are the main difficulties that the project found during the pilots' implementation? What are the strengths and weaknesses of the tested results?
The main difficulties that took place during the pilots' implementation are the following: - Absent energy data for some buildings of the initial priority set. - Absent or hard-to-find technical properties of the buildings and their systems. - Low familiarization of authority partners with Typologies of public buildings. - Administrative delays of procurements, especially regarding the small-scale investments foreseen across the partner Cities. In some cases, this led to the missing assessment of ex-post energy performance after the renovation works, as the latter ended near the end date of the project. Strengths of the tested results: - Facilitate the work of public authorities in conducting their energy efficiency action plans for their buildings, through the provision of easy to use tools and platforms. - Elevate the knowledge and skills of public technicians and energy managers to manage large samples of buildings towards the preparation of energy efficiency action plans. - Highlight the impact of cheap and easy to apply energy solutions. - Advanced decision making tools which support policy and decision makers in the prioritization of energy efficiency projects for buildings.

Weaknesses:
- The social aspect and indicators are not so enhanced in the prioritization criteria of the introduced tools, especially for the hierarchy of priority buildings.
- The user's guides of the produced tools are still only in the English language, which often is hard to comprehend due to many technical terms.
- Some produced tools still lack detailed user's guides.
- Relatively high amount of input information (especially regarding the technical information of the selected representative buildings) is still required in order for the tools to operate correctly.

Which are the main achievements of the pilots?

The main achievements of pilot activities are the following:
- Provision of valid and user-friendly tools to conduct affordable energy efficiency action plans for public buildings.
- Integration of all platforms and tools into a GIS platform with results of the partner Cities (https://impulseonline.eu).
- The generalized methodology followed and considering the capturing of the most representative public-buildings construction profiles as well as the majority of Mediterranean climate zones, ensures the replicability of solutions to similar public-building typologies located in neighbour Cities and Regions.
- Energy renovations of selected public buildings across the 6 partner Cities. Expected energy savings ranging from 25% to 50%.

What are the main conclusions after the pilots' implementation?

- Fast and user-friendly replicable tools for Mediterranean Cities for conducting energy efficiency action plans for their public buildings.
- Replicable packaged solutions, ranging from minor to deep retrofits, are now available for many public-buildings most commonly met in the Mediterranean.
- Highlight easy projects (minor retrofits with low administrative effort) with high energy impact.
- Promotion of equipment and methods of monitoring energy performance of public buildings.
- Energy savings ranging from 25% to 50% for the selected pilot buildings.
- Around 180 public technicians were trained in using the IMPULSE tools.

What are the remaining needs that must be overcome to replicate the pilots without difficulty?

- Adopt an additional common methodology to produce realistic baseline energy performance of public buildings.

- Improve the adopted levels of retrofit by means of weighted cost indicators by sq.m. and in terms of a better definition of the NZEB.

- Improve IMPULSE tools' user's guides and translation to all MED languages.

- Include social aspects and indicators in the prioritization criteria for the hierarchy of public buildings and future projects.

Please fill in the following table with main information of at least one of the most representative pilots of your Project. Answer the questions in an oriented way according to the pilot type.

Brief description of the pilot (Type of building affected, surface (m^2), affected surface (m^2), year of construction…)	Municipality of Ravenna Gym of V.Randi Primary school: the building is sit in the city center; d the gross floor area is about 873 mq. It was built in 1999.	
Location	Ravenna, street Marzabotto n.9	Pictures of the Pilot
Objectives	Improve energy efficiency	 
Physical measures (if implemented)	The final renovation project includes the following energy measures to be implemented: • Replacement of existing lighting with LED • Light sensors • Dimmer system with three possible programmable scenarios.	
Actions related to the Modular Project implementation (physical measures directly linked to the project development, methodologies implemented, training sessions, etc.)	The interventions stand for the minor retrofit scenario tested using the IMPULSE KPIs' platform.	
Estimated Annual Savings (€, Final Energy and emissions)	Primary energy saving: 16% Co2 saving: 6% € cost saving: 5%	
Real Annual Savings (€, FE and emissions)	Primary energy saving: 23%, and the CO2 saving: ~ 6%.	
Investment (€)	€ 21.764	
Other information		

Brief description of the pilot (Type of building affected, surface (m^2), affected surface (m^2), year of construction…)	Municipality of Ravenna Gym of San Pietro in Vincoli school: the building is sit in the country side; it is about 7 meters high and the gross floor area is about 719 mq. It was built in 1980.	
Location	Ravenna, street Leonardo da Vinci n.8	Pictures of the Pilot
Objectives	Improve energy efficiency	

Physical measures (if implemented)	The final renovation project includes the following energy measures to be implemented: • Replacement of existing lighting with LED • Light sensors • Dimmer system with three possible programmable scenarios.	
Actions related to the Modular Project implementation (physical measures directly linked to the project development, methodologies implemented, training sessions, etc.)	The interventions stand for the minor retrofit scenario tested using the IMPULSE KPIs' platform.	
Estimated Annual Savings (€, Final Energy and emissions)	Primary energy saving: 6,40% Co2 saving: 8,80% € cost saving: 1,52%	
Real Annual Savings (€, FE and emissions)	Comparing the average monthly value calculated for the post-relamping period and comparing it with the pre-relamping period between February and May 2018, the calculated savings are 36%.	
Investment (€)	€ 13.541	
Other information		

KEY INDICATORS OF THE EFFICIENT BUILDING COMMUNITY

Please fill in the following table with the value of the indicators and comment if needed.

Indicator	Units	Value	Comments
Number of Pilots implemented within the project	No. Pilot Cities	6	Energy efficiency plans for public buildings for the Mediterranean Cities
Total square meters refurbished	m^2	-	Not clear yet. To be defined once all D3.6.1 deliverables are completed
Total investments in EE projects achieved	€	Approx. 240,000	
Total annual avoided CO_2 emissions	% ~~Kg/m2/y~~	Approx. 35%	Mean value expected by all small-scale projects
Total Annual Primary Energy savings	% ~~KWh/m²/year~~	Approx. 35%	Mean value expected by all small-scale projects
Annual generation of Final Renewable Energy	KWh/year ~~KWh/m²/year~~	14,500	Renewable energy produced from PV integration in the pilot building of the City of Elche, Spain
Number of stakeholders participating in training activities within the project	No. trainees	Approx. 180	Trainees
Number of signed Memorandums of Understanding (MoUs) or agreements with other projects or institutions within the project	No. of MoUs with other projects	2	Signed MoUs with the SHERPA and the PrioritEE Interreg MED projects.
Other relevant indicators: _____			

PrioritEE PROJECT

The following questionnaire has been developed within the task 4.3 (Analysis and harmonization) of MEDNICE Project and its purpose is to capitalize the experiences of Modular Projects and to evaluate their impact by means of main indicators.
The results of the questionnaire will be visible in a technical report and other communication channels. In this way, with a small contribution on your part the answers will contribute to jointly disseminate the Modular Projects' results, thus increasing their impact.

LESSONS LEARNED FROM THE PILOT IMPLEMENTATION

Please fill in the following table with main conclusions of the implementation of the pilots in your project.

What kind of MP result (tool, methodology, indicator…) was tested in the pilots?
The PrioritEE project tested a set of tools (*the PrioritEE toolbox*), specifically developed within the project to support local administrations in managing energy consumption in municipal public buildings (MPB) and aimed at defining ad hoc strategies to increase energy efficiency of MPBs. The PrioritEE toolbox has been tested on five pilots in the partner regions, focusing on a varied portfolio of local priorities and covering different key energy efficiency issues. In particular, it is composed by the following main components: • **Technology analytical database**, which incorporates technical solutions to improve energy efficiency in Municipal Public Buildings. • **Decision Support Tool (DST)** to prioritize energy efficiency measures across a varied MPB building stock. • **How-to Briefs**, 7 easy-to-use guides for the implementation of selected best practices for promoting Energy Efficiency in Municipal Public Buildings. • **Repository of Good Practices** to enhance sustainable energy awareness and foster behavioural changes in Municipal Public Buildings. All these are made available through the project web-site which constitutes an **Open data & knowledge access infrastructure** as all toolbox components are free and easy to access. An overview of the main institutions and initiatives for promoting energy efficiency in MPB was also available. Most of the toolbox is available in English, Italian, Portuguese, Spanish, Greek and Croatian.
Which are the main difficulties that the project found during the pilots' implementation? What are the strengths and weaknesses of the tested results?

Main difficulties:

- Overcome the initial resistance and bias of some municipal technicians regarding the new developed tools (Decision Support Tool-DST), especially due to less than enough local authorities' human resources dedicated to energy efficiency management (basically lack of time);
- Very diverse level of expertise and know-how across the local authorities in the five pilots, with some being very experienced and other not having staff with in-depth energy efficiency background knowledge, which required being able to develop flexible enough approaches that would be suitable to all;
- Data gathering to characterize energy consumption and characteristics of MPB, since data is usually scattered among different offices of the same municipality with scarce communication among them;
- Classification and allocation of a very diverse portfolio of MPB to a few generic and representative building typologies (offices, educational buildings, cultural buildings, social centers, sports facilities and swimming pools) in order to be able to develop tools replicable to other pilots, while still ensuring they would fit the specific characteristics of the pilots;
- Limitations in communication due to language barriers and due to the different energy technologies and practices normally applied across the five different pilots (e.g. cooling or district heating not common in some countries) which required substantial efforts with translation and validation of the developed tools (especially the DST).

Strengths

- The PrioritEE Toolbox is relatively easy to use and provides plenty of useful information in all its components. It is a comprehensive toolbox that allow to make informed and cost-effective choices;
- The DST is the core of the Toolbox and can help local and regional authorities to a great extent – it offers a relatively quick and accurate results which can directly influence on decision-making. The prioritization of EE interventions with the DST using only few basic data integrated with average national data make available in the DST for each of the country of the project partner countries is an important strength. Some specific strengths of the DST are:
    - It is useful to support decision making at different levels, in particular to drive investments in EE, to support local action plans, to demonstrate benefits of single and/or combined interventions, to establish a priority of energy efficiency interventions to be carried out in a given territory; etc.;
    - It allows immediate comparison of multiple interventions in terms of efficiency and cost-benefit analysis for various combinations of technologies making it a useful tool for screening analyses based on indicative results;
    - It allows benchmarking, both per types of measures and per types or per specific buildings;
    - It is an excellent multinational energy baseline;
    - Easy to use even by non-experts;
    - It is easy to process, and relatively short time is needed to input all data for a single building (although not all pilots felt this as can be seen in the weaknesses);
    - It is open source, can be immediately used thanks to the web interface, it is flexible and simple to use;
    - It allows different levels of use in relation to data availability, moreover it is easy to use both by municipal administrators and technicians;
    - Few data required to use it and, if data is not available, most of it can be obtained easily by public authorities through several assumptions;

- Includes a variety and comprehensive set of options for promoting energy efficiency e.g. windows, heating and cooling systems, ventilation systems;
- It constitutes a common and transparent repository that collects all technical data on public buildings (usually stored in different offices);
- It allows monitoring the effects of the intervention on the MPB, as the data input can be refined (feedback on local status);

Weaknesses

- Updating and maintaining the developed tools and methodologies after the conclusion of the project;
- Some parts of the Toolbox are relatively complex and require time to leant how to use (DST);
- The Good Practices repository is not intuitive to use;
- Specifically, for the DST, the following weaknesses were identified:
  - Required time to input all the data, Some of the DST inputs are not easy to understand and obtain;
  - Limited precision also due to a too qualitative output, i.e. the non-mandatory nature of a large part of the input data in the DST, thus making necessary that some of the inputs are default values and not real ones;
  - Impossibility to consider mixed systems in the same building (different heating systems, different types of windows);
  - Lack of specification of type of radiators (cast iron, aluminum, etc.);
  - Total electricity consumption and total heat consumption variables can create confusion if electricity is used for space heating;
  - It is not clear the compatibility with other energy diagnosis software;
  - It is somewhat slow, and it is not possible to attach or upload the xml of the energy performance certificates;
  - It requires some previous knowledge to use;
  - Could include adding specific equipment;
  - It does not include technological measures to promote energy savings through automation of existing plant engineering;
  - Lack of a FAQ section on major assumptions (especially regarding PV and lighting and on how the cost of the initial investment of the redevelopment interventions is determined). This could be developed in order to provide more info about the calculations being carried out;
  - Lack of tutorials including explanation of the decision support tool calculations and reference buildings;
  - The visualization of the results could still be improved, especially on the prioritization and benchmark part.
- The Analytical database could be easier to navigate with an integrated search option
- Some components of the toolbox (DST and Analytical database) are for generic decision support and do not replace energy audits – thus they do not allow for dimensioning precise cost evaluations for specific buildings;

Which are the main achievements of the pilots?

The main achievements of pilots were as follow:

- In-depth characterization of energy consumption of 229 municipal public building in all region of partners and identification of 344 energy efficiency (and renewable energy promotion) measures for all of them, including associated costs and savings;
- Development of five local action plans (1 per pilot) identifying the energy efficiency measures to be adopted, implementation plan, necessary financial and human resources for this implementation;
- 8.03 GWh/year potentially saved with EE interventions (as obtained from the DST application across all pilots);

- 2.42 kton/year of CO2 potentially avoided if all the EE measures selected (and some renewable energy promotion measures) will be implemented;
- 0.94 GWh/year foreseen increase in renewable energy generation (mainly PV panels);
- 256 municipal technicians involved with enhanced energy competences;
- Increased capacity building of local administrators on energy issues;
- >100 students involved, with a better knowledge on energy related problems and with an increased awareness on their energy consumption and impacts, with a positive multiplier effect on their family
- Promotion of energy conservation and energy efficiency behaviors;
- Identification of the largest consumers among MPBs, as well as best investments on MPBs to save energy and money;
- Most of the municipalities involved expressed their intention to continue using the PrioritEE DST as they consider that the DST can be helpful in managing energy consumption of MPBs;
- Most of the municipal officers have agreed on the great potential of the DST to catalog the energy characteristics of the MPBs and to evaluate in a transparent way all the interventions made to increase energy efficiency in public buildings.

What are the main conclusions after the pilots' implementation?

The conclusions presented below were adapted from the following scientific paper accepted to the SWEDES conference: Salvia, M., Simoes, S.G., Gouveia, J.P, Herrando, M., Fueyo, N., Gómez, A., Čavar, M., Cosmi, C., Papadopoulou, K., Taxeri, E., Pietrapertosa, F., Rajić, K., Di Leo, S., Proto, M. (2019). Supporting Local Authorities in the Building Stock Management: Main Results of the Application of an Integrated Approach in five Mediterranean Pilots. 14th SDEWES Conference of Sustainable Development of Energy, Water and Environment Systems, 1-6 October, Dubrovnik, Croatia.:

- There is a general lack in the systematic use of analytical tools and indicators to design and implement local energy efficiency policy. Therefore, there is an urgent need to support local decision makers with adequate (and simple) tools capable to provide a benchmarking scenario on which assessing the effectiveness of policies and measures and to carefully plan local investments by comparing different alternatives while considering several key performance indicators. Moreover, these tools are very important to support capacity building in non-energy experts working in the technical departments of local authorities and who often need to outsource the technical work for energy efficiency decision-support.
- It is necessary a tool to support local public authorities (especially smaller ones) making use of available information that they may have disperse (as the energy certificates) to characterize their whole Municipal building stock, identify energy efficiency measures and prioritize their implementation. For may local authorities this is an important goal, but not the most important one of their daily activities. Moreover, they frequently have limited know-how (and/or human resources available) on these issues. Therefore, easy to use tools are crucial;
- The involvement of stakeholder engagement is crucial to improve the tools, develop capacity building and enable a wider transfer of knowledge;
- Energy savings and emissions reduction targets can be achieved at lower costs if behavioral changes occur, proving that "soft measures" are an essential lever for the implementation of "hard" technological measures;
- The users of public buildings play a key role in making more effective energy efficiency interventions on buildings, only changing their daily routine by adopting more sustainable and awareness behavior it can be maximized the energy saving.
-

What are the remaining needs that must be overcome to replicate the pilots without difficulty?

It would be desirable to:

- be able to provide more training and support in the continued implementation of Decision Support tool;
- Ensure updated and revision of the several components of the PrioritEE Toolbox after the conclusion of the project;
- Specifically for the DST:
    - Implement a FAQ section with some explanation on some of the assumptions and calculations;
    - Ensure possibility for users to input some measures customized to their specific cases;
    - Improve visualization of results;
    - Improve speed of the software version;
    - Extend the typologies of buildings and the calculation tool to residential buildings
    - Implement more cases in different climate zones with other types of buildings and energy carriers;
    - Combine technological solutions with finance advice.

Please fill in the following table with main information of at least one of the most representative pilots of your Project. Answer the questions in an oriented way according to the pilot type.

Brief description of the pilot (Type of building affected, surface (m^2), affected surface (m^2), year of construction…)	The PrioritEE project was implemented over 5 pilots in 5 countries addressing 229 concrete municipal public buildings (MPB) from the following building typologies: offices, educational buildings, cultural buildings, social centers, sports facilities and swimming pools. The built area and date of construction varies widely across the pilots and buildings.	
Location	**Italy** Potenza municipality, **Portugal** Intermunicipal Community of Lezíria do Tejo, **Spain** Deputación de Teruel, **Greece** Region of Western Macedonia and **Croatia** municipality of Karlovac	Pictures of the Pilot
Objectives	All these pilots had as an objective, capacity building and decision support tools to characterize their MPB, identify energy efficiency (and renewable energy) measures and prioritize their implementation.	See Appendix below
Physical measures (if implemented)	No physical measures were implemented but 344 measures were identified for the 229 MPB considered in the pilots. These measures are: floor, wall and/or roof renovation, window replacement, implementation of LED lighting, replacement/integration of cooling systems; replacement of heating system, and integration of PV panels and/or solar thermal collectors	
Actions related to the Modular Project implementation (physical measures directly linked to the project development, methodologies implemented, training sessions, etc.)	Each pilot organized 3 local workshops and 3 local living labs, which included training sessions on the PrioritEE toolbox and capacity building on energy efficiency issues. Circa 256 persons of local authorities in the pilots attended these sessions.	
Estimated Annual Savings (€, Final Energy and emissions)	8.03 GWh/year potentially saved with EE interventions (as obtained from the DST application across all pilots) and 2.42 kton/year of CO2 potentially avoided if all the EE measures selected (and some renewable energy promotion measures) will be implemented;	
Real Annual Savings (€, FE and emissions)	Not applicable	

Investment (€)	12.96 million euros if all measures will be implemented	
Other information		

KEY INDICATORS OF THE EFFICIENT BUILDING COMMUNITY

Please fill in the following table with the value of the indicators and comment if needed.

Indicator	Units	Value	Comments
Number of Pilots implemented within the project	n.	5	Pilots are located in Italy, Portugal, Spain, Greece and Croatia
Total square meters refurbished	m^2	Not applicable	Was not part of the scope of the project
Total investments in EE projects achieved	€	129 58 512	planned
Total annual avoided CO_2 emissions	$Kg/m^2/year$	Not available	Area not available
Total Annual Primary Energy savings	$KWh/m^2/year$	Not available	Area not available
Annual generation of Final Renewable Energy	$KWh/m^2/year$	Not available	Area not available
Number of stakeholders participating in training activities within the project		256	Staff of local public authorities
Number of signed Memorandums of Understanding (MoUs) or agreements with other projects or institutions within the project		0	2[3]
Other relevant indicators: _____			

[3] The signature of the MoUs between PrioritEE - NEWFINANCE and PrioritEE - IMPULSE took place during the project's Mid-term Conference (Kifissia, Greece, 21 June 2018) to strength synergies between Interreg MED partners, capitalize project results and foster their dissemination.

Appendix A: Some pictures of the PrioritEE pilots

A.1: **Italy** Potenza municipality

A.2: **Portugal** Intermunicipal Community of Lezíria do Tejo

A.3: Spain Deputación de Teruel

A.4: **Greece** Region of Western Macedonia

A.5: Croatia municipality of Karlovac

SHERPA PROJECT

The following questionnaire has been developed within the task 4.3 (Analysis and harmonization) of MEDNICE Project and its purpose is to capitalize the experiences of Modular Projects and to evaluate their impact by means of main indicators.
The results of the questionnaire will be visible in a technical report and other communication channels. In this way, with a small contribution on your part the answers will contribute to jointly disseminate the Modular Projects' results, thus increasing their impact.

LESSONS LEARNED FROM THE PILOT IMPLEMENTATION

Please fill in the following table with main conclusions of the implementation of the pilots in your project.

What kind of MP result (tool, methodology, indicator…) was tested in the pilots?
SHERPA has developed a transnational, holistic and peer-to-peer **methodology** to work on the main barriers related to EEB strategies in public buildings, namely: governance structures; information gathering and usage; awareness and training of responsible staff; and financing of actions. To implement this methodology, two different **tools** have been created: the Information System (aiming at providing a common data base for the collection and analysis of building information of the public administrations) and the Funding Tool (aiming at performing a financial analysis of the Energy Renovated Building (ERB) projects, in order to identify financing alternatives for these projects and to innovate the financial schemes applied, according to their specific characteristics). A part, a series of **indicators** have been calculated to determine for each one of the 100 pilot regional buildings participating in the project.
Which are the main difficulties that the project found during the pilots' implementation? What are the strengths and weaknesses of the tested results?
The main difficulty found during the pilots' implementation has been obtaining the information of the buildings as well as finding the necessary funds to implement the projects at a later stage. Regarding the obtaining of the information, the work done by SHERPA Work Group 1 - Governance has revealed the lack of coordination and planning within the different departments in relation to energy renovation issues and a low operational capacity of the already existing structures, as well as difficulties to identify building managers and the corresponding managing bodies. Administrative proceedings and the high number of interlocutors make it difficult to obtain the necessary data from buildings and to achieve a strong and long-lasting commitment for the implementation of ERB projects. As for the funding of the projects, the work developed by SHERPA Work Group 4 - Financing has revealed that budget constraints in many European countries and high goals set on ERB actions imply the need for the development of new and more standardized financing alternatives. Different kinds of funding should be taken into consideration (public, private, cofounding and other alternatives) and the use of innovative financing formulas, such as the combination between private and public funds, should be encouraged.

The strength of the result lies on the fact that once the main difficulties have been identified, SHERPA has been able to produce the tools to meet the arisen needs. This way the SHERPA main tools were born: information system and funding tool; a part, a Governance Map has been developed, in an attempt to correct the weak points detected in the existing governance structures, and guide the ERB implementation in the public administrations.

As for the weak points, the pilots developed by SHERPA, are case studies, to be implemented at a later stage.

Which are the main achievements of the pilots?

The work on the pilots has revealed the weaknesses in the system regarding the production of ERB projects by public administrations and allowed for the development of tools to respond to these weak points.

A part from the aforementioned tools and instruments, it has also been developed a training system to improve the knowledge of energy efficiency in buildings of the people responsible of the energy management of buildings; in this area, a methodology has been developed based upon a dual approach, where theoretical knowledge is combined with a more practical approach.

What are the main conclusions after the pilots' implementation?

The ERB projects have not been implemented, but have allowed for the determination of energy efficiency measures that need to be implemented and their respective economic costs, as wells as the funding strategy to be able to carry them out in the future.

What are the remaining needs that must be overcome to replicate the pilots without difficulty?

The principal obstacle to overcome is the financing. In the current economic climate, Public Administrations do no always have the necessary funds available and energy efficiency is not an investing priority. In this sense, the funding tool should help them to find the best strategies to find the needed economic resources.

On the other hand, there is also a need to raise awareness on the importance of energy efficiency among the public administrations' staff.

Please fill in the following table with main information of at least one of the most representative pilots of your Project. Answer the questions in an oriented way according to the pilot type.

<table>
<tr><td>Brief description of the pilot (Type of building affected, surface (m^2), affected surface (m^2), year of construction…)</td><td colspan="2">The Agricultural School of Santa Coloma de Farners is a public school of the Department of Agriculture of the Government of Catalunya. Its buildings and fields are located in the property “Can Xifra”, of Santa Coloma de Farners, with an extension of 49.445 m2.

The main building was built in 1930. Then on 1985 the building was extended and the student’s residence was built as well as the industrial units.</td></tr>
<tr><td>Location</td><td>Casa Xifra, Esparra Road, 17430 Santa Coloma de Farners, Catalonia - Spain</td><td>Pictures of the Pilot</td></tr>
<tr><td>Objectives</td><td>The building works as a school and its most important energy consumers are the lighting system, the heating production and the equipment associated to the academic activities.

The most of the lighting system is formed by fluorescent lights despite of being replaced with LED when they are no longer useful. A first step to reduce the electric cost caused by the lighting system is replacing the existing luminaires by LEDs which consumes significantly less and has a larger life cycle.

The school is composed of 4 buildings and the heating production is decentralized, that is each building has its own boiler. One of the measures studied is to centralize the heating production in the basement of the residence building and replace the current gas-oil boilers with a wood chip fired boiler (biomass boiler).

The main building has a glass cloister (central patio). This cloister receives an important amount of solar radiation creating thermal discomfort inside the building during the summer and winter periods. To solve this problem, the solution studied has been a BIPV (Photovoltaic Integrated System). The idea has been to install</td><td> 
  </td></tr>
</table>

	photovoltaic cells on the glass cloister reducing the thermal discomfort at the same time as producing energy.	
Physical measures (if implemented)	The EEM proposed are: 1. **Improvement of the lighting system:** - Replacing fluorescent lighting with LEDs - Implementation of presence sensors and photocell and automatic disconnection system. 2. **Improvement of the heating production:** - Centralized system placed in Residence building's basement. - Replacement of the gas-oil boilers with biomass boilers. 3. **Implementation of renewable energies:** - Photovoltaic Pergola/Cloister (BIPV)	
Actions related to the Modular Project implementation (physical measures directly linked to the project development, methodologies implemented, training sessions, etc.)	When working in this Pilot, SHERPA methodology has been followed: -Meetings with all the involved agents have been held. -Training sessions have been carried out. -Building data have been introduced in the information system. -Designed indicators have been calculated -Energy efficiency measures have been determined. -Best financing possibilities have been studied.	
Estimated Annual Savings (€, Final Energy and emissions)	Estimated energy savings: 130.500,19kWh/y Estimated economical savings: 15.136,09€/y	
Real Annual Savings (€, FE and emissions)	N/A	

Investment (€)	Estimated investment: 192.950,00€	 
Other information	The measures analyzed and studied in this pilot of the SHERPA project have not been implemented; they are only viability studies.	

KEY INDICATORS OF THE EFFICIENT BUILDING COMMUNITY

Please fill in the following table with the value of the indicators and comment if needed.

Indicator	Units	Value	Comments
Number of Pilots implemented within the project	ERB projects	100	The ERB Projects are a viability study
Total square meters refurbished	m^2	1.370.229,22	Construed surface
Total investments in EE projects achieved	€	53.479.149,45	Theoretical investment for implementation
Total annual avoided CO_2 emissions	$Kg/m^2/year$	11,88	
Total Annual Primary Energy savings	$KWh/m^2/year$	45,26	Calculus made with global construed surface
Annual generation of Final Renewable Energy	$KWh/m^2/year$	9,08	Calculus made with the construed surface of 31 buildings, where the Renewable energy implementation has been studied.
Number of stakeholders participating in training activities within the project	Civil servants	156	The number of targets (civil servants) been participating in training activities, without repeating in each session.
Number of signed Memorandums of Understanding (MoUs) or agreements with other projects or institutions within the project	MoU – European projects	3	SHERPA-IMPULSE SHERPA-CESBA.MED SHERPA-NEW FINANCE
	MoU-municipalities	50	Work in progress
Other relevant indicators: _____	Observers	150	Number of targets participating in capacity raising activities on energy efficiency

EduFootprint PROJECT

The following questionnaire has been developed within the task 4.3 (Analysis and harmonization) of MEDNICE Project and its purpose is to capitalize the experiences of Modular Projects and to evaluate their impact by means of main indicators.
The results of the questionnaire will be visible in a technical report and other communication channels. In this way, with a small contribution on your part the answers will contribute to jointly disseminate the Modular Projects' results, thus increasing their impact.

LESSONS LEARNED FROM THE PILOT IMPLEMENTATION

Please fill in the following table with main conclusions of the implementation of the pilots in your project.

What kind of MP result (tool, methodology, indicator…) was tested in the pilots?
EduFootprint aimed at improving the management & control of energy in the public buildings (schools) boosting the efficiency and reducing their environmental footprint, considering the whole cycle of the education system. Partners tested a calculator assessing the footprint of their schools considering both the direct and indirect consumption and identified possible solutions to reduce it especially through behavioral measures. The Calculator has been the main tool to do it. By the gaming activities and the use of the mobile APP, 60 schools created their energy plans making them known to the involved SEAPs municipalities and 28 agreements have been signed.
Which are the main difficulties that the project found during the pilots' implementation? What are the strengths and weaknesses of the tested results?
It has been a challenging initiative because, considering the national legal frame of each involved country and the management of the school buildings often undertaken by different players. Main strengths have been the interest and involvement of the school community, the existing awareness on the environment preservation and the impact of our daily actions on the environment, the support provided by the schools managers/owners and the alignment of this project with the local SEAPs. Main weaknesses regarded the lack of time and resources to improve the data monitoring (students are involved in the ordinary activities, teachers are busy carrying out the program in the scheduled times, administrative staff is often located in a different building), the technical interventions are often too expensive or the building too old. To fine-tune the model and tool, partners have been warmly asked to promote the use of the calculator both in the pilot schools (for an incremental improvement) and in the new ones, being very careful in the data collection.
Which are the main achievements of the pilots?
Edufootprint project provided a positive impact in the involved regions. As regards the environmental impact. Measuring the environmental footprint has helped school organisations to identify the most relevant areas to improve with a life cycle perspective and to plan some actions aimed at reducing the footprint.

Furthermore, these actions have produced significant positive social-economic impacts. The most relevant impacts for the local communities were the following ones:
> sustainable governance for policy making
> support for the growth of local communities (involvement of students, teachers and other stakeholders)
> awareness of climate change
> strengthening of the education community.

What are the main conclusions after the pilots' implementation?

The EduFootprint calculator has proved to be a very useful and accessible tool to determine the environmental footprint of the school service and to help identify the most relevant improvement areas for energy and resource efficiency.
The support of the local authority and the involvement and participation of the school communities has been essential for the implementation. Activities such as data collection, coordination, local training, design and implementation of energy action plans (as well as the production of storytelling videos) have been at the core of the Testing phase in EduFootprint.
The energy action plans implemented in the schools have mainly focused on measures to save energy and fuel, as well as on waste sorting and recycling. Mainly awareness raising and behavioural actions have been carried out. Some partners implemented some technical interventions as windows replacement, lights replacement etc. since the equipment improvement in the schools has been co-funded by the project.
The interest and the involvement of the schools' directors and teachers and, particularly, of the students, has been an encouraging factor during the testing phase, even if "bad" habits are very difficult to change and everyone behaves differently when he is not at home.
Finally, calculator can be a valid and very useful tool if the data collection is accurate, complete and reproducible. The more the measure will be corrected and the method reproducible, the more the actions will be beneficial and focused on the most important environmental phases.

What are the remaining needs that must be overcome to replicate the pilots without difficulty?

EduFootprint model and tools have been developed and tested including innovative elements: LCA joined with an active involvement of all local actors and a general awareness and behavioral change; a solution that it is not only a management model but also a useful monitoring tool; an integrated approach with the local SEAPs. The project has demonstrated that not just high demanding actions are needed in energy planning of buildings, but activities that are more creative can be identified thanks to LCA approach and good practices. We are sure that, after the project closure, EduFootprint model can be tested also in other type of public buildings (municipal buildings, buildings of the welfare service, railway/tramway stations and depots),considering, again, the environmental negative effects on the lifecycle of all the activities taking place in those buildings and their measurement and communication to stakeholders, whose behaviour change is a key solution to solve the problem. At the moment, the calculator is calibrated on specific national emission factors and it can be used only by potential users belonging to the Countries involved in EduFootprint project: Spain, Portugal, Slovenia, Greece, Albania and Italy. A possible future development could be the experimentation of the method developed by the European Commission to assess the Product Environmental Footprint (PEF) and the Organization Environmental Footprint (OEF) for organizations managing

public buildings, also involving other actors in the supply chains of services (public transport companies, territorial waste managers, canteen services). Different types of public buildings could be targeted; municipal/welfare service buildings, railway/tramway stations etc.

Please fill in the following table with main information of at least one of the most representative pilots of your Project. Answer the questions in an oriented way according to the pilot type.

Brief description of the pilot (Type of building affected, surface (m^2), affected surface (m^2), year of construction…)	EduFootprint project involved 60 pilot school buildings in 6 countries (Italy, Spain, Portugal, Slovenia, Greece and Albania). As regards the Veneto area, the project activities focused on some buildings of Treviso province involving 15 pilot schools (lower secondary and upper secondary schools) and 8 SEAP municipalities. The total usable area has been 85,173.08 m2; the students have been 8,393, while the teachers and staff have been 1,331.	
Location	Veneto area (Italy)	Pictures of the Pilot (some pilots)
Objectives	EduFootprint main objective was to test the project integrated energy strategy with a Life Cycle Assessment (LCA) approach in schools, consisting in the elaboration and implementation of energy efficient practices integrated with local Sustainable Energy Action Plans (SEAPS).	  
Physical measures (if implemented)		
Actions related to the Modular Project implementation (physical measures directly linked to the project development, methodologies implemented, training sessions, etc.)	After the identification of the 15 pilot schools, some teachers attended a three months training whose contents have been: - Calculator guidelines - Life-cycle (LCA) analysis and its contextualization - Energy Action Plans - Behaviour as a key point to decrease the CO2 production and energy consumption - How to communicate best practices (Digital Storytelling). After the training, the teachers (tutors) supported the other teachers in implementing the	

	project activities in the 15 schools. The different school teams (formed by teachers, students and administrative staff) collected the consumption data to include in the beta version of their calculator considering a specific baseline (school year 2015-2016). In order to fine-tune the tool, they actively collaborate in highlighting the difficulties in handling it contributing towards an upgraded version of the tool itself. Considering the emerged hotspots (areas where it is possible to reduce the energy consumption and CO2 production), the pilot schools elaborated 15 Energy Action Plans. The plans (including behavioural measures) produced some results that have been analysed and checked after a second data collection (school year 2017/2018). Some pilot schools created personal instruments such as a monitoring sheet used to write daily the necessary data for the calculator (paper consumption, toner and cartridge). The Province of Treviso provided other information (garbage production, energy consumption). The service owner has given the data regarding the use of the vending machines. During the testing of the model and the environmental calculators in the schools, the 8 SEAP municipalities have been constantly informed about the project activities, supporting the schools, supplying the necessary data	 

	for the calculators and taking part in the different events aiming at explaining the results. Finally, the municipalities formally integrate the 15 school energy plans with the municipal SEAPs.	
Estimated Annual Savings (€, Final Energy and emissions)		
Real Annual Savings (€, FE and emissions)		
Investment (€)		
Other information	Thanks to the EduFootprint calculator, the schools have identified those categories showing the greatest impact on the School's environmental footprint: - mobility - building consumption - product consumption It is important to stress that the EduFootprint project uses the Life Cycle Assessment (LCA), an approach that considers not only the direct impacts of buildings but also the indirect ones such as impacts of resource consumption in public procurement, mobility and transport, human awareness and behavior, waste management. In LCA approach, the unit of measurement is the CO2/student considering the functional unit (school). On the contrary, the municipal SEAPs take into account the CO2 emission produced by the energy consumption within a Municipality area (fixed territory). The School Energy Action Plan can be considered a tool sharing a number of characteristics with the SEAPs, therefore it is familiar to the Municipalities and easily understandable by their staff. It can become a common ground of mutual interest and cooperation.	

KEY INDICATORS OF THE EFFICIENT BUILDING COMMUNITY

Please fill in the following table with the value of the indicators and comment if needed.

Indicator	Units	Value	Comments
Number of Pilots implemented within the project	60		
Total square meters refurbished	m^2		
Total investments in EE projects achieved	€		
Total annual avoided CO_2 emissions	$Kg/m^2/year$		
Total Annual Primary Energy savings	$KWh/m^2/year$		
Annual generation of Final Renewable Energy	$KWh/m^2/year$		
Number of stakeholders participating in training activities within the project	1,646		The endeavour has been remarkable but the final number of target groups participating in capacity raising activities on energy efficiency has exceeded the project main output quantification
Number of signed Memorandums of Understanding (MoUs) or agreements with other projects or institutions within the project	28		
Other relevant indicators: _____			

TEESCHOOLS PROJECT

The following questionnaire has been developed within the task 4.3 (Analysis and harmonization) of MEDNICE Project and its purpose is to capitalize the experiences of Modular Projects and to evaluate their impact by means of main indicators.
The results of the questionnaire will be visible in a technical report and other communication channels. In this way, with a small contribution on your part the answers will contribute to jointly disseminate the Modular Projects' results, thus increasing their impact.

LESSONS LEARNED FROM THE PILOT IMPLEMENTATION

Please fill in the following table with main conclusions of the implementation of the pilots in your project.

What kind of MP result (tool, methodology, indicator…) was tested in the pilots?
TEESCHOOLS tested in the pilots the web tool for conducting simplified energy audits and checked the economic feasibility of refurbishing to nZEB level existing school buildings in the partner countries
Which are the main difficulties that the project found during the pilots' implementation? What are the strengths and weaknesses of the tested results?
• Problems in gathering complete building (plans, dimensions) and energy consumption data for conducting the audits; • Different quality of the audits due to different sensibility of the auditors; • Different application of European legislation in the partner countries of the project. The definition of nZEB, in fact, varies widely from country to country • The selected school buildings are not representative of the whole school building park of the countries; • TEESCHOOLS WEB TOOL results approximated sufficiently the full audit results
Which are the main achievements of the pilots?
• TEESCHOOLS WEB TOOL has been validated against full audit results in all countries The pilots helped to standardize the methodology for making the energy audit and contributed to aligning the tool results with the energy audits in the field.
What are the main conclusions after the pilots' implementation?
• Existing financing schemes are not sufficient to make school building refurbishment to nZEB standards convenient (payback time too long); • The main obstacles to school refurbishment are not only financial but also organizational. Strong capacity building activities (training on technical, public procurement aspects) are needed for Municipalities staff to overcome these obstacles Moreover with the application of pilots we verified that it is possible to carry out simplified energy audits using the tool, obtaining data with a margin of error of about 10%
What are the remaining needs that must be overcome to replicate the pilots without difficulty?
A greater number of applications in school buildings in the national territory could be useful to refine the tool. It would also be important to replicate the pilots in other countries of the European community that did not participate in the project

Please fill in the following table with main information of at least one of the most representative pilots of your Project. Answer the questions in an oriented way according to the pilot type.

Brief description of the pilot (Type of building affected, surface (m^2), affected surface (m^2), year of construction…)	Object of pilot are school buildings of different degrees (primary, secondary and high). 1937 - Albertazzi-Pizzigotti Primary and Secondary School 5539 m^2 1980 - Alberghetti Secondary School 725 m^2 1950 - Don Milani Primary School 658 m^2 2005 - Scappi High School 7966 m^2 1985 - Sassatelli Primary School 3167 m^2	
Location	Castel San Pietro Terme (Bologna)	Pictures of the Pilot
Objectives	To test and to validate a tool for simplified energy audits; To calculate the ecological footprint of building renovation projects based on the building life cycle study; To realize a database for "Best Available Technologies" for the renovation of school buildings with zero energy consumption (nZEB); To develop tailor-made energy supply models; To study innovative financing instruments in order to facilitate the concrete implementation of the energy efficiency measures. To implement renovation plans for school buildings involved in the project; To design e-learning platforms for professionals, researchers and other stakeholders to learn and integrate the main results of the project into their work; To develop policy recommendations to be integrated into local, regional, and national action plans (SEAP) To publish a "Green paper" on energy efficiency in school buildings.	   
Physical measures (if implemented)	Our goal is also to help municipalities to obtain funding to carry out energy improvement actions. Castel San Pietro Terme has obtained funding from the Emilia-Romagna Region for 2 of the 5 participating schools of the pilot.	

Actions related to the Modular Project implementation (physical measures directly linked to the project development, methodologies implemented, training sessions, etc.)		
Estimated Annual Savings (€, Final Energy and emissions)	Albertazzi-Pizzigotti (annual savings 64.155,00 €, estimated energy consumption reduction 75%, reduction of total CO_2 emission 44 ton/year) Alberghetti (annual savings 73.501,00 €, estimated energy consumption reduction 90%, reduction of total CO_2 emission 87 ton/year) Don Milani (annual savings 9.262,00 €, estimated energy consumption reduction 77%, reduction of total CO_2 emission 29 ton/year) Scappi (annual savings 9.262,00 €, estimated energy consumption reduction 77%, reduction of total CO_2 emission 29 ton/year) Sassatelli (annual savings 96.304,00 €, estimated energy consumption reduction 72%, reduction of total CO_2 emission 56 ton/year)	
Real Annual Savings (€, FE and emissions)	Project activities were limited to the design phase of refurbishment	
Investment (€)	Albertazzi-Pizzigotti – 1.455.000,00 € Alberghetti – 335.300,00 € Don Milani – 409.000,00 € Scappi – 177.4000,00 € Sassatelli – 1.060.800,00€	
Other information		

KEY INDICATORS OF THE EFFICIENT BUILDING COMMUNITY

Please fill in the following table with the value of the indicators and comment if needed.

Indicator	Units	Value	Comments
Number of Pilots implemented within the project	Number of school	35	5 schools in each of the 7 partner countries
Total square meters refurbished	m^2		Project activities finished with the drawing up of preliminary renovation plans,
Total investments in EE projects achieved	€		
Total annual avoided CO_2 emissions	$Kg/m^2/year$		
Total Annual Primary Energy savings	$KWh/m^2/year$		
Annual generation of Final Renewable Energy	$KWh/m^2/year$		
Number of stakeholders participating in training activities within the project		160	8 face to face trainings and 20 attendees on average; e-learning course will initiate soon
Number of signed Memorandums of Understanding (MoUs) or agreements with other projects or institutions within the project			The activity will start in the next months
Other relevant indicators: _____			

ENERJ PROJECT

The following questionnaire has been developed within the task 4.3 (Analysis and harmonization) of MEDNICE Project and its purpose is to capitalize the experiences of Modular Projects and to evaluate their impact by means of main indicators.
The results of the questionnaire will be visible in a technical report and other communication channels. In this way, with a small contribution on your part the answers will contribute to jointly disseminate the Modular Projects' results, thus increasing their impact.

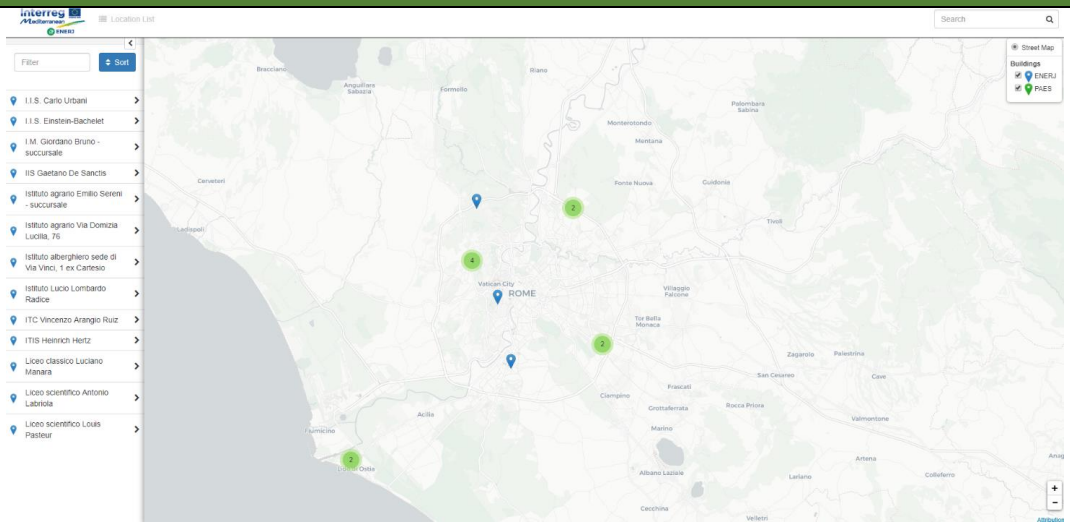
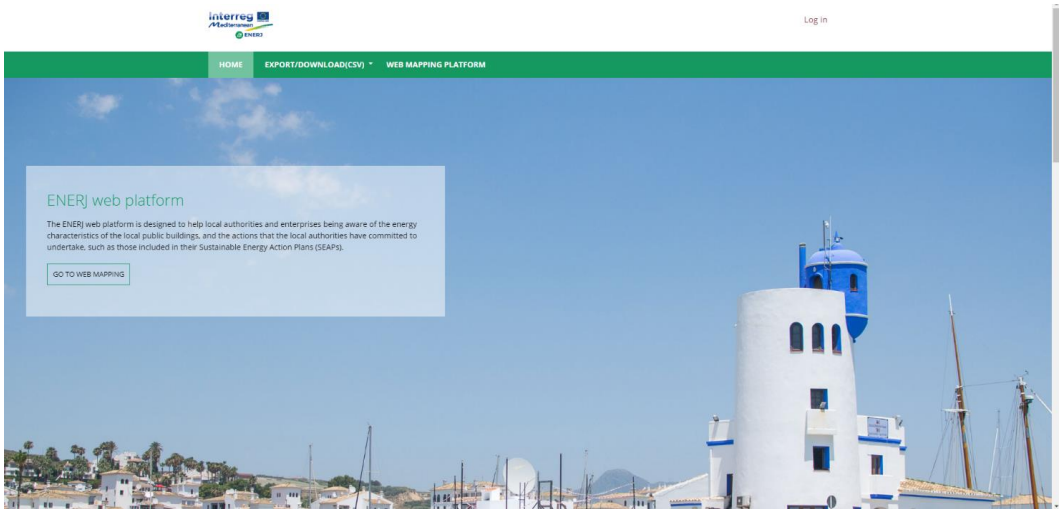
LESSONS LEARNED FROM THE PILOT IMPLEMENTATION

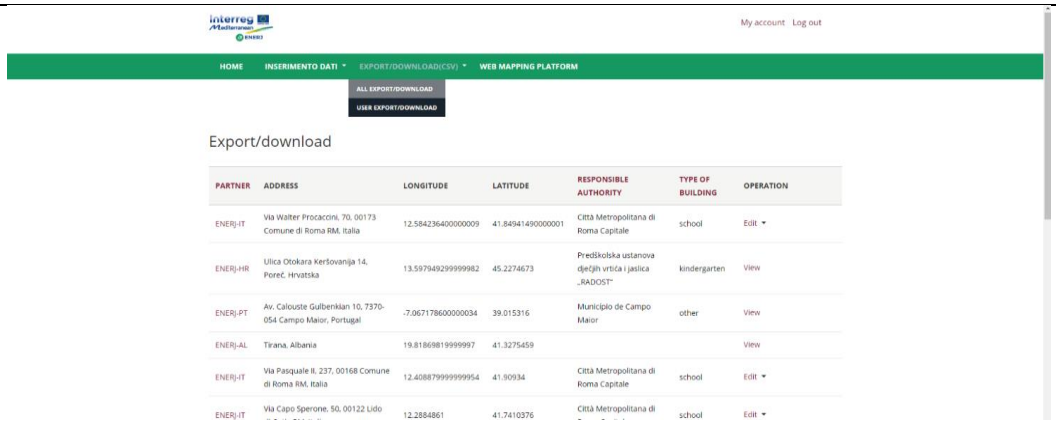
Please fill in the following table with main conclusions of the implementation of the pilots in your project.

What kind of MP result (tool, methodology, indicator…) was tested in the pilots?
The ENERJ web platform A Main output of the MED ENERJ project is the Web Platform: The ENERJ web platform is : ▪ A collection of data on local public building stock, to be prepared to explore the possibility of implementing energy efficiency interventions; ▪ A dynamic database updated by the partners and the municipalities through controlled access that allows the public and the investors (ESCO), to know the state of the art of the public buildings regarding their state of efficiency. ▪ An updated database containing information on the actions envisaged by the SEAPs The web platform is designed as a resource for local authorities and enterprises to check up on the energy characteristics of the local public buildings, and the actions that the local authorities have committed to undertake, for example in their Sustainable Energy and Climate Action Plans (SEAPs and SECAPs). **Main features of the web platform** ▪ Accessible for entering data on buildings and SEAPS by each partner and their municipalities through a registration with ID and PW; ▪ Freely accessible by the public and investors interested in knowing the municipal SEAPs; ▪ Allows to extract information on buildings in the data base in a CSV open data format. Local authorities' civil servants, can access the data input functions after logging in with their own specific accounts. **Accessing the platform:** www.enerj-platform.eu

Which are the main difficulties that the project found during the pilots' implementation? What are the strengths and weaknesses of the tested results?
First difficulty was to agree on the type of data to be used (Location, Type of Building, Geometric data, Technical data, Financing sources) After that, the database had to be created to insert these data. The problems arouse that not all public buildings had the required information, nevertheless, after a lot of work; the project partners could come up with reliable data to upload on the web platform.
Which are the main achievements of the pilots?
The Web Platform is a useful tool for municipalities to have a real picture of the energy condition of their buildings, with up-to-date information and therefore decide the priorities of energy refurbishment and the appropriate financing sources.
What are the main conclusions after the pilots' implementation?
A useful monitoring tool of which constantly updates the energy consumption of the buildings in the platform and is relatively easy to use.
What are the remaining needs that must be overcome to replicate the pilots without difficulty?
Usually replication comes through capacity building of results through workshops, seminars and new capitalization projects.

Please fill in the following table with main information of at least one of the most representative pilots of your Project. Answer the questions in an oriented way according to the pilot type.

Brief description of the pilot (Type of building affected, surface (m^2), affected surface (m^2), year of construction…)	The Pilot is still in the implementation phase. At this point, data are being uploaded to the web platform and results will be available in later months.
Location	Pictures of the Pilot
Objectives	
Physical measures (if implemented)	
Actions related to the Modular Project implementation (physical measures directly linked to	

the project development, methodologies implemented, training sessions, etc.)		
Estimated Annual Savings (€, Final Energy and emissions)		
Real Annual Savings (€, FE and emissions)		
Investment €)		
Other information	A description of the Web Platform features: • General data: Address, Name of building, Type of building, Year of construction, Year of renovation/retrofit • Geometric data: Net surface, Gross surface, Net volume, Gross volume, Number of floors • Technical data: Type of structure, Type of external walls, Type of windows, Type of roof, Type of heater, Energy efficiency class of heater, Type of heating terminals, Type of air conditioning equipment, Energy efficiency class of air conditioner, Main type of lighting, Energy efficiency class of building, Monthly electric energy consumptions (kWh), Monthly consumptions for heating (kWh), Energy Certificates of buildings (before and after renovation) • SEAP ACTIONS: Address, Type of buildings, Number of buildings involved, Presence of energy audits/analysis, Area of intervention (energy efficiency measures, renewable energy production measures), Responsible authority, Description of action, Energy consumption reduction goal (MWh/year), Renewable energy production goal (MWh/year), Number of buildings involved, Expected/actual start date, Expected/actual end date, Status of implementation, Expected costs as per action plan (€), Costs spent so far (€), Funding source	

KEY INDICATORS OF THE EFFICIENT BUILDING COMMUNITY

Please fill in the following table with the value of the indicators and comment if needed.

Indicator	Units	Value	Comments
Number of Pilots implemented within the project	1	40.000 Euro	Web Platform creation
Total square meters refurbished	m^2		
Total investments in EE projects achieved	€		
Total annual avoided CO_2 emissions	$Kg/m^2/year$		
Total Annual Primary Energy savings	$KWh/m^2/year$		
Annual generation of Final Renewable Energy	$KWh/m^2/year$		
Number of stakeholders participating in training activities within the project			
Number of signed Memorandums of Understanding (MoUs) or agreements with other projects or institutions within the project			
Other relevant indicators: _____			

IMPULSE PROJECT

The following questionnaire has been developed within the task 4.3 (Analysis and harmonization) of MEDNICE Project and its purpose is to capitalize the experiences of Modular Projects and to evaluate their impact by means of main indicators.
The results of the questionnaire will be vis
ible in a technical report and other communication channels. In this way, with a small contribution on your part the answers will contribute to jointly disseminate the Modular Projects' results, thus increasing their impact.

LESSONS LEARNED FROM THE PILOT IMPLEMENTATION

Please fill in the following table with main conclusions of the implementation of the pilots in your project.

What kind of MP result (tool, methodology, indicator…) was tested in the pilots?
STEPPING project tested a common methodology for EPC implementation in MED Area local administrations. The methodology is based on: Investment handbook with specifications for pilot activities; Investment Plan methodology; Simulation Tool for the evaluation of the financial sustainability of an EPC contract and a set of criteria and methodology to be used in EPC STEPPING tender's launch
Which are the main difficulties that the project found during the pilots' implementation? What are the strengths and weaknesses of the tested results?
In terms of project's activities, EPC Investment Plans for public buildings in the MED context have been prepared by all STEPPING partners according to what planned. Some partners went even beyond what foreseen by the project, delivering even more investment plans than initially foreseen. Nonetheless, considering: - the different stage of EPC market experience in partner's Countries: lack of awareness/knowledge concerning EPC and the efficiency of savings guarantee; existing ESCOS and energy supply market; - the very different legislative and framework conditions of each region involved in the project, also with standard documentation; it won't be feasible to work out and adopt a "common MED EPC model". On the contrary a common step by step procedure to guide the PP in setting up the conditions for EPC investments was a valuable and effective result. This is also highlighted by results of the Investment Plans phase of the project, where in some more mature contexts bundling buildings of several Municipalities was an affordable option, while for several partners only providing Investment Plans for each single Municipality made a real sense to the regional/legislative context. Further, in some cases, national incentives and subsidies conflicting with EPC have been made available, making EPC less attractive for municipalities. Concerning EPC tender launch, 2 over the 4 partners engaged in the tendering phase (Italian partners) succeeded in launching 2 tenders so far. For Piemonte Region there is a good chance another tender will be published by the end of the project. The Greek partner is trying hard to have the tender published by the end of the project, while for Spanish partner publishing the tender will not be possible, since the delivered Investment Plans seems to be not attractive enough to the ESCOs market. On the other hand, some other partners who were not formally engaged in this project's phase (i.e. French pp) are expecting to get an EPC tender launched by the end of the project in relation to the developed Investment Plan. As above reported, considering the very different legislative and framework conditions of each involved regions, instead of implementing a "common

MED EPC model", a common step by step procedure has been applied by all PP in setting up the conditions for EPC investments to be prepared.
Furthermore STEPPING project succeeded in:

- Strongly involve an high number of local authorities (more than 80) by signing MOU or letters of agreement;
- Select nearly 200 buildings integrating the local context and conditions and audit more than 100 (the audit has to define the feasibility and costs of saving measures as well as the optimized scenarios combining measures to reach the objectives). Two ways of selection have been tested with success during Stepping: 1. Selection by building type with good technical (high consumption) or financial (subsidies) potential; 2. Selection by municipalities with motivation to renovate a pool of buildings but in this case, a second step of building selection is necessary;
- Design two ways for grouping/pooling project: the traditional one with a common tender lead to some constraints like having a leader to launch the tender for all and a common timetable for all buildings' renovation. A different one with one tender per building or per municipalities but linked through a common operator insuring a market size. This common operator can be a public ESCO launching the tenders for the municipalities or eventually an energy agency or a public body working as a common facilitator. This second solution is particularly interesting to implement a sustainable EPC market not only for one project but for many projects in the next years. It is more complicated to set up, but it is more reassuring and efficient for the municipalities and for the market. The same tender model will be used many times and will save time for both demand and offer sides;
- Delivery significant transferring activities, in particular training courses (26) and meetings with stakeholders and target groups, which contributed to raise the competences on EPC, both of public procurers and market players but also of financing institutions and policy-makers. Public procurers and market players beyond the MED area have also been reached, since STEPPING was selected and featured in a high-level policy event at EUSEW19.

Which are the main achievements of the pilots?

Totally 16 Investment Plans were delivered, 2 EPC tenders have already been achieved and other 3 are expected to be launched by the end of the project.
The results available at this moment are referred to 67 municipalities involved, 158 buildings, 255 000 m², and €17,4M investments, but at the end of the project numbers will be even higher as some activities are still running. Anyway it is possible to state that the results are very interesting and significant. The average energy consumption of 167 kWh/m² is low due to the south climate and the choice of schools as pilot buildings by 3 partners: Spain, Malta and France (schools have low consumption due to their intermittent use). The average energy savings of 25% is good in comparison with the average €68 investment per m² but these values are not very representative as the range of values is very high from 9% to 58% of savings and from €7/m² to €232/m² investment.
In a global approach, higher investment leads to higher energy efficiency but the very high differences between the climate, the building types (from schools to hospitals) and the initial performance of the buildings cause to many exceptions such as high investments leading to poor energy savings or small investments leading to high energy savings.
The pilot projects seem to be divided in two groups considering the investment/m²:

- The first group is composed of projects with less than 30% savings and an investment lower than €100/m². The efficiency rate is high with between 1 to 2 kWh saved per invested euro. The motivation of these projects is clearly economic.
- The second is composed of projects with more than 45% savings and an investment around €250/m². The efficiency rate is low with between 0.1 and 0.3 kWh saved per invested euro. The motivation is not only economic but also building conservation; energy savings being just a part of a wider renovation project.

The leverage factor (cost of assistance VS investment) is > 20 for 5 partners especially in countries where an EPC market and a framework exist (Italy, France). Such leverage factor is compatible with ELENA or H2020 PDA projects. On the opposite, the ratio is < 10 for 3 partners in countries where the EPC awareness has to be increased and the EPC framework to be re-enforced (Slovenia, Spain, Portugal). This highlights the additional efforts that partners have to pursue to create a favorable context.
What are the main conclusions after the pilots' implementation?
- A stable legal framework for EPC and EPC awareness is needed in each country. - EPC is complex and specific skills are needed. - To define the frame of a project, opportunities/constraint, subsidies, market, legal framework, grouping capacity, tender specifications, are to be explored as early as possible. All steps are linked from the first analysis to detailed audits and depend on the model/opportunities. - It is necessary to pool small projects to interest the EPC market, but it is difficult to pool municipal projects in one common tender. - Considering the long pay-back time, some projects are not suitable for third party financing. From the economic point of view, the ambitious energy renovation is not financially justified. However, energy rehabilitation contributes to social benefits and it has to be taken into account. - EPC is not only a question of pay-back time or investment but also a question of market/budget for ESCOS.
What are the remaining needs that must be overcome to replicate the pilots without difficulty?
- Create more EPC awareness: organizing informative campaigns and training formats to increase the knowledge and share the knowledge between ESCOS and municipalities - Support energy advisory and energy management services, and create EPC technical assistance/facilitator services for the public sector - Subsidies are needed for municipalities/or ESCOs that can be combined with ERDF subsidies. - EPC can be seen as a tool to guarantee savings.

Please fill in the following table with main information of at least one of the most representative pilots of your Project. Answer the questions in an oriented way according to the pilot type.

Summary Results/Indicators of Investment Plans and tender carried out by AESS in the province of Forlì (ITALY)

<table>
<tr><td>Brief description of the pilot (Type of building affected, surface (m²), affected surface (m²), year of construction…)</td><td colspan="2">The analysis concerned 63 buildings owned by the Municipalities of Bertinoro, Castrocaro Terme and Terra Del Sole, Civitella di Romagna, Forlì, Forlimpopoli, Meldola, Predappio. The buildings being analyzed are mainly scholastic (classified as E.7 according to Presidential Decree 412/93 and subsequent amendments), with included gyms for some of them (category E.6 (2), and offices (E.2). Affected surface m²: 60.214 – Heated volume m²: 309.748
Only the Forlimpopoli and Predappio Administrations include in the present Service all buildings currently managed by an expiring Heat Service. For the purposes of the elaboration of the Investment Plan 2017 year has been taken as energy baseline. For each Energy Audits a wide number of improvements in terms of energy efficiency have been proposed.</td></tr>
<tr><td>Location</td><td>Municipalities of Bertinoro, Castrocaro Terme and Terra Del Sole, Civitella di Romagna, Forlì, Forlimpopoli, Meldola, Predappio, located in FORLI' Province (Emilia Romagna Region, Italy)</td><td>Pictures of the Pilot</td></tr>
<tr><td>Objectives</td><td>Intensive Energy refurbishment with EPC tender</td><td rowspan="6"> 
  </td></tr>
<tr><td>Physical measures (if implemented)</td><td>From new systems to envelope insulation interventions.</td></tr>
<tr><td>Actions related to the Modular Project implementation (physical measures directly linked to the project development, methodologies implemented, training sessions, etc.)</td><td>- MOU with municipalities
- Detailed energy audit of each building
- Pooling the municipalities/buildings
- Joint Investment plan
- Joint Tender procedure and launch</td></tr>
<tr><td>Estimated Annual Savings (€, Final Energy and emissions)</td><td>Energy saving: 27%;
Savings kWhe: 215.773
Avoided CO2 emissions: 108.033 kg CO2/y (t)</td></tr>
<tr><td>Real Annual Savings (€, FE and emissions)</td><td></td></tr>
<tr><td>Investment (€)</td><td>6.302.000</td></tr>
<tr><td>Other information</td><td colspan="2">Contract duration: 9-15 years
Available public funding/incentives considered (€: 40% National Incentive named "Conto termico (GSE)" 1.329.000€ from ROP ERDF Emilia-Romagna Region</td></tr>
</table>

Summary Results/Indicators of Investment Plans and tender carried out by Piemonte Region in the province of Novara (Italy)

<table>
<tr><td>Brief description of the pilot (Type of building affected, surface (m²), affected surface (m²), year of construction…)</td><td colspan="2">The Investment Plan involve 6 public buildings belonging to 2 municipalities, namely Ghemme and Borgomanero. Both Municipalities are settled in the province of Novara, in the East-North part of the Piemonte Region. One building, a large gym, is located in Borgomanero, whereas the resting 5 buildings (2 primary schools, one kindergarden, one gym and one office building) in Ghemme. The overall heated surface of the pool of the buildings is nearly 8.000 sqm, with an heated volume of about 50.000 cubic meter and a baseline consumption of 141.500 cubic meter of natural gas.</td></tr>
<tr><td>Location</td><td>Municipalities of Ghemme and Borgomanero, province of Novara (Piemonte Region, Italy)</td><td>Pictures of the Pilot</td></tr>
<tr><td>Objectives</td><td>Intensive Energy refurbishment with EPC tender</td><td rowspan="5"> 
  </td></tr>
<tr><td>Physical measures (if implemented)</td><td>A set of measures for each building such as:
• change of heating system
• insulation of roofs
• insulation of envelopes
• change of indoor light
• energy management system
The above list is only indicative and details are provided for each building in the audits. In any case it is the ESCO that is asked to provide its own solutions during the bid delivery.</td></tr>
<tr><td>Actions related to the Modular Project implementation (physical measures directly linked to the project development, methodologies implemented, training sessions, etc.)</td><td>- Formal agreement with municipalities
- Detailed energy audit of each building
- Pooling the municipalities/buildings
- Joint Investment plan
- Joint Tender procedure and launch</td></tr>
<tr><td>Estimated Annual Savings (€, Final Energy and emissions)</td><td>Energy saving: For each Municipality and energy curries a minimum energy saving target is fixed:
• for Borgomanero: 56.2% for natural gas, 47.0% for electricity);
• for Ghemme: 35.6% for natural gas.
Minimum Avoided CO2 emissions: 140.300 kg CO2/y (t)</td></tr>
<tr><td>Real Annual Savings (€, FE and emissions)</td><td></td></tr>
<tr><td>Investment (€)</td><td>450.000€</td><td></td></tr>
<tr><td>Other information</td><td colspan="2">Available public funding/incentives considered (€: 40% National Incentive named “Conto termico (GSE)” 140.000€ from ROP ERDF Piemonte Region</td></tr>
</table>

Summary Results/Indicators of Investment Plans and tender carried out by Piemonte Region for INRiM Italy's national metrology institute in Torino (Italy)

<table>
<tr><td>Brief description of the pilot (Type of building affected, surface (m²), affected surface (m²), year of construction…)</td><td colspan="2">The Investment Plan involve 7 public buildings belonging to the Italy's national metrology institute, namely INRiM. The research centre is settled in Torino, in the West-North part of the Piemonte Region. All buildings are used as office and labs. The overall heated surface of the pool of the buildings is nearly 17.804 sqm, with an heated volume of about 91.748 cubic meter and a baseline consumption of 472.217 cubic meter of natural gas. All buildings are supplied with the same heating system.</td></tr>
<tr><td>Location</td><td>Torino (Piemonte Region, Italy)</td><td>Pictures of the Pilot</td></tr>
<tr><td>Objectives</td><td>Intensive Energy refurbishment with EPC tender</td><td rowspan="7"> 
  </td></tr>
<tr><td>Physical measures (if implemented)</td><td>A set of measures for each building such as:
● change of heating system
● insulation of roofs
● insulation of envelopes
● change of indoor light
● energy management system
The above list is only indicative and details are provided for each building in the audits. In any case it is the ESCO that is asked to provide its own solutions during the bid delivery.</td></tr>
<tr><td>Actions related to the Modular Project implementation (physical measures directly linked to the project development, methodologies implemented, training sessions, etc.)</td><td>- Formal agreement with INRIM
- Detailed energy audit of each building
- Pooling the buildings
- Joint Investment plan
- Joint Tender procedure and launch</td></tr>
<tr><td>Estimated Annual Savings (€, Final Energy and emissions)</td><td>For each energy curries a minimum energy saving target is fixed:
● 16.8% for natural gas,
● 13,4% for electricity;
Minimum Avoided CO2 emissions: 263.960 kg CO2/y (t)</td></tr>
<tr><td>Real Annual Savings (€, FE and emissions)</td><td></td></tr>
<tr><td>Investment (€)</td><td>1.631.712€</td></tr>
<tr><td>Other information</td><td colspan="2">Available public funding/incentives considered (€: 40% National Incentive named "Conto termico (GSE)" 231.400€ from ROP ERDF Piemonte Region</td></tr>
</table>

KEY INDICATORS OF THE STEPPING PROJECT

Please fill in the following table with the value of the indicators and comment if needed.

NOTE: data are referred to a significant number of buildings involved. Numbers are going to still increase by the end of the project

Indicator	Units	Value	Comments
Number of Pilots implemented within the project		67 Municipalities 158 buildings	
Total square meters refurbished	m^2	256 549	
Total investments in EE projects achieved	€	17,4M	
Total annual avoided CO_2 emissions	$Kg/m^2/year$	About 1.600.000	
Total Annual Primary Energy savings	$KWh/m^2/year$	167	The average energy consumption of 167 kWh/m^2 is low due to the south climate and the choice of schools as pilot buildings by 3 partners: Spain, Malta and France (schools have low consumption due to their intermittent use)
Annual generation of Final Renewable Energy	$KWh/m^2/year$		
Number of stakeholders participating in training activities within the project		Not yet available final number of participant as reporting activity is still running. 25 training events organized 2 web/conference training (EU level)	
Number of signed Memorandums of Understanding (MoUs) or agreements with other projects or institutions within the project		67 MOU or agreements signed with municipalities 1 MOU signed with MED NEW FINANCE	
Other relevant indicators: % energy saving		25%	