



MED beX.Live webinar

MED **beX** live

Mediterranean Cross Border Living Lab
live the experience of university building environment

Topic: How to perform energy efficient renovation of school buildings and its integration into education programs and education environment?

Date: 30-06-2020

Host:

Naples Agency for Energy and Environment – ANEA

University of Campania - Department of Architecture and Industrial Design – DADI

University of Naples Federico II - Industrial Engineering Department - DII



Project funded by the
EUROPEAN UNION



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Med-EcoSuRe Project

Project Title	Mediterranean University as Catalyst for Eco-Sustainable Renovation
Project acronym	Med-EcoSuRe
Funding scheme	European Union under the ENI CBC Mediterranean Sea Basin Programme 2014-2020
Start date	September 1st, 2019
Duration	36 months

Med-EcoSuRe is a project funded by the European Union, under the ENI CBC MED programme 2014-2020. The programme is managed by the Autonomous Region of Sardinia (Italy) and aims to promote cross-border cooperation in the Mediterranean region.

The main objective of the project is to propose and implement innovative and eco-sustainable energy renovation solutions for Mediterranean university buildings and introduce an active collaborating approach for decision support, among key actors involved, in the framework of a Living Laboratory: MED beX.Live (Live the eXperience of university building environment).



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1. Target audience

- Energy managers and technicians from the “Infrastructure and Buildings” departments in universities;
- Professors and students interested in energy policies and regulatory and technical aspects of energy efficiency in buildings;
- Key Actors (experts, manufacturers, engineers, architects, etc.) with activities related to energy management in buildings;
- Public Bodies and Municipalities engaged in energy efficiency interventions on public buildings

2. Addressed Issues

- The objectives and the approach of the Mediterranean Cross Border Living Lab;
- The legal framework of Italian regulation on energy efficiency in buildings;
- The experience of an Italian Municipality in the energy retrofit of school building;
- The benefits of energy renovation of buildings in students living comfort;

3. Invited speakers

- Representatives of Universities and research centers;
- Technicians and expert of energy efficiency field;
- Politicians and mayors of Municipalities;
- Italian partners of ESMES project (Istituto per la cooperazione universitaria and Municipality of Alcamo) funded by the European Union, under the ENI CBC MED programme 2014-2020



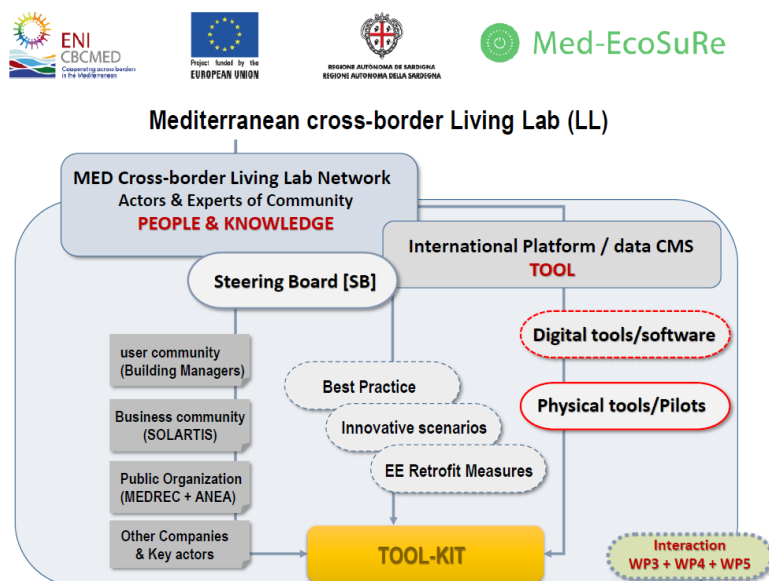
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4. Presentation of the Cross Border Living Lab: objectives and approach

Presented by Antonella Trombadore – Department of Architecture of University of Florence - DIDA

The aim of the webinar is the presentation of the Cross Border Living Lab within the Med-EcoSuRe project: this Mediterranean cross-border Living Lab (LL) is coming up with the notion of working with stakeholders to produce research towards innovative solutions. Its key concept and first goal is to turn university managers in active players, from being traditionally considered as merely “passive technical or administrative” subjects to whom new approaches and solutions are simply proposed, into active players contributing to the co-creation and experimentation of emerging ideas, breakthrough scenarios and innovative concepts.

MED Cross Border Living Lab intended as a network, as community of actors and experts who share knowledge and competences in order to try to find common solutions to energy retrofit interventions on university buildings. The MED Cross Border Living Lab is structured by a Steering Board (SB) composed by several members: user community (building managers), business community, public/private organizations and others companies and key actors interacting with each other sharing best practices, innovative scenarios and energy efficiency retrofit measures. The knowledge transfer will take place through both digital tools (international platform and software) and the pilot sites at the universities.





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At digital level, through the platform, will be collected all the best practices, the operational tools and the data that comes out from the analysis of the buildings; at physical level will be conducted also monitoring activities on in the university buildings, in order to combine real and simulated performances. For this reason, the creation of a digital version of the buildings (digital twin) helps not only as a predictive system to understand the behavior of the buildings and assess the renovation scenarios, but also to evaluate the shift that occurs between the simulated conditions and the real ones, through the use of sensors that will be installed in the buildings pilot.

The overall goal is to make the physical and the virtual buildings communicate in the Living Lab, in order to optimize the renovation scenarios.

The output of this interaction among the Living Lab participants will be a Tool Kit for training and education of technicians and students that gather all the information and suggestions in management and experience sharing.

The five main stakeholders of the MED Cross Border Living Lab are:

- Researchers, who can deepen their theoretical investigation and get study cases;
- Students, who will implement their awareness in the field of energy efficiency and the rule of smart human behavior;
- Building managers, who can get the solutions that fits to their specific needs;
- Companies, who can get and experiment new and innovative ideas;
- Public organizations, which can get increased concern of issues co-identified with researchers





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5. Med-EcoSuRe project: objectives and findings

Presented by Nicola Barbato – ANEA project manager

Med-EcoSuRe (Mediterranean University as Catalyst for Eco-Sustainable Renovation) is a project funded by the European Union (EU), under the ENI CBC MED programme.

ENI CBCMED brings together the coastal territories of 14 EU and partner countries in view of fostering fair, equitable and sustainable development on both sides of the EU's external borders. The general objective of the Program is to foster fair, equitable and sustainable economic, social and territorial development, which may advance cross-border integration and valorise participating countries' territories and values.

The strategy is based on the following two overall objectives:

- Promote economic and social development
- Address common challenges in the environment

With a general budget for the 2014/2020 of a 209 million of euros, the Program establishes 4 thematic objectives:

- SMEs and business development
- Technological transfer and innovation
- Social inclusion and fight against poverty
- Environment and climate change

Med-EcoSuRe is a standard project with the goal to promote innovative and cost-effective solutions, taking into account the type of buildings and the climate zones. The project has 7 beneficiary partners and 3 associates from Italy, Spain, Tunisia and Palestine. The total budget for this project is around 2.9 M€. The European contribution to the budget is about 90%, which comes from the European Union and the remaining 10% is a contribution of the project partners. The project started in September 2019 and has duration of three years.

The overall objective of the project is to value and implement innovative and eco-sustainable energy renovation solutions for Mediterranean higher education institutions and introduce active collaborating approach for decision support.

Two main expected results:

- Developing and transferring knowledge on the design and implementation of energy high- performance renovations within higher education institutions and promoting eco-sustainable technical solutions and best practices for reduced and cleaner energy consumption in the rehabilitated building;



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- Initiating an intermediation entity, a living lab, for the collaboration between academics, decision-makers and stakeholders, in order to support energy managers on planning and implementing innovative sustainable energy measures within higher education buildings.

The project foresees the following main outputs:

- 6 toolkits of passive solutions design for higher education buildings retrofitting;
- 6 cross-border strategic plans for university buildings retrofitting;
- 2 policy tools for energy efficiency in higher education buildings;
- 6 energy audits performed in selected higher education institutions;
- 9 energy efficiency retrofitting pilot actions;
- 2 technologies transfer for higher education retrofitting building

From the beginning of the project to date, several actions have been realized:

- Communication Plan and Project visual identity;
- Kick off meeting in Tunis on 21st and 22nd November 2019;
- Launch press conference in Tunis on 23rd November 2019;
- Identification of a list of stakeholders to actively involved in the project activities;
- First global newsletter shared with stakeholders and final beneficiaries of the project;
- Energy audit in one of the buildings identified as pilot sites (An Najah University – Palestine);
- Survey to identify innovative solutions addressing energy retrofitting of university buildings
- First MEDBeXLive webinar held on 23rd June and organized by MEDREC and ENIT.



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6. The role and experience of UniCampania as associated partner of Med-EcoSuRe project and the Med beX.Live in Campania Region

Presented by Antonella Violano – Associate Professor of Architectural Technology - Department of Architecture and Industrial Design “Università degli Studi della Campania

The Department of Architecture and Industrial Design (DADI) was established in 2012 as an institutional transformation of the Faculty of Architecture “Luigi Vanvitelli”; the training offer follows the 2 parallel souls: architecture and design. One of the research groups of DADI is the Zero Energy Buildings towards Zero Embodied Energy Building, engaged in the evaluation of the built or newly built heritage in relation to the energy and environmental qualities of the built.

Energy renovation of university buildings

Europe’s building stock is responsible for 36% of CO2 emissions and about half of the total energy needs. In achieving the European decarbonisation objectives of the building sector, the energy upgrading of existing buildings plays a key role. In this context, the role of public buildings is particularly relevant, as underlined in the Energy Performance of Buildings Directive (EPBD). In addition, Directive 2012/27/EU also required the energy upgrading of at least 3% of building stock for central government buildings.

Article 2bis of Directive 2018/844/EU (Energy Performance of Buildings) requires all long-term renovation strategies to include specific policies and actions for all public buildings.



In fact, in the Italian Legislative Decree n° 48 of 10/06/2020 (that transpose the European Directive 2018/844/UE), 3 main points are particularly significant:

- Promote equal access to finance, including for the worst performing segments of the national house stock, for consumers in energy poverty, for social housing and for households facing the dilemmas posed by fragmented incentives, while taking into account affordability;
- Ensure that measures to improve energy performance in buildings are not limited to the building envelope, but includes all relevant elements and technical systems of a building, such as passive elements that contributes to passive techniques to reduce energy needs for heating or cooling, energy consumption for lighting and ventilation, thereby improving thermal and visual comfort;
- Definition of an indicator of the predisposition of buildings to intelligence and a methodology by which it must be calculated (smart buildings)



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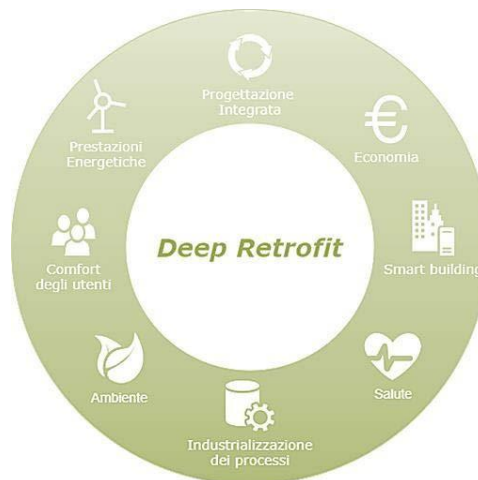
The EU Building Stock Observatory defines the level of renovation on the basis of primary energy savings. Three renovation levels are defined:

- Light (less than 30%)
- Medium (between 30 and 60%)
- Deep (over 60%)



The approach, purposes and methods proposed in the project are fully shared by the Department of Architecture and Industrial Design; the retrofit approach intended as a process of feedback, “updating”, adaptation, upgrading, implemented with the application of technologies, systems and technical elements that are innovative, more advanced and efficient than the techniques conventionally adopted in building recovery. Energy retrofit interventions therefore involve the application of innovative technologies aimed at saving and efficient use of energy, small-scale renewable energy production and passive air conditioning (M. Losasso).

Deep retrofit of a building is able to significantly improve its energy performance, aiming at the “near zero energy” or NZEB target.



According to Commission Recommendation (UE) 2019/786 of 8 May 2019 on building renovation, deep renovations are those leading the refurbishment that reduces both the delivered and final energy consumption of a building by a significant percentage compared with pre-renovation levels, leading to very high energy performance.



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Therefore, it is important to define the level of restructuring according to the objectives to be pursued: any long-term renovation strategy (LTRS) must include an evidence-based estimate of expected energy savings and wider benefits, such as those related to health, safety and air quality (Art. 2a(1)(g) of the Energy Performance Buildings Directive).

Among the tools and strategies for identifying criticalities we have:

- Energy audit (comparison between standard and tailored rating);
- Analysis of comfort conditions;
- Involvement of direct users: identification of critical issues in relation to the specific fruition modalities

The research group of DADI is focused on the identification of technological passive solutions, taking into consideration the climatic parameters of reference.

Passive solution design

Which can be called "passive solutions"?

Criteria for identifying passive retrofit solutions in relation to:

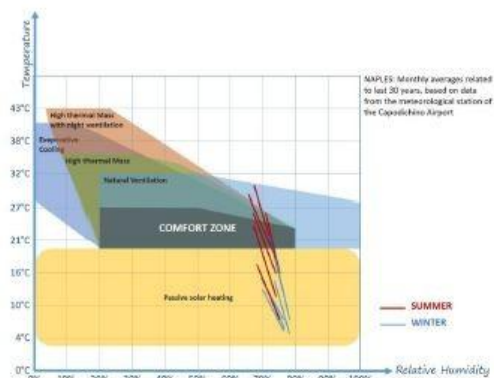
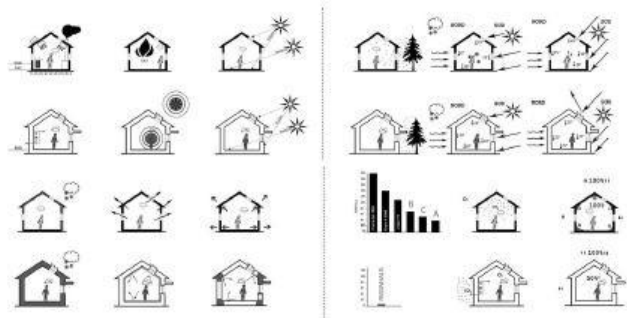
- controlled parameters (temperature, relative humidity, solar radiation)
- Effectiveness in relation to seasonality

Input data

- maximum average temperature
- minimum average temperature
- average maximum relative humidity
- minimum average relative humidity

Selection of "passive solutions" according to:

- Climatic and microclimatic characteristics
- Type of building
- Construction system
- Materials and technologies used
- Possible presence of specific constraints (historical buildings, landscape constraints, etc.).
- Functional characteristics
- Expected comfort conditions
- Compliance with current legislative requirements






Other fundamental aspect is related to the methodological approach, linked to how to select the university buildings for retrofitting. For this purpose, the research groups are identifying some case studies that will become best practices from which will be driven the guidelines for the buildings selected as pilot sites by the project.



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Here below are some elements to take into consideration:

- Very dispersant buildings (low energy performance)
- Buildings with poor aesthetics, functional, maintenance requirements
- Buildings for which energy requalification interventions can represent an opportunity to renew the image of the building
- Highly distinctive buildings (perceptive and representative) located in a central and representative position

	<p>Energy retrofitting must in any case be combined with an improvement in the architecture (from both an aesthetic and functional point of view).</p>	
<p>Energy retrofitting of Palazzo Nuovo - Turin</p>	<p>The choice of a university building with high public and strategic visibility at an urban level, can accentuate the demonstrator character of the intervention and determine a MULTIPLIER EFFECT.</p>	 <p>Energy retrofitting of Dip. Ingegneria Civile Catania</p>

With reference to the priorities, the selection of energy requalification interventions can be made according to different criteria:

- Reduction of primary energy needs
 - Cost benefits and payback time analysis
 - Major energy/functional/maintenance criticalities found during the audit phase
 - Criticalities found by the users in terms of comfort, giving priorities to the interventions that can best solve the criticalities expressed by the users
- **Energy audit results**

It is appropriate to identify a correspondence between criticalities found and technological solutions proposed →

Living Lab outcomes

- Visibility and representativeness of the proposed solutions.

When the interventions have a particularly representative character, they take on a value that goes beyond the energy savings generated

- Additional benefits over and above energy savings (social, functional, educational)



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It is appropriate to establish how all these aspects should be taken into account, by assigning weights to each criterion through Living Lab

The Living Lab can therefore be used not only to identify the critical points in terms of comfort, but also to select the requalification interventions, as well as for a post-intervention evaluation of the validity of the interventions carried out.

According to this approach, the Living Lab becomes a driver of development and co-creation taking different roles and presenting different skills.



The 4 fundamental steps are:

- The knowledge on technologies;
- The definition of maintenance strategies;
- Materials testing;
- Any plant efficiency improvement operations

In addition to the case studies identified by University of Florence, the DADI research group added additional case studies, both with reference to Italian Universities (Padova, Torino, Salerno and Napoli) and European Universities (Sevilla, Stuttgart and Southern Denmark).

The case studies have been selected following a global knowledge of the buildings hosting European and Italian Universities. The case studies have a certain significance not only as regards the efficiency of the built heritage, but also for the involvement of people in the retrofit intervention, in a sort of participatory energy quality.

7. The role and experience of Federico II as associated partner of Med-EcoSuRe project

Presented by Diana D'Agostino - Engineer at the Industrial Engineering Department of the University of Naples "Federico II"

Over the years, the Industrial Engineering Department of the University of Naples "Federico II" has been involved in energy efficiency projects for university buildings.

In particular, we present the SMART CASE demonstrator project, realized by the Industrial Engineering Department of "Federico II" University, in collaboration with CUEIM (University consortium of industrial and managerial economics), STRESS S.c.a.r.l., Arethusa S.r.l. research team.

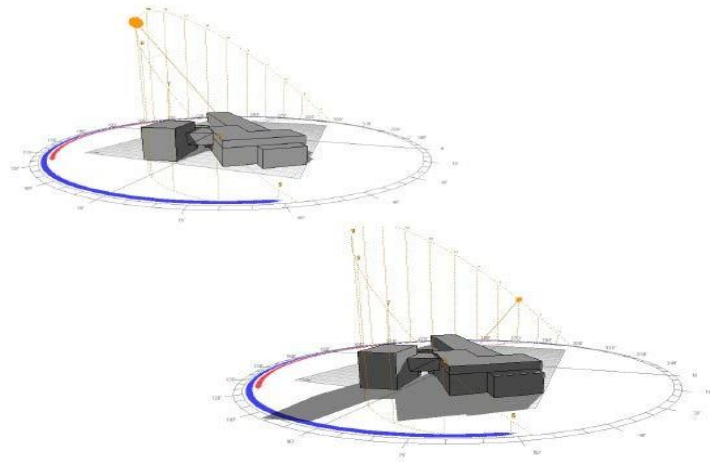
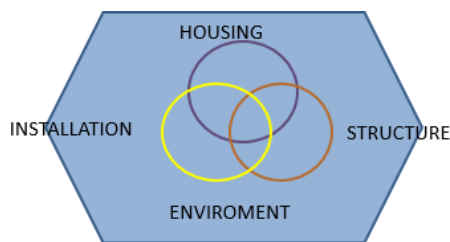


The intervention area consists of two buildings and a central building that connects them. The building 9 stands on 4 levels with a total area of about seven hundred and twenty square meters. The building 10 stands on 3 levels with a total area of about six hundred and twenty square meters and the central body stands on 3 levels for an area of about two hundred and forty square meters.



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The concept of the project is to obtain a full-scale research laboratory to encourage the continuous process of “knowledge to practice”. The main goals are: optimizing design process to obtain buildings capable of reducing energy consumption, being comfortable and efficient by implementing innovative technologies. All this by taking advantage of the Building Information Modelling and the integrated design technique.



The main critical issues of the existing building concern:

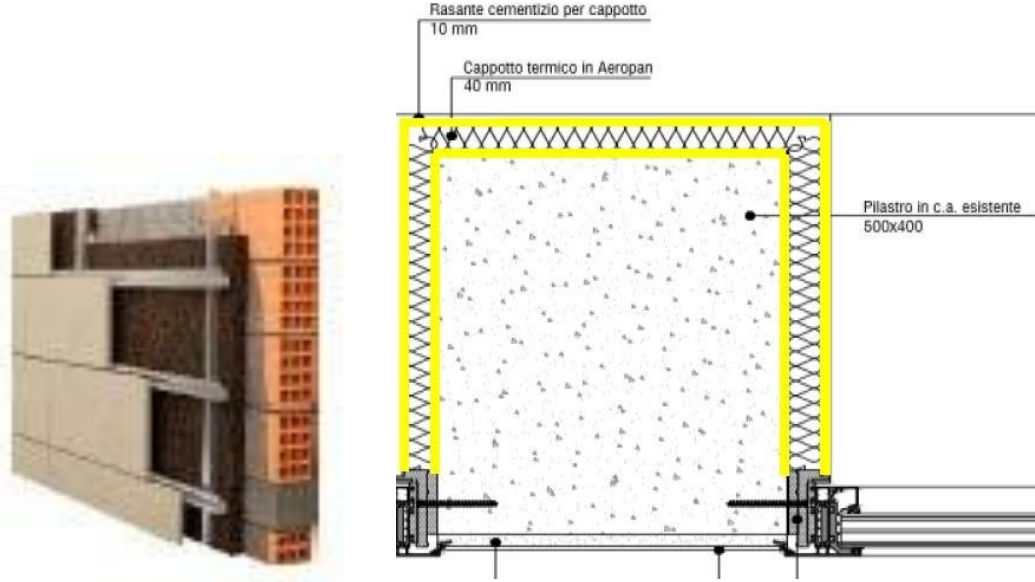
- Low energy efficiency due to the lack of thermal insulation and an obsolete heating ventilation and air conditioning system;
- Several architectural barriers;
- Partial connection between the two main buildings,
- Insufficient number of offices and lack of conference room
- Discontinuity of the facade that characterizes the two main fronts of the buildings.

The solutions to improve the energy performance of the building envelope are:

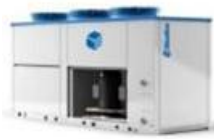
- Introduction of coat insulation, in order to reduce the heating thermal load;
- A ventilated facade system to improve the natural ventilation in order to reduce the cooling thermal load;
- The elimination of thermal bridges through the use of air gel insulation and nano technological materials as finishing layer



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In order to replace the old and not adequate HVAC system, the project includes a new system to respect the regulations in force. In fact, the proposed configuration is characterized by 3 independent high efficiency systems for the three different macro areas (education, offices and multi-purpose room) and a large use of automation systems. All this interventions allowed an energy saving of about 50%.



**air-to-water multi-purpose
heat pump for 4-pipe
systems**

- Heating capacity=46 kW
COP=3.2
- Cooling capacity=43 kW
EER=2.9



**low enthalpy water-to-
water geothermal heat
pump**

- Heating capacity=44
kW COP=4.6
- Cooling capacity=45
kW EER=7.0

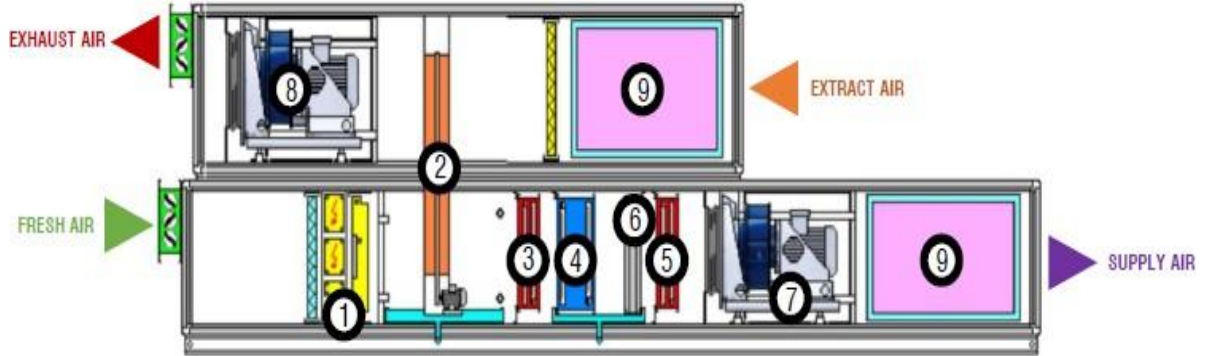
Following are the main generators proposed:

In order to improve the indoor air quality and thermal discomfort in the building n° 9, a high efficiency air handling unit is designed, and heat recovery units are expected in the building n°10.

Furthermore, to improve the architectural interaction between the HVAC system and the building, system terminals with innovative design are chosen.



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The connection between the two buildings is improved by:

- Eliminating architectural barriers, demolishing the old staircase and building a new one that reaches all floors of the building;
- Encouraging the independence between volumes and reflecting the different intended uses of the building

All internal spaces have been re-designed leading to the creation of:

- 25 new offices for professors and researchers;
- New conference room;
- New meeting room;
- Open space for Ph.D students;
- New poly-functional space for scientific activities

Lastly, the discontinuity of the main façade is improved by renovating the front of the building using the central body as in-between space and designing shadow system with kinetic brise-soleil.



8. Presentation of ESMES project; Partner's knowledge sharing on energy retrofit of school buildings: methodology and expected results; School intervention: methodology and capitalization results

Presented by Sofia Rossi – ICU (Institute for University Cooperation) ESMES project coordinator

ICU is an ONG based in Rome and works mainly in Middle East, Sub-Saharan Africa and South America. ICU is leading the consortium of ESMES project (Energy Smart Mediterranean Schools Network).



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Energy Smart Mediterranean Schools Network



ESMES project has 3 main objectives:

- 1) Cross border capacity building and mutual support among partners, associated and stakeholders, from public/private academic sector to:
 - Elaborate new strategies and tools for energy rehabilitations;
 - Reinforce capabilities of Public Authorities to adopt effective and sustainable energy policies
- 2) Pilot of a new process for monitoring-driven rehabilitations focused on most consumption-intensive systems and parts of buildings
- 3) Training initiatives for students to develop their skills as future energy professionals and communication campaign to foster SE habits

The project objectives are achieved through Cross Border Cooperation, since partners' roles are based on their specific competences and complement each other's expertise at basin level.

In addition to ICU, lead partner of ESMES, the other project partners are:



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German Jordanian
University



Consorci del
la Ribera



Lebanese Center for
Energy Conservation



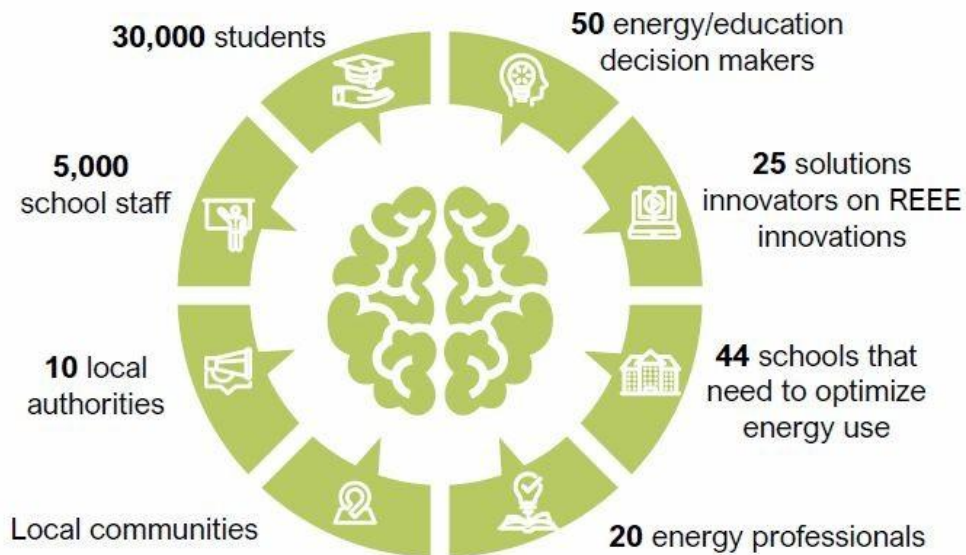
Alcamo Municipality



الوكالة الوطنية
للتحكم في الطاقة
ANME

Agence Nationale pour la Maîtrise de l'Énergie

The final beneficiaries and the main target groups of ESMES project are:



The main expected project results are:

- 1) Capacity of 5 institutions to realize innovative energy rehabilitations in public schools are enhanced through multilevel governance and adoption of energy mix efficiency strategies;
- 2) Energy consumption in 10 public schools is optimized through innovative, monitoring- based REEE pilots:



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- 240 tons CO₂/year saved, 27000 kWh/year from RE and 30000 kWh/year through EE
- 30.000 €/year saved from sustainable solutions
- 3) 120.000 people improve SE habits through mutual influence, leading impact on broader public
- 4) 8.000 students are trained on field, getting better SE employment opportunities

In order to reach the objectives, the project foresees a knowledge exchange among the partners of different countries able to reinforce the operational capacities of Energy and Education institutions to plan, implement and evaluate energy rehabilitations that are sustainable, cost-effective and tailored on building types and uses, energy loads and climatic zones.

This process will be possible thanks to a cross border and national common work among partners, associates and external stakeholders, through the establishment of National Energy Hub in each partner country, involving the main actors of the energy field.

On the 25th of June 2020, took place the first meeting for the establishment of the National Energy Hub in Lebanon; the meeting was attended by 20 stakeholders and 12 ESMES project representatives. The meeting was organized with the scope of presenting ESMES project, the objectives and activities of the National Energy Hub and the next steps scheduled.

The result of this sharing knowledge process will be:

- 2 approved procedures for smart and sustainable energy management in public school buildings
- 5 approved strategies to support efficient and cost-effective energy mix in public schools' buildings
- 6 case studies on REEE project portfolio solutions for enhanced energy rehabilitation for schools' buildings
- 3 tools for implementing REEE project portfolio solutions and SEM measures in schools' buildings

The second part of ESMES project foresees concrete interventions in the schools of the 5 involved countries. This will happen in two stages:

- Elaboration of intervention plans based on real-time monitoring (energy diagnosis)

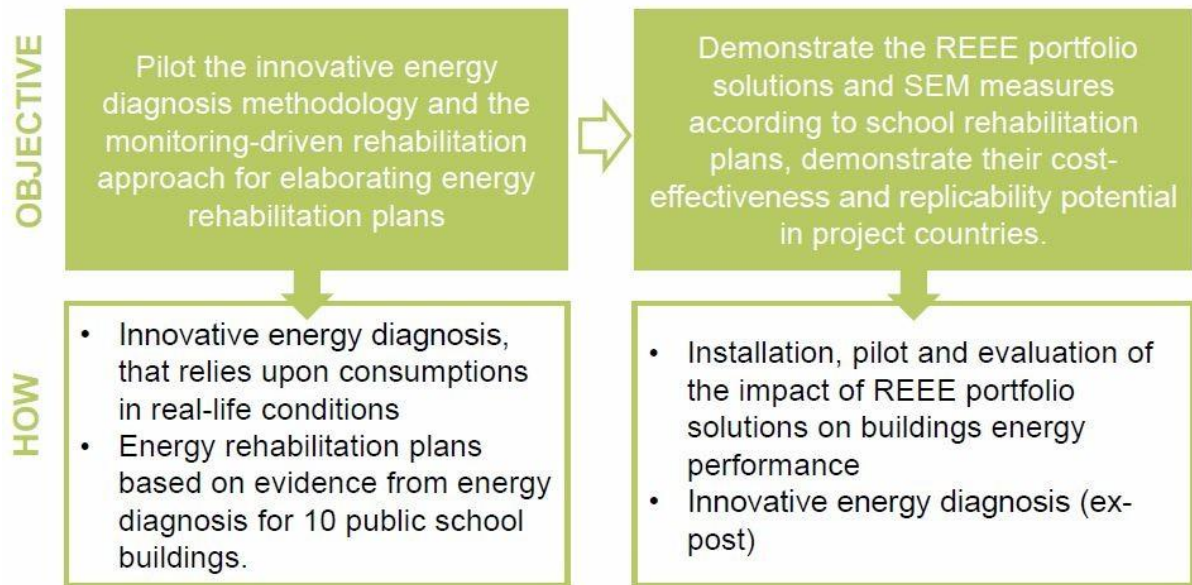


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- Plans implementation to demonstrate the effectiveness of energy efficiency and REEE solutions in schools, where students have been trained in adopting good energy saving practices.

Thereafter an audit and an ex post monitoring will be carried out to evaluate the effectiveness of the results.

Schools intervention



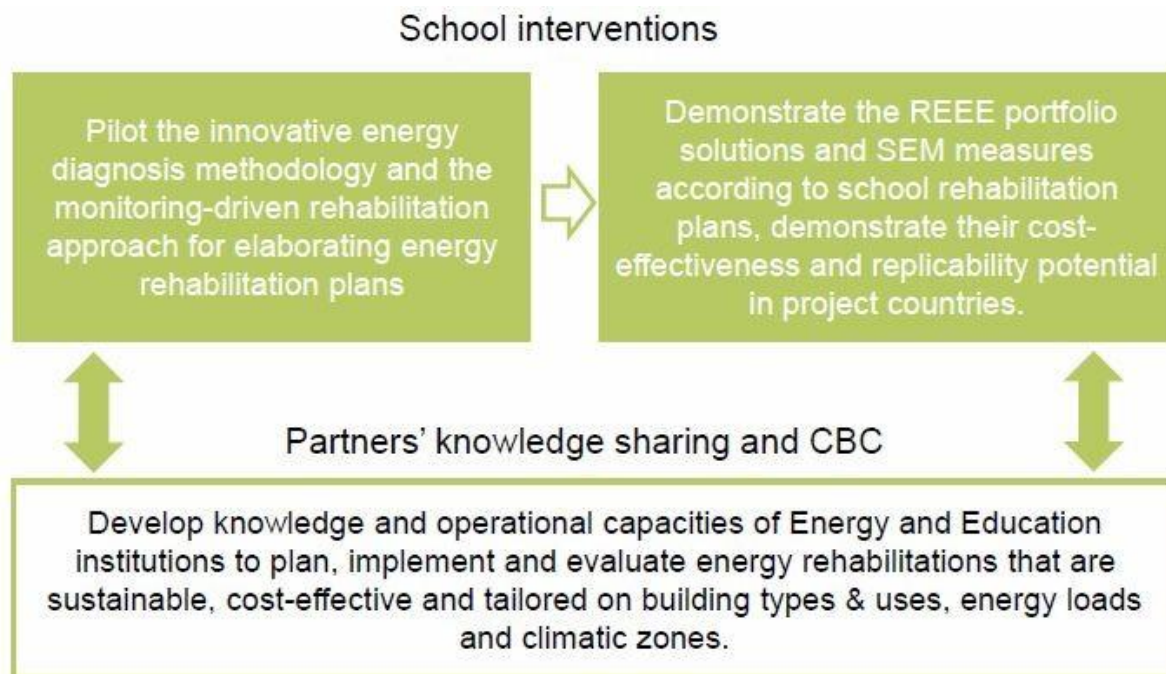
Linked to the school interventions, there are 4 main outputs:

- 5 REEE rehabilitation plans for 5 selected public school buildings with non-linear energy loads;
- 2 pilot REEE cost-effective project portfolio solutions
- 5 REEE rehabilitation plans for 5 selected public schools funded by project sub-grants
- 10 Energy Performances certificates (EPC) released to rehabilitated schools

These goals are linked together as the results of each is input for the others: the results of the interventions will serve as inputs for the definition of the procedures and strategies of the National Energy Hubs. Besides, well as the reflections and the results of the meetings between the partners will be taken into account in the definition of the plans for the schools.



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9. The energy situation of school buildings in the Municipality of Alcamo, project activities and post COVID school

Presented by Enza Anna Parrino – Engineer of Municipality of Alcamo (IT) ESMES partner

Participation in the ESMES project of the Municipality of Alcamo is part of a path already started about 4 years ago on the energy efficiency of school buildings: seismic checks were carried out, as well as adaptation to the fire regulations, extraordinary maintenance interventions, removal of architectural barriers. Last year, the Municipality of Alcamo placed energy efficiency work as priority of extraordinary maintenance. We agree on the fact that the ordinary maintenance intervention represent the right way to keep a building patrimony in extreme efficiency, including the school one, but for the Italian municipalities the problem is serious. In fact, while ordinary maintenance interventions fall under Title 1 of the municipal budget (current expenses), which is a part of the budget that always presents problems in terms of funds availability, the extraordinary maintenance interventions fall under Title 2 of the municipal budget (residues) where the funds available are greater and there are more possibilities to obtain financing. So the difficulties of the Italian municipalities are represented by the funding availability in the Title 1 of their municipal budgets (current expenses).

Within ESMES project, the Municipality of Alcamo will set up an Energy Committee composed by all the school principals, energy manager, ENEA (Agenzia nazionale per le nuove tecnologie,



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l'energia e lo sviluppo economico sostenibile) representative: this is a very big challenge for a municipality like Alcamo, located in the peripheral area of the western part of Sicilia Region, in province of Trapani.

Within the Energy Committee, regular meetings are planned, as well as an operational guide has been planned that will include both structural interventions for energy efficiency but also the daily practices that students and school staff can implement. The Energy Committee meets at the headquarters of the “Young Citadel” located in the Municipality of Alcamo. Energy Committee meetings are public and also open to all those who want to participate (citizens): through the Municipality of Alcamo website, all the useful will be provided information ensuring maximum visibility. 19 elementary and middle schools are present in the territory of the Municipality of Alcamo: each of the schools will create (considering that COVID-19 emergency slowed down the activities) a team consisting of one teacher and three students. The teacher will be supported by the energy manager and the ENEA representative and, together with the 3 students, will form the school's energy team. We are talking also about 10-year-old students that will be involved and will make their contribution limited to their knowledge and possibilities. Within the spaces of the school or municipal spaces (theater), it will be possible to organize extended meetings to try to exchange the identified practices.

The aim of the Municipality of Alcamo is to share with the schools also the monitoring results and actions on energy school consumption, since this kind of activity is already carried out within the SEAP (Sustainable Energy Action Plan) of the Municipality of Alcamo, as signatory of the Covenant of Mayors. This monitoring of consumption should be shared with schools, so that an improvement can be perceived with respect to the intervention or good practice that will be carried out (for example with reference to relamping). Monitoring will take place on consumption (bills) and through the introduction of technology that will allow both initial monitoring (starting point) and consumption in real time through meter monitoring: the monitoring activity will last 1 year. This will allow in-depth analysis of the building's energy management.

We hope that in September 2020 schools will re-open and the project can continue with all the activities planned.

10. The commitment of the Municipality of Piaggine in promoting energy retrofit interventions

Presented by Guglielmo Vairo – Mayor of the Municipality of Piaggine (SA)

Piaggine is a Municipality in the province of Salerno with 1.200 inhabitants, with a territory of about 64 sq. km. Like most of the small Italian municipalities (especially in Southern Italy), the municipality of Piaggine also experiences financial difficulties and for this it is very interested in actions and projects related to the energy efficiency of buildings in order to reduce current spending. Piaggine is a municipality located in the mountains with a lot of wood mass available: this is the reason for which there is a great interest in the production of renewable energy from



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clean sources. The Municipality, over the years, has been working hard on sustainable development in order to identify and implement solutions that can replace diesel fuel, still used for heating in the elementary school of Piaggine.

Besides the need for energy saving (and therefore also economic), the real challenge and need for the Municipality is represented by the energy efficiency of buildings, not only public ones (such as schools, municipal headquarters) but above all with reference to historic center, largely owned by private citizens but they are abandoned as the owners have emigrated over the years. It is therefore important to find the right administrative procedures that allow the Municipality to have the availability of these properties to put them first in safety and then in income.

Another fundamental aspect regards the material used for the construction of the envelope is the following: it is certainly important to carry out interventions for the insulation of the envelope, but at the same time, it is essential that the materials for the insulation of the envelope are purchased from close distances and not hundreds of kilometers away: this aspect must also be taken into consideration when planning energy efficiency measures for buildings, therefore linked to both energy saving and less pollution.

11. The experience of CITTAM in the energy retrofit of buildings: research activities and initiatives

Presented by Marina Fumo – Director of CITTAM (Interdepartmental research center for the study of traditional techniques of the Mediterranean area) – University of Naples “Federico II”

CITTAM was established about 20 years ago, has been always engaged in the development of strategies and techniques for land transformation within the Mediterranean basin. The main objective is gathering, within a unique operative frame, various disciplines and a number of expertise around the ancient but still present values of the cultural and material traditions within the countries that are wet by the Mediterranean Sea. These traditions have been recognized upon time as showing a strong common root, not only in terms of geographical, morphological and climatic items ..., but also as far as sociality, of literature, of historical, artistic events and material culture are concerned. The mission of the CITTAM thus consists in the investigations and in the actions meant at discovering and diffusing those common roots which can be observed in the existing built heritage and perceived in the local populations' living behavior. The care for the technical, historical, configurative and last but not least ecological values of the constructions of so ancient region as the Mediterranean is still considered as a cradle of one of the biggest civilizations in the world. This could in fact be applied only by means of a careful and deep spatial and material analysis of the various Mediterranean phenomena and their comparison. The center intends to test over studying methodologies, and thus conscious knowledge, and over design procedures aimed on one hand at safeguarding these values and on the other hand at defining sustainable innovative technologies at a number of scales.

Therefore, the architecture, the engineering, the geology and the material sciences, jointed with the settlement history, the land management and the planning, examining under a range of



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points of view (territorial, urban, building, technical...) the Mediterranean realities, are to be considered as the main tools able to interpret and re-qualify this high precious constructed heritage, by always applying, with a common methodology and appropriate strategies, durable and sustainable transformation habits. The latest aim can be better achieved only if the ancient and still strongly represented bioclimatic intents of the whole area would be recognized, and if this wide common know-how would be published and disseminated.



The importance of an interdepartmental research center within the University of Naples "Federico II" is evident: traditional techniques can be treated from different points of view (resource, landscaping, chemical, physical, technological, environmental, and urban planning).

In fact, the following Departments of the University of Naples "Federico II" are involved in the CITTAM:

- DiARC – Department of Architecture
- DICEA – Department of Civil and Environmental Engineering
- DISTAR – Department of Earth Science
- DICMAPI – Department of Chemical, Material and Industrial Production Engineering

CITTAM carries out activities of consultancy, research, education, monitoring and innovation in the following sectors:

- Traditional Construction Technologies;
- Planning and Management of Mediterranean Heritage;
- Historic Architecture and Archeology;
- Eco-sustainable and Bio-compatible Architecture;
- Sustainable Land Transformation;
- Innovative Techniques;
- Material Science and Technology;
- Security and Safety
- Ergonomics for Enhancement and Fruition Quality of Traditional Built Contexts

Comfort

The study of traditional techniques always takes place with a view to innovation: studying the past allows us to understand what can be learned and not necessarily to preserve, but to innovate: it starts from the etymology of the word tradition, which is not equivalent to conservation, but means to go forward bringing knowledge.



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CITTAM counts on many international partners thanks to the Erasmus Mundus masters, especially with reference to a DYCLAM (Dynamics of Cultural Landscapes Heritage Memory and conflictualities) since 2008 coordinated by the University of Saint Etienne in France.



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DYCLAM+ est un programme européen de formation universitaire original et unique labélisé ERASMUS + proposant aux étudiants un parcours pédagogique à l'Université Jean Monnet (France, semestre 1), à l'Institut Polytechnique de Tomar (Portugal, semestre 2), à l'Université Babes Bolyai (Roumanie, semestre 3), à l'Université Federico II de Naples (Italie, semestre 4 et cours délocalisés) et de nombreux partenaires associés.

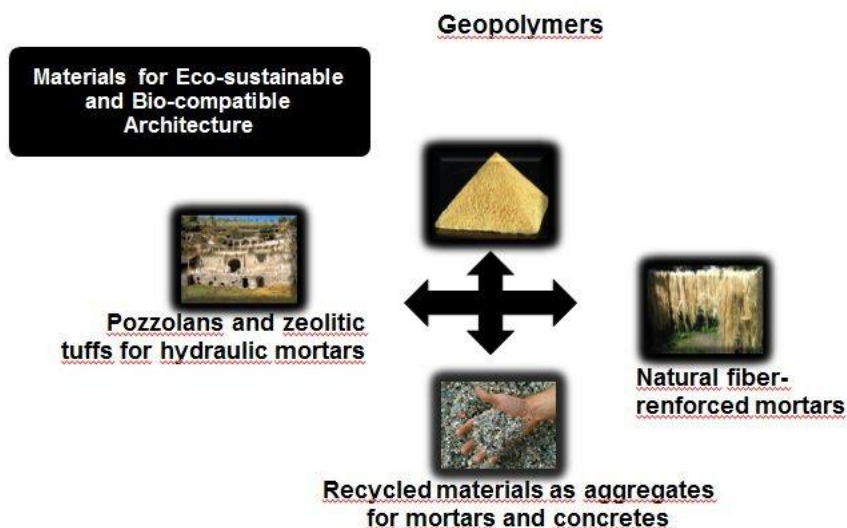
Au terme de ces deux années d'étude et de mobilité, les étudiants auront les connaissances et compétences indispensables pour travailler dans des ONG (Europa Nostra, Bouclier bleu, Traditions pour demain...), des institutions internationales de valorisation, expertise et sauvegarde du patrimoine et du paysage culturel (UNESCO, UICN, ICOMOS...), dans des collectivités territoriales, des sites patrimoniaux ou des entreprises privées (ICONEM).

Currently, CITTAM is working on materials, both for eco-sustainable and bio-compatible architecture and for cultural heritage. CITTAM works, in particular, on the reuse of demolition materials, even if in Italy little is demolished and the heritage of buildings in reinforced concrete is rather old and shows signs of inadequacy. Even a simple seismic adaptation involves huge expenses, so the solution could be to demolish these buildings (mainly schools and universities) and rebuild them from scratch with the demolished and more eco-sustainable materials. We are convinced that demolition is the future and that is why CITTAM is studying how ancient populations reused demolition materials in order to re-propose the processes.

Therefore, the challenge and the study that CITTAM is conducting is to combine demolition materials with new geo-materials, such as the case of geopolymers.



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These materials can be used not only for the construction of new buildings, but also to retrofit existing buildings. However, not only geomaterials, but also plastic materials: in fact, they can be recycled and used to make the new ventilated facades.

In 2018, the Metropolitan City of Naples commissioned to CITTAM a study on how to make schools energy efficient: the research and identification of best practices in Italy and Europe has led to establishing contacts with Spanish partners with whom there was an activity of comparison between the regulations of the various European countries, on sustainability criteria and on the methods of redevelopment of existing buildings. This knowledge transfer activity led to the creation of a manual written half in Italian and half in Spanish, which was presented, together with a case study, in a dedicated workshop in Madrid with Italian and Spanish students. The case study identified refers to the Colegio Estudio in Madrid institute. The construction of the building dates back to the Franco era, with very innovative construction ideas for the time: great quality of the very large spaces, not only at architectural level, but also in terms of distribution of spaces.

We are referring to high schools, but this experience could be useful also with regard to Universities, as scheduled by the Med-EcoSuRe project: retrofit interventions can also be considered as regards the distribution and management of spaces

As part of the study carried out on behalf of the Metropolitan City of Naples, a series of school buildings in the province of Naples were identified as examples of a particular construction technology, considering that we are talking about buildings built in the 70s and 80s, according with the criteria and critical issues of the time: a single approach, despite being designed by different professionals throughout Italy.



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Today we are witnessing an evolution of the concept of comfort and energy saving which involves a revisitation of the old concept: in this regard, CITTAM has developed guidelines in order to understand the defects and criticalities of the various macro-types of buildings and how they can be solved. Each proposed solution is not permanent and definitive but is subject to changes over time, especially in light of the emergence of new technologies and techniques.

This is why the name chosen for the guidelines is "Towards a resilient school" to communicate the need to adapt to the conditions to come and take into account the possibility of unforeseen events (for example COVID-19 emergency).

12. Conclusions

After the scheduled speakers, the engineer Francesco Minichiello (professor of the Faculty of Engineering of the University of Naples "Federico II") intervened appreciating the 360-degree approach of the webinar and the project: research and reuse of materials, innovative solutions, energy efficiency of the building envelope, plant engineering.

Hopefully that this approach can be carried forward and applied to concrete cases in order to have optimal but also verifiable solutions (monitoring activities). The monitoring "issues" is also very interesting, as presented by Eng. Parrino of the Municipality of Alcamo, and how it will be implemented in the Med-EcoSuRe project. The monitoring of consumption in the case studies to later verify how far we deviate from expectations as mentioned previously by the speaker about maximum deviation between expected energy consumption and actual energy consumption.

The webinar ends with the last intervention of Antonella Trombadore from University of Florence, coordinator of the Living Lab, thanking all the participants and informing them about the possibility to extend the stakeholders list through the future activities planned within the project, as this webinar is only the first step.

In addition Antonella Violano from University of Campania and Marina Fumo underline the importance of the concept of "educating building" where the user is in the center and, as a child, can grow up in sustainable environments and learn why certain materials have been chosen in the construction of the building and thus contribute to creating a sustainable generation.



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ANNEXES

1. Agenda



Invited Project:
 **ESMES**

MED bex live
Mediterranean Cross Border Living Lab
live the experience of university building environment

**Mediterranean University as Catalyst for Eco-Sustainable Renovation
WEBINAR**

How to perform energy efficient renovation of school buildings and its integration into education programs and education environments?

Tuesday, 30 June 2020 4:00 - 6:00 PM CEST

link to connect: <https://meet.google.com/vyn-poci-hsb>

Organized by: **ANEA**- Agenzia Napoletana Energia e Ambiente
in collaboration with: **Università degli Studi della Campania Luigi Vanvitelli** and **Università degli Studi di Napoli Federico II**

<p>h. 4:00-4:10 A. TROMBADORE / Living Lab Coordinator Università degli Studi di Firenze - Dipartimento di Architettura DIDA <i>Presentation of the Cross Border Living Lab: objectives and approach</i></p> <p>h. 4:10-4:40 N. BARBATO / Med-EcoSure Project manager ANEA - Agenzia Napoletana per l'Energia e l'Ambiente <i>Med-EcoSuRe project: objectives and findings</i></p> <p>A.VIOLANO / Med-EcoSure Associated partner Università degli Studi della Campania "L. Vanvitelli" - Dipartimento Architettura e Disegno Industriale <i>- The role and experience of UniCampania as associated partner of Med-EcoSuRe</i> <i>- MedBeXLive in Campania Region</i></p> <p>D. D'AGOSTINO / Med-EcoSure Associated partner Università degli Studi di Napoli "Federico II" - Dipartimento Ingegneria Industriale <i>- The role and experience of Federico II as associated partner of Med-EcoSuRe</i></p>	<p>h. 4:40-5:00 S. ROSSI/ ESMES Project Coordinator Istituto per la Cooperazione Universitaria <i>- Presentation of the ESMES project</i> <i>- Partner's knowledge sharing on energy retrofit of school buildings: methodology and expected results</i> <i>- School interventions: methodology and capitalization of results</i></p> <p>E.A. PARRINO/ ESMES Project Partner Comune di Alcamo (TP) <i>Energy situation of school buildings in the municipality of Alcamo, project activities and post COVID school</i></p> <p>h. 5:00-5:20 M. FUMO / Director CITTAM Centro di ricerca Interdipartimentale per lo studio delle Tecniche Tradizionali dell'Area Mediterranea <i>The experience of CITTAM in the energy retrofit of buildings: research activity and initiatives</i></p> <p>G. VAIRO / Sindaco Comune di Piaggine (SA) <i>The commitment of the Municipality of Piaggine in promoting energy retrofit interventions</i></p> <p>h. 5:20-6:00 Debate and conclusion</p>
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2. Webinar News

<http://www.enicbmed.eu/med-ecosure-oragnises-series-webinars-launch-its-bexlive-ll>

<http://www.enicbmed.eu/med-ecosure-bexlive-series-webinars-continues>

<http://www.anea.eu/>

3. Registered Participants

Full Name	Organisation	Position within the organisation	Country
Gigliola D'Angelo	DADI - Dipartimento di Architettura e Disegno Industriale (DADI) Università della Campania "L. Vanvitelli"	Researcher	ITALY
Antonella Violano	Università della Campania "L. Vanvitelli"	Associate Professor	ITALY
Monica Cannaviello	Dipartimento di Architettura e Disegno Industriale (DADI) Università della Campania "L. Vanvitelli"	Adjunct Professor	ITALY
Souha Ferchichi	Mediterranean Renewable Energy Centre (MEDREC)	Technical expert	Tunisia
Martina Pezzuti	DII - Dipartimento Ingegneria Industriale - University of Naples Federico II	Researcher	ITALY
Nicola Barbato	ANEA	MED-ECOSURE Project manager	ITALY
Marina Fumo	CITTAM	Director	ITALY
Michele Macaluso	ANEA	Director	ITALY
Giovanna Signore	ANEA	ANEA employee	ITALY
Diana D'Agostino	DII - Dipartimento Ingegneria Industriale - University of Naples Federico II	Researcher	ITALY
Francesco Minichiello	DII - Dipartimento Ingegneria Industriale - University of Naples Federico II	Adjunct Professor	ITALY
Massimo Dentice D'Accadia	DII - Dipartimento Ingegneria Industriale - University of Naples Federico II	Department Coordinator	ITALY
Guglielmo Vairo	Municipality of Piaggine (SA)	Mayor	ITALY



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Sofia Rossi	ICU - Istituto per la Cooperazione Universitaria	ESMES project coordinator	ITALY
Enza Anna Parrino	Municipality of Alcamo (TP)	ESMES partner	ITALY
Agata Scandariato	Municipality of Alcamo (TP)	ESMES partner	ITALY
Mauro Simeone	ANEA	ANEA employee	ITALY
Martina Di Costanzo	ANEA	ANEA consultant	ITALY
Antonella Trombadore	DIDA - Department of Architecture of University of Florence	Med-EcoSure LL coordinator	ITALY
Gisella Calcagno	DIDA - Department of Architecture of University of Florence	Researcher	ITALY
Juan Camilo Olano	DIDA - Department of Architecture of University of Florence	Architect	ITALY
Marco Paolini	DIDA - Department of Architecture of University of Florence	Architect	ITALY
Rosario Pinto	ANEA	ANEA consultant	ITALY
Aniello Poerio	ANEA	ANEA employee	ITALY
Gabriele Panella	Associazione VISIONARIA	President	ITALY
Alberto Aiello	Self-employed	Engineer	ITALY
Roberto Montesi	Self-employed	Engineer	ITALY

4. Presentations

https://drive.google.com/drive/folders/1jLb9KuNhk7T_hL9w1ljwmQUtVgt68s7C?usp=sharing

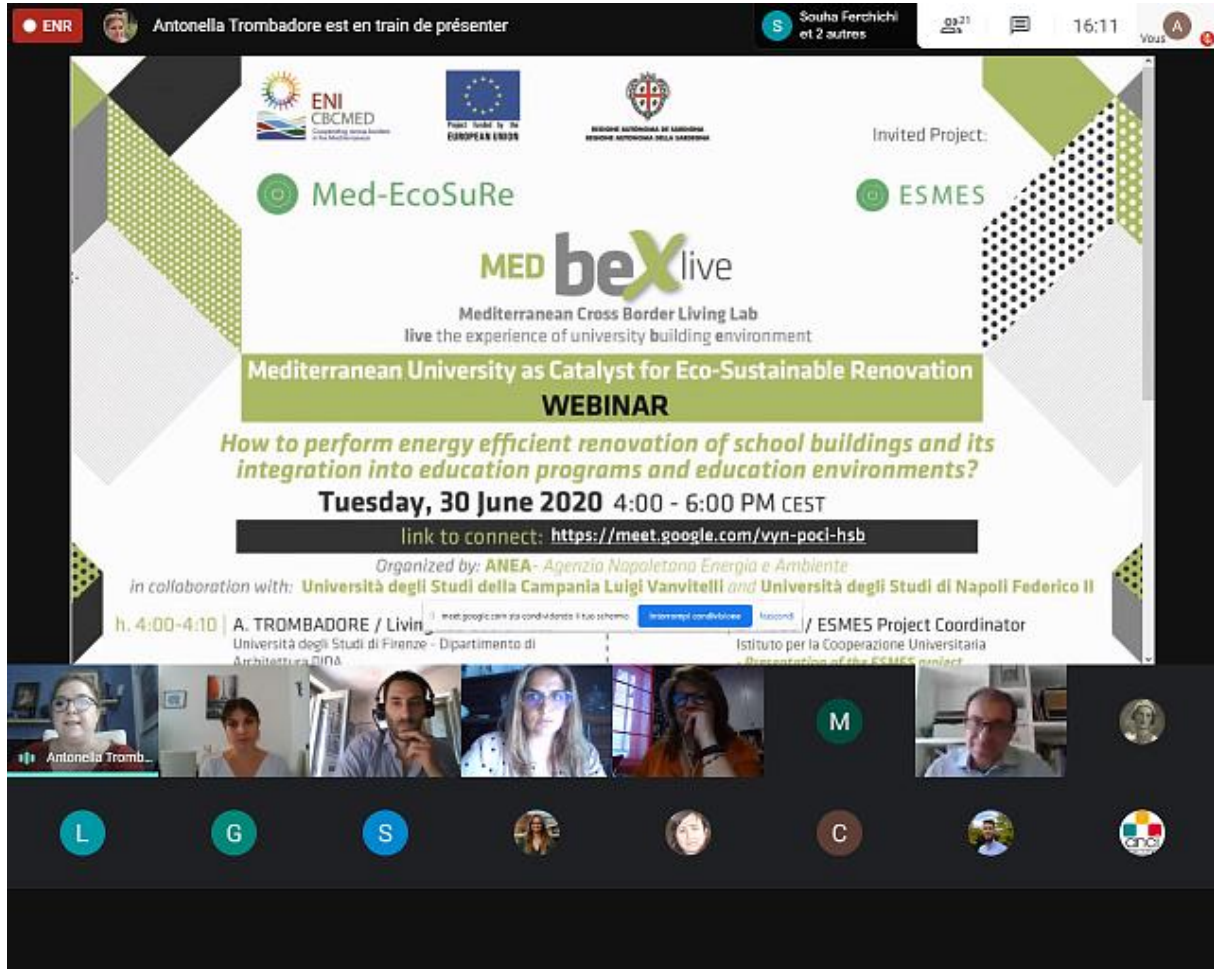
5. Recording of the webinar

<https://drive.google.com/file/d/1lbmDxzSZUQT4VZk44AcExl0ZjeTfVy2T/view?usp=sharing>

6. Photos



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ENR Antonella Trombadore est en train de présenter

Souha Ferchichi et 2 autres 16:11

Invited Project: ESMES

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live the experience of university building environment

**Mediterranean University as Catalyst for Eco-Sustainable Renovation
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h. 4:00-4:10 | A. TROMBADORE / Livorno
Università degli Studi di Firenze - Dipartimento di Architettura DIDA

ESMES Project Coordinator
Istituto per la Cooperazione Universitaria
Presentation of the ESMES project

Antonella Tromb...


L G S C



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ENR Antonella Trombadore est en train de présenter

Rovena Xhaferi et 2 autres 09:21 16:16

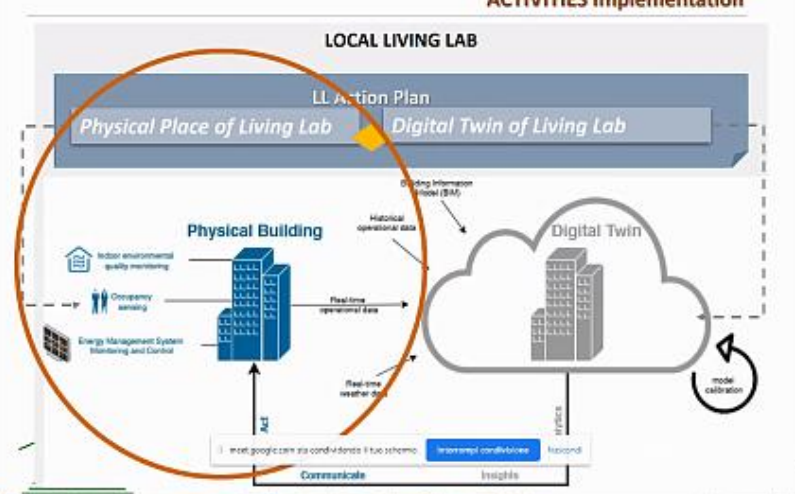


ACTIVITIES Implementation

LOCAL LIVING LAB

LL Action Plan

Physical Place of Living Lab Digital Twin of Living Lab



Physical Building Digital Twin

Indoor environmental quality monitoring
Occupancy sensing
Energy Management Systems (Heating and Control)

Real-time operational data
Real-time weather data

Building Information Model (BIM)
Historical operational data

model calibration

Interoperability Insights

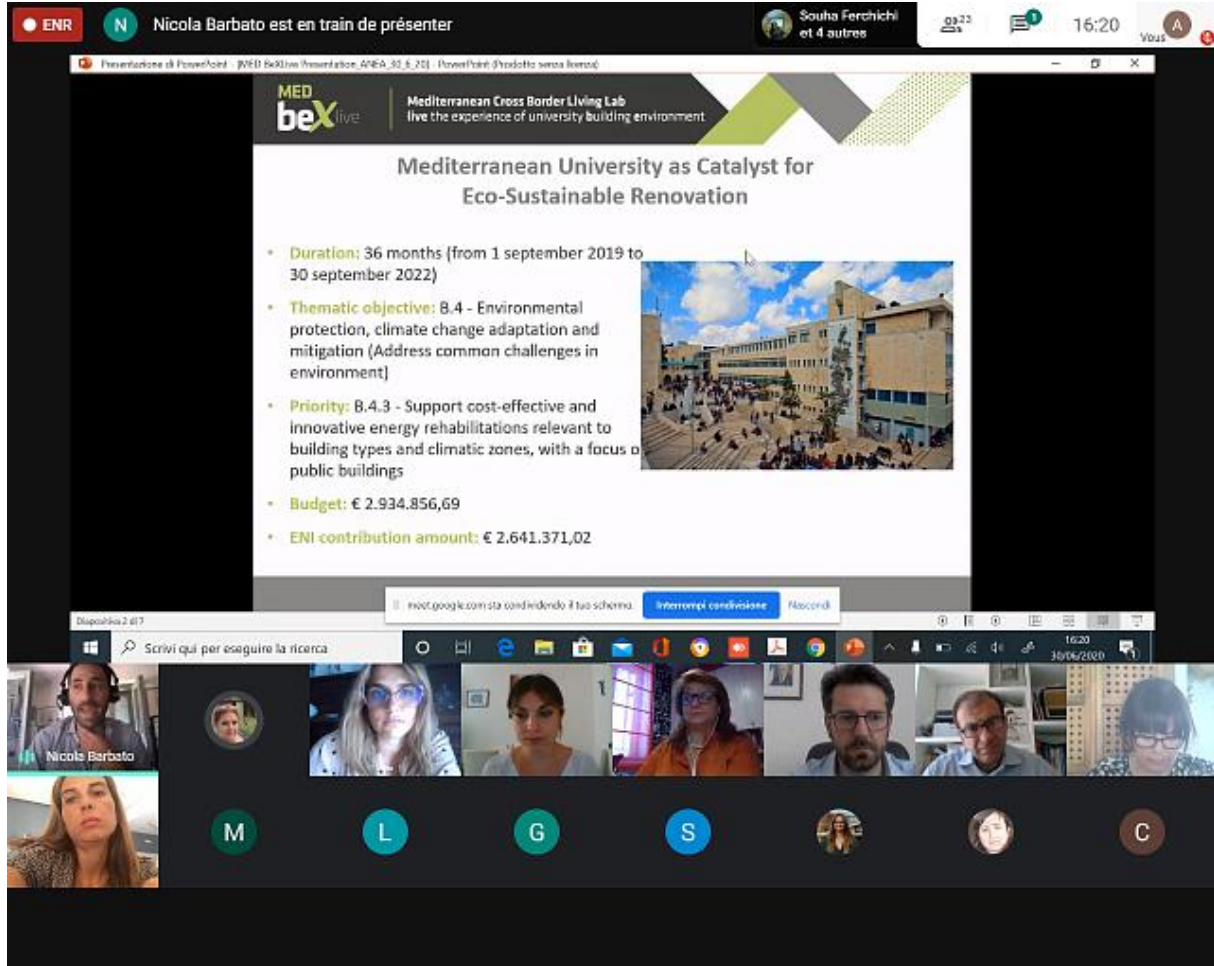
Comunicazione

Antonella Tromb... M L

G S C



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ENR N Nicola Barbato est en train de présenter

Souha Ferchichi et 4 autres

16:20

Presentazione di PowerAid - (MED beXlive Presentation ANE-G_30_8_20) - (PowerAid) (Prodotto senza licenza)

MED beXlive Mediterranean Cross Border Living Lab live the experience of university building environment.

Mediterranean University as Catalyst for Eco-Sustainable Renovation

- **Duration:** 36 months (from 1 september 2019 to 30 september 2022)
- **Thematic objective:** B.4 - Environmental protection, climate change adaptation and mitigation (Address common challenges in environment)
- **Priority:** B.4.3 - Support cost-effective and innovative energy rehabilitations relevant to building types and climatic zones, with a focus on public buildings
- **Budget:** € 2.934.856,69
- **ENI contribution amount:** € 2.641.371,02

Diapositiva 2 di 7

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Nicola Barbato

M L G S C