

FINAL TRAINING PROGRAM

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1. INTRODUCTION

1.1. Intro to Marie Project

According to the point -1.3 Summary of the project (text below)

“MARIE aims to improve Med. building energy efficiency (EE) and exploit the opportunities presented by EU policy and directives on EE in Buildings, taking into consideration the distinct characteristics of the MED space and creating more suitable socio-economic conditions in order to meet the following challenges:

- *The need for new regulations and institutional tools in response to the new EU Energy Performance of Buildings Directive (EPBD) recast.*
- *The lack of financial mechanisms able to stimulate EE refurbishment of buildings.*
- *The Small and Medium Enterprises (SME) dominated buildings sector requiring external support in order to stimulate innovation in the provision of adequate services and products for energy refurbishment of buildings.*

MARIE includes 3 groups of Pilot Actions (PA) to test and develop solutions in response to these challenges.

The final result of the project will be the MED Building EE Strategy (MEDBEES). This will integrate the outputs from all tasks (WPs) combining top-down, bottom up, supply and demand side considerations enriched by new know-how gained from the Pilot Actions.”

The overall objective of MARIE is to achieve an improvement of EE renovation in the existing buildings in the Mediterranean, considering the goals for 2020.

1.2. Intro to Core Training Program

Previously to the detailed development of the Training Program, there has been an analysis and study of the actions that the different countries have developed to improve the EE in the existing buildings in the Mediterranean region (Provider Analysis). From the analysis of the actual state the baselines for the future training program have been defined.

1.3. Intro to Final Training Program

Within the framework of MARIE a training program model has been generated with the objective of standardizing the most relevant best practices (BP) in terms of EE improvement in existing buildings.

The most replicable BP are completed and optimized, in a way that they will allow to reach all the objectives of MARIE, and in addition, they will be replicable to other regions, through procedures and training actions.

This includes a proper performance of information and communication actions, training actions, products and services improvement, financial sustainability and legal agreements solutions.

It's hoped that throughout the Final Training Program (FTP) different profiles will be trained to apply the protocols of a MIP, in part (BP) or in global (MIP), and in any region, through training actions and later, through the exercise of professional practice.

2. AIMS OF THE FINAL TRAINING PROGRAM

General aims:

To improve building actors' energy related capacities, including technicians and decision-makers, at all stages of the building life cycle: previous use, awareness of energy deficiencies, analysis and diagnosis of actual conditions, design and refurbishment with the incorporation of new solutions and technologies in order to facilitate the improvement of energy performance in existing buildings in line with EU sustainable development and energy policy as well as to offer guidance in the decision making during the whole process.

Specific aims:

To define a strategy that has to achieve the Energy Renovation of Buildings (ERB) supply and demand activation through the development of an "applied" training program based in best practices of ERB. For optimizing any available resources, the proposal will concentrate in those strategically selected typologies with greatest energy saving potential.

The strategy defined in this measure 2.2, will contribute to the development in MARIE of a Mediterranean Building Energy Efficiency Strategy (MEDBEES) providing a roadmap for the significant training changes that are required for a better rationalization of the ERB, the management and the use of energy in the Mediterranean.

3. FINAL TRAINING PROGRAM STRATEGY

In order to set up a strategy aimed to the development and definition of training contents and methodologies in the Mediterranean region, it has been necessary to identify those training agents and programs which are currently being held in the different participating regions, as well as those relevant cases which have been developed in terms of energy efficiency in the same regions.

3.1. Identifying training needs and systems: state of the art

True market necessities: Training needs

In order to define the criteria that should guide the drafting of a Mediterranean map of training needs aimed to the energy efficiency of buildings an analysis of relevant case studies implemented in the different regions was necessary. These best practices were used as an indicator of the actions that have already been implemented in the different regions and to detect those best practices that can generate big impacts in energy saving.

The collection of the relevant cases (Best Practices BP) was developed by Escola Sert as part of a pilot activity and is attached as *ANNEX 1: PROVIDER ANALYSIS RESULT*.

In order to quantify the impact of these best practices' implementation and therefore, the number of agents that will be trained, it was necessary to resort to the state of the art of the building stock which was developed in WP4/Task 4.1 (Regional Benchmarking Analysis of the Demand Side For Energy Efficiency in Buildings) in April 2012. The number of existing buildings, according to typology and year of construction, will be used to quantify the number of agents that need to be trained to fulfil the objectives established by the European commission.

Training systems and methodologies

As a starting point, a survey on the existing training situation on the Mediterranean has been taken among the participating regions involved with the objective of detecting the current training providers and programs as well as analyzing the main weaknesses to achieve the EU established goals in terms of energy and sustainable development.

The training campaign data collection has tried to gather enough information regarding the following points:

- **Training agents** that are currently developing programs related to energy efficiency and sustainable refurbishment in existing buildings. The agents included professional schools, universities, associations, private companies and public organizations.
- **Training programs** related to energy efficiency and sustainable refurbishment in existing buildings that are currently being developed and relative to the different fields of action: maintenance, use/management, construction/refurbishment, energy generation/distribution or others).
- **Trained professionals and work force** that are taking part in these programs, including high-level technicians, medium-level technicians and trade workers and specifying if the training is addressed to the public or private sector.
- **Methodology** of each program specifying if the program is connected to the praxis and if it's linked to a specific building typology (offices, detached dwellings, schools, etc.).

The methodology for the analysis of the information received was:

1. Data collection
2. Integration of the information
3. Analysis of results

To compile all the data and information, a template was distributed among the participating regions including a brief description of the requested information. The state of the art is attached as *ANNEX 2: CURRENT TRAINING SYSTEMS QUALITATIVE ANALYSIS*.

Conclusions

After analyzing the data received from each region regarding training systems and true market necessities the following could be concluded:

- There is a big diversity of courses and programs related to energy efficiency and renovation throughout the Mediterranean.
- Training is not connected to the praxis in good practices. The program contents are not necessarily focused on successful real cases in ERB projects (projects with maximum energy savings, minimum investment and high replicability). Training systems are not connected to a systematic market analysis of real cases.
- Training based in procedures hasn't been detected. Traditional training is based on individual situations with its particular characteristics and conditions.
- There are profiles and roles which are not currently being qualified and promoted but have high impacts in the generation of energy saving projects. Training is generally addressed to technicians and not to other roles which are also involved in the energy renovation of buildings (promotion, communication, marketing, etc).
- Training systems don't involve the demand. It's a system generally limited in training the supply agents. The risk of training just the supply is to supersaturate the market with unemployed technicians and to develop training with no interested students.
- Training is not based in real cases. The students do not experience the market situation but work on hypothetic situations that will never be really proved.

3.2. Designing a new training program model: hypothesis

With the information of the current training systems and the market necessities we have been able to detect the following gaps or barriers between both. The detection and analysis of these barriers has been used to set up the guidelines of a training system model which will try to fill in the gaps and complete the methodology. The hypotheses used as a baseline for the model are the following:

- **Hypothesis 1:**
Cloning successful best practices can improve the impact of Energy Efficiency (EE) projects. A training program based on replicable best practices, and not based in individual particular cases, will improve the results of the projects that will be implemented.
- **Hypothesis 2:**
It's possible to elaborate action protocols based on best practices which will guarantee the reliability of relevant real cases able to generate high impact savings.
- **Hypothesis 3:**

Training not only technicians but all agents involved in ERB projects will improve its results, such as decision-makers, commercial managers, users, etc.

The actual training is very technician based, but the success of future intervention projects will depend on other roles and profiles which are not conveniently being trained.

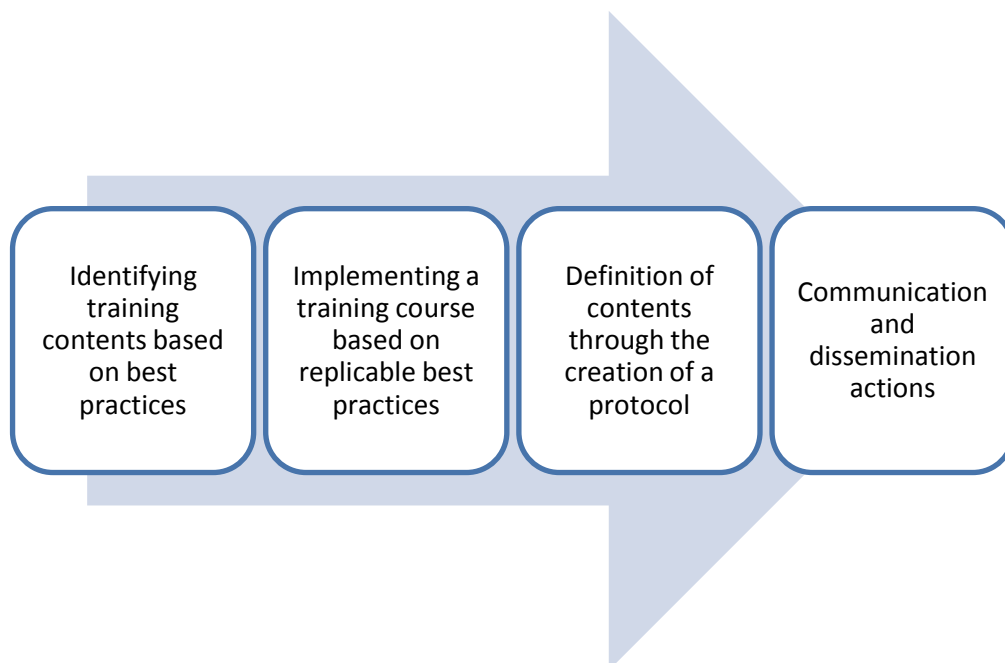
- **Hypothesis 4:**

The demonstration of results (energetic and economical savings) through actions in real cases will stimulate the participation of other projects.

A training program which performs directly on real buildings (learning by doing), involving institutions in charge of a big amount of buildings stock, will stimulate the participation of other buildings and therefore, will contribute to accelerate the process of ERB.

4. STRATEGY VALIDATION: PILOT ACTIONS

In order to verify the hypotheses of the training program model different pilot actions have been developed. These pilot actions are to be considered as research initiatives that will verify the efficiency of the methodology used and will help to detect other training needs not identified in the state of the art as well as confirming the reaction of the market.



4.1. Identification of training contents based on Best Practices in EE

In order to detect those successful best practices in which the training contents will be based on, a collection of implemented projects in energy efficiency throughout the Mediterranean was developed.

The first pilot activity, related to the collection, analysis and selection of best practices, was developed in a Mediterranean scale, with the following partners involved: Generalitat de Catalunya, Region PACA, University of Evora, UMAR (Malta), Region UMBRIA, GOLEA (Slovenia) and ANKO (Greece).

The objectives of the pilot action were:

- To **validate a procedure** to collect, select and analyse best practices to develop the contents of a training program.
- To **detect a first draft of training contents and methodology** that need to be developed in order to generate savings aligned with the European commission objectives.
- To **produce a map of existing good practices** in most of the Mediterranean regions, with the highest potential in terms of reduction of energy consumption.
- To **detect the actors** implied in both parts, supply and demand, in each of the case studies and define their profiles and needs in terms of awareness and training.

When collecting real and successful examples of EE renovation of buildings, some minimum requirements must be fulfilled. We have called those case studies meeting the standards “best practices” (BP) and once selected they have becomes appropriate for being analysed in order to design the awareness and training program that is best suited to cover its needs in both sides, supply and demand.

The criteria used for the selection of best practices were:

- Actions already implemented.
- $\geq 20\%$ energy saving with respect to previous situation.
- Return of investment ≤ 10 years.
- Replicable in other Mediterranean regions.

After the final deadline and once each regional provider sent all of their required documentation, the Escola Sert COAC collected, classified and analyzed all the obtained data. 114 channels were used to disseminate the project and more than 100 experts collaborated providing 102 Best Practices.

The methodology is detailed in the *ANNEX 3: PROCEDURE AND DOCUMENTATION FOR THE COLLECTION, ANALYSIS AND SELECTION OF BEST PRACTICES*.

4.2. Implementation of a training course based on Best Practices

The second pilot activity, related to the implementation of a training course in efficient use of office buildings, based on replicable best practices and using learning by doing methodology was developed in a regional scale with the involvement of Generalitat de Catalunya and Escola Sert.

The objectives of this pilot action were:

- To **confirm the results of the BP** used as a reference and prove that the actions that were developed can be replicable in other buildings achieving similar results in terms of energy saving, investment, job creation, etc.
- To **connect supply and demand**, open up new ways of employment and professional practice, adapting the profiles to the market demands and answering to the regional needs. Training (understood) as a springboard directly to employment.

From the selection of best practices the ones considered to have a higher impact are those related to Management and Use in Office buildings: they don't require investment in equipment and are able to produce immediate results. These experiences could be extrapolated to the vast majority of office buildings in the Mediterranean, with centralized management and either of private or public property. Following you will find a table with the selection of the most replicable best practices collected.

Table 1

The selected Best Practices have been rated according to additional criteria shown in the vertical columns. 1 is the lowest rate and 3 is the maximum one.

	Maintenance	Geographic impact	Energy Savings Impact	Short/Long term results	Use	Geographic impact	Energy Savings Impact	Short/Long term results	Construction	Geographic impact	Energy Savings Impact	Short/Long term results	Energy Generation / Distribution	Geographic impact	Energy Savings Impact	Short/Long term results
OFFICES (Public)					ES 4	3	3	3								
SCHOOLS (Public)	ES 9	3	2	3	ES 9	3	2	3								
SCHOOL DANCE (Public)									FR 22	1	3	2	FR 22	1	3	2
SCHOOLS (Public)	FR 35	3	2	3												
THEATRES (Private)	ES 14	1	1	1					ES 14	1	1	1	ES 14	1	1	1
Tertiary Sector (Public)	PT 7	3	3	1												
Tertiary Sector (Private)	GR 2	3	1	3	GR 2	3	1	3								
Tertiary Sector (Mixed)					PT 6	3	3	3								
Tertiary Sector (Mixed)					ES 11	3	1	3								
Residential - Detached (Private)									FR 1	1	3	2				
Residential - Detached (Private)									FR 8	1	3	2				
Residential block (Public)									FR 14	2*	2	1				
Residential block (Private)									IT 14	3	2	1	IT 14	3	2	1
Residential block (Private)									FR 15	2*	2	1				

The best practices taken as reference for the course were the experiences carried out in Catalonia (BP ES 4, ES 9 and ES 11), the experience in Greece (BP GR 2) and the one in Portugal (BP PT 6).

Two editions of the course have been implemented, which have been used to detect the barriers of the market and provide solutions in order to create and define a protocol in efficient use of buildings.

In the first edition of the course six office buildings participated, including public and private properties, as well as 39 students. In the second edition, 6 buildings participated as well as 34 students.

The contents, program and procedure of each edition are attached as *ANNEX 4: ENERGY MANAGEMENT TRAINING COURSES*.

4.3. Definition of the final contents of the course through the creation of a Protocol

During the implementation of the experimental training course with focus on office buildings' use improvement, the experts responsible of the course but also the two MARIE partners participating (Lead partner and UMAR) have understood the importance of the standardization of procedures for intervention.

A pilot activity in this field was implemented in Catalonia consisting in the creation of the technical training contents for a course in efficient use and management of office buildings, with the objective of creating a replicable model protocol which could be implemented in other building typologies and regions. This protocol was based on the best practices of reference and fostered by the experiences and problems encountered during the implementation of the training and compose the base of the training contents.

The objectives of this pilot action were:

- To **generate a replicable protocol based on BP** of reference that will be replicable in other buildings and regions and will generate energy and economic savings.
- To **design the training contents of the course**, considering all the characteristics defined in the final training program strategy: program based on replicable best practices, considering all roles and profiles, performing on real buildings and involving demand.
- To **detect the local barriers** for the implementation of this kind of actions. These barriers may or may not be coincident between regions and should be tested in every region.
- **Activate the participation of office buildings** in the public and private sector with the implementation of a specifically designed energy management system.

Each typology of building (offices, commercial, individual homes, collective housing, hotels, schools, etc.) but also each type of intervention (maintenance, management, equipment renovation, refurbishment, etc.) requires a specific effort to determine the detailed training contents to implement improvement measures and to monitor the energy and economic savings achieved.

The Protocol developed in the pilot action is attached as *ANNEX 5: PROTOCOL MARIE: ENERGY EFFICIENCY IN THE USE OF OFFICE BUILDINGS*.

4.4. Dissemination and communication actions

Once the protocol is designed and tested in different buildings through pilot actions it's necessary to carry out dissemination actions in order to spread its results within the market and activate the participation of other buildings.

The experience has proved that the demonstration of results through actions in real cases stimulates the participation of other buildings and the involvement of institutions. The background of a European project like MARIE has provided security and inspired confidence within the institutions and owners and has proved to be a key factor in the demand-activation.

Different dissemination activities, involving public and private entities, related to the pilot action courses and its training contents are being prepared in Catalonia:

- Communication actions within the "*Estratègia Catalana per la renovació energètica d'edificis*", promoting the best practices collected, the pilot action course and its training contents.
- Dissemination session of energy efficiency in office buildings: Barcelona, 31st of October 2014.
- Publication of the procedure in the webpage of Col·legi Oficial d'Arquitectes de Catalunya: May 2014
- Dissemination session of energy efficiency in hotels: Barcelona, June 2014
- Dissemination session within the "World Sustainable Building 2014": Barcelona, 28th, 29th and 30th of October 2014.

4.5. Conclusions

- Regarding the Best Practices detection, the amount of best practices collected was sufficient but not as numerous as expected. The methodology used proved to be adequate but the number of implemented best practices is higher. The creation of regional teams in charge of detecting and collecting the latest BP seems necessary to keep updating the contents.

- The implementation of best practices in the different regions is very heterogeneous. Their field of action and building typology is biased by the stimulations received by every region. Some of the best practices collected require a high initial investment, which makes them not easily replicable.
- The most efficient best practices detected with the compilation of best practices (in terms of high savings with no investment) are the ones involved in energy management and use of buildings. These low cost actions, achieving savings with zero investments and just managing the use of the building, could invest the savings generated in other actions increasing its impact.
- The best practices collected mainly consist of the development of specific actions carried out by a group of professionals in one particular building. In these groups of actions the procedures are not developed.
- Evaluated and certified protocols by the European commission are necessary in order to guarantee the success and generate confidence throughout the market.
- The actual market forces the building's maintenance sector to take responsibility for energy management but the training in these profiles doesn't always include this capacity.
- It's possible to generate procedures based on a group of actions aimed to the efficient use of the building's skin, its installations and the users' habits of use with the objective of saving energy.
- Learning by doing methodology proved to be efficient but not exclusive. The high amount of technicians and profiles to train indicate the necessity of combining it with other methodologies.

5. TRAINING PROGRAM

5.1. Premises for the Training Program development

After the implementation of the pilot actions a validation of the proposal has been carried out, analyzing the hypotheses which were established before the pilot actions development and the conclusions from its implementation.

The premises for the development of a training program are:

- Best practices can be replicated if systematized. Detecting, analyzing and improving successful best practices implemented in each region can guide the organization of effective training courses focused directly in practical skills development and spread energy efficiency practices in other buildings, generating higher savings.

- Protocols for intervention in buildings can be standardized according to building and intervention typology. The implementation of protocols allows a structured intervention and can structure the contents of the training program.
- Considering and involving all stakeholders, from both sides of the market, improves the success of the implementation of protocols.
- A training program which performs on real buildings (learning by doing) stimulates the activation of buildings and owners and contributes to accelerate energy renovation processes. In addition, the inclusion of real cases in the program generates very valuable capacities among the students, related to market activation and users' activation and helps to demonstrate the success of implementing the protocol.

5.2. Final Training Program Model

If MED regions want to design and implement a training program to reinforce the ERB strategy implementation, they must consider the five main lines of work integrated in the training model:

- Best Practices collection and analysis.
- Design of training contents based on protocols.
- Implementation of training courses: retrofitting and redefinition of the final training contents.

Best Practices collection and analysis

The first step for the development of a training program is to identify the main contents and profiles on which it will be based, throughout the detection of relevant best practices in the region. The criterion used for the selection of best practices is:

- Actions already implemented.
- $\geq 20\%$ energy saving with respect to previous situation.
- Return of investment ≤ 10 years.
- Replicable in other Mediterranean regions.

The BP collected will need to be classified according to different parameters like **type** (action or training), **use** (offices, residential or mixed), property and management

(public/private), **field of action** (construction, maintenance, energy generation, etc), **% of energy saved, level of investment** ,etc.

Those relevant BP will have to be completed in terms of:

INFORMATION: To identify those tools optimum for the collection and recording of data in a structured and systematic way, in any case or in any building. Those tools must be suitable to collect the numerical data of the energy consumption of a building, a group of buildings or a neighbourhood, for an enough period of time, different seasons, different day time, etc. The amount of information must be sufficient to draw meaningful conclusions.

COMMUNICATION: To identify communication processes aimed at achieving the objectives. It will be highly valued those who have been targeted to raise awareness and to the commitment of the parties involved in the project, in each of the stages of development.

TRAINING: To identify the mechanisms of training, that within the project have been designed to enable any of the profiles (professional or users) who have participated in the development of good practice.

PRODUCT AND SERVICES IMPROVEMENT: To identify improvements in products and / or services that each practice has implemented during the development process and, if an investment has been made in construction, if the project has been an improvement in the management and use of buildings, etc..

EMPLOYMENT: To evaluate and quantify, in each case, whether staff have been hired to develop management and maintenance tasks, or any other practice that the execution of each practice requires.

FINANCING: To identify sustainable funding models based on the resources that the practice has generated.

COLLABORATION AGREEMENTS: To identify models of collaboration, initial commitments, contracts and agreements that have defined the relationship between all parties involved in the development of each practice, public and private organizations.

An expert team, using local data of each region and also indicators of all Mediterranean area, will need to select the most replicable BP according to the potential of the regional impact in the following fields:

- Energy Savings impact.
- Geographic impact.
- Short/Long term results.

The methodology and activities for the Best Practice collection and analysis is:

1. Data Collection

- Detection of dissemination channels and contacts with institutions and experts to communicate the action.
- Expert panels and dissemination actions.
- Data gathering.

2. Integration of the information collected

- Integration of all the BP received: requirements fulfilment, classification according to typologies and fields of action.
- Data validation and benchmarking proposal.

3. Analysis of results and BP improvement

- BP analysis by expert committee: detection of key factors, analysis of gaps, replication possibilities, geographical and economical impacts, etc.
- Selection of most relevant BP and confirmation of the level of fulfilment according to: information, communication, training, improvement of products and/or services, financial models and collaboration agreements.
- Proposal and validation of the necessary actions to improve the energetic, social and economical impact of the BP selected.

4. First draft of major impact practices

- Final proposal of major impact practices, separated by building typologies and fields of action and specifying roles and responsibilities.

Design of training contents based on protocols

The second step of the training program development is the elaboration of the training contents, which could be based on standard protocols created according to fields of action and building typologies. All of the actions destined to the fulfilment of those relevant BP, which have been selected in the first phase of the training, generate a protocol of intervention for every case.

Main subjects of the training program:

The main subjects of the training program aimed to improve buildings' energy efficiency in the Mediterranean have been detected in the first pilot action (Identifying training contents and typologies) and could be divided in three groups:

- Energy efficiency in the **use of the building**: use of the building's skin (facades, openings, divisions...), use of the building's energy systems (ventilation, lighting, heating...) and management of the building's users.
- Energy efficiency in the **maintenance of the building**: maintenance of the building's skin and energy systems.
- Energy efficiency in the **intervention in the building**: renovation of passive systems, renovation of active systems and renovation of energy generation/distribution systems.

Contents of the subjects:

The contents to be developed by each subject will be based on the protocols of intervention developed for each subject and specified for each building typology.

Although the Core Training Program classified the BP in four groups (maintenance, use, construction and energy generation/distribution) actions in renovation of existing buildings can be summarized in three groups:

- **Use** of the building.
- **Maintenance** of the building.
- **Intervention** on the building: passive systems, active systems and energy generation/distribution.

Following you can find a scheme of all the protocols that have an impact on energy renovation of buildings:

	USE	MAINTENANCE	INTERVENTION		
			PASSIVE	ACTIVE	ENERGY
OFFICE BUILDINGS	✓				
SCHOOLS					
HOTELS					
DWELLING BLOCKS					
DETACHED DWELLINGS					
COMMERCIAL					
(...)					

It's necessary to standardize these protocols achieving an overall technical agreement on this standardization process. The **guidelines for the creation of procedures** are:

- Alignment with the European Commission objectives in terms of energy efficiency of buildings, its deadlines and goals.

- Based on best practices which fulfil all the criteria: actions already implemented, with at least 20% of energy savings with respect to previous situation, return of investment inferior to 10 years and replicable in other regions.
- Specification of its territorial range: local, regional, Mediterranean or global scale.
- Definition of its scope of action: building typology, field of action, area, etc.
- Design by qualified technicians.
- Inclusion of all agents, whose involvement guarantees the success, including supply and demand.
- Presentation and validation of results to the competent authority, to prove the results obtained and assure its possibilities of success.
- Technical data provision in order to compare results and achievements.
- Inclusion of references: buildings, experts, institutions, etc.
- Experimentation through a pilot action to test the procedure and present results.

The training contents will need functional and geographic adaptations. The experimentation works developed to create the contents have showed us the method, the importance and the need to develop protocols but is only the first step of a large and intensive process that each region should implement to create an adapt and effective training program. Throughout the Training Program different profiles will be trained to apply it in every typology proposed and in every Mediterranean region, as a transversal and generic method or procedure.

The training program should include the participation of all stakeholders, playing different but main roles in every one of them. Each region should identify all the roles and profiles involved in the implementation of the protocol in their region.

The same procedure used to create the *Protocol in use of office buildings* could be used to create the other protocols of the system. Each building typology, as well as each region, needs to adapt the general protocol of intervention of each of the three groups.

Nonetheless the design of training contents based on protocols needs to be implemented in parallel to other typologies of training models and shouldn't be exclusive. There's a big variety of energy efficiency training already being implemented in the MED countries which is relevant and necessary to reach all fields of actions and agents. You can find some examples in the *ANNEX 6: OTHER ENERGY EFFICIENCY TRAINING IMPLEMENTED IN MED COUNTRIES*.

Profiles and roles:

The specific contents should be oriented to update or generate the competences needed for every profile necessary for the ERB projects performance. These profiles should be detected and validated through the different Pilot Actions based on every protocol.

The roles and profiles to be trained will have to be defined by the expert commission in charge of the definition of each protocol. Although a first draft of roles and responsible can be defined according to the BP collected and analyzed, it's necessary to confirm the hypothesis throughout the implementation of pilot actions. The experience carried out in Catalonia demonstrated that the experimentation with real buildings is an effective way to detect those roles that ensure the success of the protocol's implementation.

The pilot activity experience developed in Catalonia, related to efficient use of office buildings has detected five main roles:

- The role of **energy management**, represented by the energy manager. It needs to have technical knowledge in diagnosis, energy improvement actions implementation and follow-up tasks. It will technically lead the protocol in coordination with the building's owner, the management of the organization that occupies the building, the maintenance staff and its workers and users.
- The role of **operational management**, represented by the building's facility manager or its maintenance responsible. It needs to receive information of the responsible of the external maintenance contracts of equipment and installations and must participate in the organization of data gathering, in the improvement actions implementation and its management and follow-up.
- The role of **organizational management** represented by a responsible of the property, the responsible of human resources or communication department of the organization. This role has been considered indispensable for the success of the protocol implementation. In the cases where it hasn't existed the first implementation phases have failed.
- The role of **responsible for the property**, represented by the property of the building or the senior management of the organization occupying the building. It must obtain and transmit information to the responsible of Financial direction, Human Resources and Communication office. It must assist in periodical meeting with the energy management team and facilitate the information to workers and users.
- The role of **representative of workers and users**.

These roles detected could be the same roles involved in other protocols of intervention, but they may need an adaptation according to the each region and each protocol.

Typology of training courses

The definition of typology of training (e-learning, on site, etc.) as well as the number of hours or number of students will depend on different factors: the situation of every region, the training agents' territorial scope and resource availability, the target to be trained, etc.

Overall, courses could consist of a theoretical part, which could either be implemented on site or online, and a practical part experimenting on real cases, which has to be held in the different buildings participating in the course and accompanied by tutoring of teachers.

But in any case, **learning by doing methodology** has proved to be effective in terms of activating buildings in the energy renovation process, as well as qualifying students with better competences and involving supply and demand in the training.

A proper mixture of methodologies will be necessary for covering, at the same time, both the qualitative and quantitative training needs. But the high number of professionals to be qualified will require a combination between this kind of real-cases experiences and other methodologies, such as case-study methodology, lectures or master classes.

The methodology and activities for the design of training contents based on protocols is:

1. Expert panels' creation (experts in each of the typologies and fields of action, including supply and demand).
 - Identification of key factors.
 - Identification of gaps that need to be fulfilled (information, communication, training, products or services, financial model and collaboration agreements).
 - Identification of stakeholders and profiles and roles to train.
2. Creation of expert committee to define the training contents (experts in development of training contents)
 - Definition of contents, methodology, number of hours, number of students, etc.
 - Creation of training material.
 - Drafting of the generic protocol, according to field of action and building typology (carried out by experts in that field of action and typology)
 - Verification of guidelines fulfilment.
3. Communication and agreements.
 - First contact with training agents who could implement the program.

- First contact with institutions, companies, etc. who could be interested in including their buildings in the first edition of the courses.
- Dissemination actions: sessions, conferences, interviews, etc.
- Collaboration agreements definition.

Implementation of training courses: retrofitting and redefinition of the final training contents

The experience of the pilot actions has proved the adequacy of using the first editions of a training course to readjust and redefine the training program. Before carrying out a massive implementation of the training program in a regional scale, the implementation of a first edition in a local scale will be used to:

- Test the theoretical aspects defined in the contents within the real market and verify the hypothesis in which these have been set up.
- Redefine the contents, methodology and typology of the courses.
- Adjust and redefine the roles and competences detected.
- Implement the protocol in real buildings to test the replicability and verify its potential impact in terms of energy efficiency.

The final step for the definition of a training program is to elaborate a communication and dissemination strategy in order to reach all stakeholders and activate the buildings and students' participation. The strategy developed during the pilot actions **to** activate the participation of buildings has proved to be effective and stimulating. Including real buildings in the training is a win-win strategy for both sides.

The participating buildings get to implement an action protocol in their building aimed to improve their energy efficiency, as well as training some of their staff in this specific program which will be able to replicate the procedure in other buildings.

On the other hand, the experimentation through real cases (learning by doing) qualifies students with a better absorption and connects them to real praxis and the market problematic.

The inclusion of real successful cases will help the demonstration of the procedures' results and should activate new participation of the buildings' owners and managers and also of new students (future experts) in the ERB processes.

The methodology and activities to implement training courses is:

1. Detection of stakeholders and contact with institutions and companies.

- Detection of stakeholders involved and search of institutions, companies, organizations (private and public) that could communicate the training and be interested in reaching agreements.
 - First contact with dissemination institutions.
2. Strategy and communication plan definition.
 - Invite local training agents to access the Final Training Program and implement it in their regions.
 - Invite communication agents for the dissemination of the Final Training Program.
 3. Implementation of the training courses.
 - First part of the implementation: theoretical contents.
 - Second part of the implementation: actions in real buildings.
 4. Retrofitting and redesign
 - Revision by the expert committee of the protocol and readjustment of the contents.

5.3. Next steps

The objective of this document is to define a strategy to develop a training program to be implemented in the Mediterranean area in accordance with MARIE strategic lines to improve Mediterranean buildings energy efficiency.

In order to continue with the **implementation of this training program model** proposal within the different participating regions there are some next steps that could be developed:

- During MARIE working time all partners involved in training tasks have experimented the collection, classification and analysis of best practices; however the feeling is that there are many more best practices which haven't been detected. In this sense, **if a region wants to build an effective training program, it should develop an intensive process to detect best practices in their own territory** that can help the responsible to prepare a proper training program.
- The pilot action has proved that protocols for intervention in buildings can be standardized and can impulse the replication of best practices. In order **to prove the replicability of this protocol in other regions, it would be necessary to implement it in other office buildings of a different region.** This implementation would detect those convergent points between regions and those points which will

need to be adapted for each region, especially those aspects involving regional regulations and public financial mechanisms.

- The definition of the global training contents and subjects is determined by the creation of protocols. **The following step would be to create other protocols of intervention defined in the strategy, based on the methodology defined in this document, according to building typology and field of action, as well as adapting the existing protocol to other building typologies.**
- Once the training contents and subjects are defined **a massive dissemination should be developed within all training agents in the region** in order to implement the training program in their territories.

6. ANNEXES

ANNEX 1: PROVIDER ANALYSIS RESULT.

ANNEX 2: CURRENT TRAINING SYSTEMS QUALITATIVE ANALYSIS.

ANNEX 3: PROCEDURE AND DOCUMENTATION FOR THE COLLECTION, ANALYSIS AND SELECTION OF BEST PRACTICES.

ANNEX 4: ENERGY MANAGEMENT TRAINING COURSES.

ANNEX 5: PROTOCOL MARIE. ENERGY EFFICIENCY IN THE USE OF OFFICE BUILDINGS.

ANNEX 6: OTHER ENERGY EFFICIENCY TRAINING IMPLEMENTED IN MED COUNTRIES.