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REPORT ON IMPLEMENTATION OF INNOVATIVE INVESTMENTS

WP4 – Testing

Activity 4.2: Innovative investments realization

Partner in charge: Regional Energy Ageny North

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1. Introduction

This report is a short presentation on innovative investments carried out in partners' countries. All four innovative investments were implemented according to legal framework of each country and according to tender requirements. All were supervised by authorized supervisory engineer and controlled and evaluated by external national technical expert. As such, each investment is documented by a fact sheet, without unnecessary explanations of legal framework or other details, which are already described in most of WP3 deliverables and specific WP4 deliverables 4.1.1 Report on implemented procurement procedure and 4.3.1 Public Procurement Innovation implementation strategy in MED countries.

There were four innovative public buildings renovation investments carried out in partners' countries in years 2019 and 2020:

- The pilot project for extensive energy efficient transformation of a prefabricated kindergarten building "Loptica" (820 m²); carried out for the city of **Koprivnica in Croatia** under the management of project partners **City of Koprivnica** (KOP) and **Regional Energy Agency North** (REAN).
- The pilot project for the refurbishment of an old (1891) orange storage building ("Magatzem de Cucó" – 992 m²); carried out for the municipality of **Alzira in Spain** under the management of project partners **Consorci de la Ribera** (RIBERA) and **Polytechnic University of Valencia** (UPV)**.**
- The pilot project for the refurbishment of a kindergarten "Gianni Rodari" hosting children from 6 to 36 months, parallel with earthquake-proof reinforcement of the building (1248 m²); carried out for the municipality of **Narni** in Italy under the management of project partners **Municipality of Narni** (NARNI) and **Sviluppumbria** (SVIL).
- The pilot project of the renovation of the city hall that also hosts the Roman part of Mértola's museum (685 m²); carried out for the municipality of **Mértola in Portugal** under the management of project partners **Baixo Alentejo Intermunicipal Community** (CIMBAL) and **IrRADIARE** (IRR).

Each country has established its own steering expert team for investment preparation and coordination in accordance with the requirements of country specific public procurement law, construction law and construction regulations. Each national investment began with a tendering process, supported by external national PPI expert, external national technical expert and implementing partner's public procurement department. Immediately after signing the contract with supplier of works, each implementing partner also cooperated with or contracted the service of a supervisory engineer and the investment works began. Each national steering expert team was regularly supervising and tracking their investment on-site and on a week and monthly basis through management, financial and reporting documentation. Overall, all four teams were part of Prominent MED Joint Evaluation Team (JET). Responsibilities, tasks and members of JET are described below.

1.1. Joint Evaluation Team

The Joint Evaluation Team (JET) was established as one of outputs of "Activity 4.1: Public Procurement of Innovation Implementation" as an open team prior to publication of tenders. JET consisted of subject matter experts – external national PPI experts, external national technical experts – and partners' representatives. The function of JET was expert support during the procurement procedure and investment implementation.

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External national PPI experts and external national technical experts were procured and contracted by each responsible partner and their specific tasks and responsibilities (as members of JET) defined by individual contracts. Additional staff was later added to JET (to each national steering expert team) as the investment was progressing, according to the needs. Contracted supervisory engineer and representatives of suppliers were not members of JET, since that would be a conflict of interest.

Members of JET were officially appointed either by contracts, such as external national PPI and technical experts, or were already pre-appointed by existing official allocation within the Prominent MED, such as partners' representatives. This was enough for the JET to become operative, so there was no international JET members appointment document, since within the scope of the project there was no such international document envisaged (if possible at all).

JET members were regularly exchanging experiences via regular Prominent MED communication channels.

JET tasks, responsibilities and competences were common and country specific, as follows:

- support with TOR definition – definition of tender content, technical & innovation specifications, support with definition of assessment and qualitative criteria for selecting innovative solution
- preparation of tender documents
- publication of tenders
- addressing questions from bidders
- evaluation of bids
- other support during selection process of the innovative product or solution
- cooperation with contracted designer of general project technical documentation during the solution designing process
- cooperation with contracted construction supervision engineer (overall quality and functionality check at specific points of time)
- review and evaluation of implemented innovative solutions in accordance with qualitative criteria for selecting innovative solution, justification of implemented solutions
- other support during the investment implementation.

1.2. Members of JET

Members of JET and their roles are presented in four tables, one for each country.

Table 1: JET members from Croatia

Partner or institution	Name	Position or Role
KOP	Maja Balaško Kiš	Preparation of PPI process
KOP	Marija Potroško Kovačić	Public procurement department, main project procurer
KOP	Mario Perković	Appointed expert for investment coordination

Partner or institution	Name	Position or Role
Kindergarten Loptica	Ida Šipek	Manager of the kindergarten, investment coordination
REAN	Denis Premec	Appointed expert for investment coordination, Preparation of PPI process
Private consultant	M.Sc. Manuela Licul Martinčić	External national PPI expert
Faculty of Civil Engineering ZG	Assist. Prof. Dr.Sc. Bojan Milovanović	External national technical expert

Table 2: JET members from Spain

Partner or institution	Name	Position or Role
RIBERA CONSORTIUM	Plàcid Madramany Sanchis	Coordination. Preparation of PPI process. Follow-up of realisation of works.
RIBERA CONSORTIUM	Mª Isabel Serrano Cantó	PPI pilot project implementation and monitoring
Municipality of Alzira	Xelo Bisbal Ferrer	Municipal architect. Technical monitoring.
Municipality of Alzira	Carmen Herrero Pardo	Coordination of PPI procedure.
UPV	Amparo Ribes	Coordination. National technical expert in performance of materials. Technical monitoring of works.
UPV	José Badia	National technical expert in performance of materials. Technical monitoring of works.
UPV	José Manuel Navarro	Technical monitoring of works.
UPV	Víctor Cloquell	Technical monitoring of works.
ENERLIS	NA	External national PPI expert
TECNALIA	NA	External national technical expert in the field of Energy Efficiency in Buildings, with experience in Public Procurement of Innovation; the work-team was mainly represented by an Architect and an Engineer

Table 3: JET members from Italy

Partner or institution	Name	Position or Role
NARNI Municipality	Pietro Flori	Public Works Responsible - Sole Responsible of the Procedure
Province of Terni	Giovanni Maggi	Responsible of the tender office of "single central purchasing body" (Centrale Unica di Committenza) in the Province of Terni
External Expert	Daniele Spinelli	External national PPI expert (lawyer)
MIARCH company	Silvano Gismondi	External national technical expert (architect with experience in school building designing)
SVILUPPUMBRIA	Matilde Lo Giudice	Legal support to PPI implementation
SVILUPPUMBRIA	Catia Del Buono	Legal support to PPI implementation

Table 4: JET members from Portugal

Partner or institution	Name	Position or Role
CIMBAL	Fernando Romba	Main responsible and main project procurer
CIMBAL	Pedro Pacheco	Preparation of all PPI process
Mértola Municipality	Manuela Inácio	Municipality coordination
Serpa Municipality	Carlos Ferreira	Municipality coordination
ECOFINI	Jorge Almeida	External supervisor expert
IRR	Elsa Ferreira Nunes	Appointed expert for investment coordination Preparation of all PPI process
IRR	Sofia Martins	Preparation of all PPI process
Pedro F. Borges	Pedro Borges	External national PPI expert
CEEETA	Carlos Laia	External national technical expert

2. Description of innovative solutions

2.1. Innovative solution in Croatia

Before the start of this pilot project, the prefabricated wooden kindergarten building was considered to be near the end of its useful lifetime. This is why the PPI process was chosen in order to try to find an innovative solution to enhance the building and extend its lifetime. The idea was to avoid the

demolition of the kindergarten and thus also avoid the construction of a new building, which would both be a substantial cost.

The pilot project delivered innovative and replicable concept for external, internal, energy efficient and functional transformation of a prefabricated wooden kindergarten and the concept was then implemented as a final solution on the same building.

The innovative solution was applied to two areas, as two measures:

- Measure 1: Remediation of all inadequate water supply and drainage system of the building, taking into account all restrictions such as "no major invasive works in walls or floor", "new installations must not be visible to users in spite of these restrictions".
- Measure 2: The thermal protection of building envelope, taking into account that current wooden walls are not able to withstand normal load capacity, therefore it was necessary to propose innovative way of mounting and reinforcement.

There were six more measures implemented, but they didn't have innovative nature. The contractor had to implement them to achieve a complete building transformation. These measures were: Increase of the daylight illumination of rooms, Didactic and learning elements as a part of new envelope, Damaged internal walls remediation, New final floor layer in children's rooms, High-efficiency heat energy production system, High-efficiency heat energy production system, Ventilation system with recuperation.

The innovative solutions consisted of following:

- Measure 1:
    - The replacement of all inadequate water supply pipes and installation of new water supply without invasive works was done by constructing the water supply network in the attic and connecting it vertically down directly to bathrooms and kitchen. In this way the new system is invisible to occupants and there was also no need for supporting structure, which proved to be both innovative and cost effective solution.
    - Installation of completely new internal drainage/sewage system without replacement of an old one, using only minimal invasive works in a synergy with floor reconstruction. The drainage system was laid in one common narrow route throughout the building, with only one exit tube to connect to external drainage (instead of previous three exit tubes).
- Measure 2:
    - Implementation of the thicker-than-possible thermal protection of external walls due to proposed reinforcing of the exterior walls construction by using ordinary OSB panels. The OSB panels enabled additional load capacity, a possibility to properly anchor the ETICS facade and to install PVC windows according to RAL standard.

The final solution was completely transformed kindergarten building with extended lifetime of 25+ more years for the cost of less than 500,00 € per square meter, which is less than 50 % of a cost of a new kindergarten building in Croatia (price without roof and interior equipment costs). The solution also resulted with 61 % savings on heating energy, 66 % savings on primary energy and 66 % less CO_2 emissions, all per year.

Finally, instead of demolishing the old building and constructing new one, we achieved one more goal along the way. By transforming and upgrading the building which was considered to be near the end

of its useful lifetime we have diverted from landfill the whole building with net area of 820 m^2, thus contributing to general local sustainability.

2.2. *Innovative solution in Spain*

The building chosen for refurbishing in Alzira was an old storage dated form 1891, which was intended to be used as Youth Center. This turned into the necessity of having a bright diaphanous open area for multiple uses, with an energy efficient mind-set and a high acoustical insulation in both senses. Then, in order to focus on a suitable refurbishment of the building for the foreseen budget, the pilot was centred on the acquisition and installation of innovative windows that could respond to the following outcome-oriented requirements: Maximize the use of natural light; Minimize heat gains in summer, to avoid overheating in summer and take advantage of solar gains in winter; Minimize heat losses; Provide ventilation (either by opening windows, or by integrated ventilation system); Soundproofing (Acoustic insulation); Ensure the quality of the assembly with the opaque envelope; Easy maintenance and cleaning; Sustainable product, guarantee to minimize waste, use of sustainable materials, consider the life cycle of the installation; Provide security against vandalism.

The municipality expected innovations on any of the three elements of the windows, namely, glasses, frames or shadowing elements, individually or in combination, considering the use of innovative materials or innovative structural elements in the windows.

The main innovation focused on the window-facade joint. The implementation took place on 86 windows.

The implemented solution of innovative windows scored well in Life Cycle Cost assessment, passive cooling strategies and soundproofing. The contractor implemented a combination of solutions from different manufacturers with their own R&D services and thus they responded holistically to the identified needs.

2.3. *Innovative solution in Italy*

The identified school building was built at the end of the 1970s, therefore it was totally inadequate with respect to the anti-seismic and energy regulations in force, as well as lacking in terms of the quality and functionality of the internal environments. It needed a multiple requalification, in relation to: structural resistance to seismic actions; energy efficiency of the envelope and air conditioning systems; multisensory comfort of internal environments.

The first evaluation carried out by the designers concerned the choice between the demolition and the reconstruction of a new building, or the maintenance of the existing building, in both cases the same qualitative parameters remained. From the comparison of the execution and disposal costs (in case of demolition) it was considered advantageous to preserve the old building, in the spirit of "recovery" and "enhancement" of the existing building stock.

Generally, public works, especially for small/medium-sized local authorities such as the Municipality of Narni, are carried out by separating the typically building/plant engineering work from the supply of materials/various devices into separate contracts. In this case, however, Narni wanted to combine all these processes under a single management, in order to optimize both the financial resources available (Regional ESI funds and Prominent MED funds), and the execution times (in order to minimize the inconvenience deriving from the transfer of pupils to another school location).

To achieve this result, it was necessary to select companies from among those capable of managing this complex operation, and moreover also capable of proposing innovative improvement solutions.

Therefore, for the first time, the Municipality of Narni used the "Competitive procedure with negotiation" to award the contract in question. In this way it was possible to discuss, in two successive phases, with the companies admitted to participate in the tender, in order to refine their improvement project proposals and make them more suitable to meet the requirements of the Municipality.

The works implemented were redevelopment of the internal environments of the school building, from a thermo-acoustic, aesthetic and functional point of view, through the recovery and conservative restoration of the internal walls, applying panels that guarantee adequate thermal and acoustic insulation. The solution also improves the structural safety of the building, with particular attention to the anti-overturning of the internal walls in order to prevent the school from earthquake. These technical requirements are combined with the aesthetic and sensorial qualities of the finishes, in order to guarantee positive pedagogical effects for children-users.

The innovative solution consists in this combination of technical interventions and didactic-pedagogical environment. Indeed, the internal environment has been conceived in order to stimulate the learning of the pupils through a multi-materials and multi-sensorial approach, guaranteeing at the same time thermal and acoustic insulation and structural safety. Pupils can see, touch and interact with their school: in the classrooms, the installation of both certified didactic panels, made with ecological materials, functional to the tactile experience and to exercise logical processes, and of the IWBs (Interactive Whiteboards) to train digital practice allow to carry out multisensory activities all around.

In this perspective, it has been conceived also the anti-seismic intervention on the structure, represented by the 8 massive multi-coloured cylindrical columns, positioned at the top of the building, almost like an embellishment of the existing building, whose external walls, painted of white, they become gigantic sheets of paper on which to draw with the 8 coloured pencils. Likewise, the interior spaces are characterized by the same colours, so that each classroom is associated with its respective “giant pencil” (i.e. the use of the "Linoleum" -an eco-friendly material produced in the Tarkett factory in Narni- in the flooring of the school canteen allows to draw a perfect rainbow).

2.4. Innovative solution in Portugal

The urgency of energy rehabilitation of buildings is central to the European Ecological Pact and determinant for the success of the carbon neutrality vision in 2050.

The challenges faced by rehabilitation in Historical Buildings' case are intensified and require combined strategies, new approaches and political commitment. In what regards the Building in Mértola municipality and due to the fact that there is an ongoing UNESCO process energy rehabilitation was much more challenging.

This is why the PPI process was chosen in order to try to find an innovative solution to enhance the building thus complying with existing stricter rules that must be followed. The idea was to find solutions that could fit in the building without conflict with the aesthetics of building and overall landscape.

The innovative solutions should enable installation of new windows and new ventilation systems that comply with specific historical heritage site rules. The main implementation results were in the areas of energy efficiency regeneration, namely:

- Measure 1: Implementation of more efficient windows complying with the heritage rules that mention the obligation that wood must be used.

- Measure 2: Implementation of new ventilation systems more efficient and also not conflicting with the historical scenario; this is a special concern in Mértola municipality since the building is a service building that presents in its basement a pole of the roman museum.

The main objectives were to implement solutions that could make the buildings be smart, energy efficient, better adapted and presenting good conditions to its users (workers and visitants). Another added value is the reduction in what regards CO_2 emissions and the reduction of the energy expenses of the building.

At the end of this process the buildings are better prepared in what regards temperatures, especially in summer, more efficient and with better conditions to all its users.

2.5. Evaluation of implemented innovative solutions by JET

The most important members of JET for the process of evaluating of proposed innovative solutions in all pilot projects were of course external PPI experts and technical experts.

External PPI experts had ongoing tasks mostly during the tendering processes, mainly to compare offered bidders' solutions with the innovative award criteria and assess whether they formally meet set innovative requirements. This process is already described in other documents.

External technical experts had also to engage during the tendering processes – their job was primarily to decide whether the offered solutions are indeed innovative and feasible, based on their expertise and experience.

To conclude, all four innovative solutions in all four pilot projects were confirmed to be true by these external experts.

Generally it was concluded that all innovations resulted from the combination of existing materials and basic techniques not previously offered or used in the national market, and partly there were completely new solutions never seen before. This already qualifies all four solutions as innovative solutions.

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3. Annex I – Photographs of innovative solutions

3.1. Photos of Innovative solution in Croatia

Measure 1

Remediation of all inadequate water supply and drainage system of the building, taking into account all restrictions such as "no major invasive works in walls or floor", "new installations must not be visible to users in spite of these restrictions"

Figure 1 : The attic used for laying down the water supply pipes…

Figure 2 : …making invasive works only to vertically connect to…

Figure 3 : …the floor pipes in bathrooms.

Figure 4 : Original outdated installations and walls in children bathrooms

Figure 5 : The bathrooms after the works have been done 1

Figure 6 : The bathrooms after the works have been done 2

Measure 2

The thermal protection of building envelope, taking into account that current wooden walls are not able to withstand normal load capacity, therefore it was necessary to propose innovative way of mounting and reinforcement

Figure 7 : The original building wooden envelope

Figure 8 : Reinforcing the envelope with ordinary OSB panels in a complete new way

Figure 9 : An envelope before reinforcing

Figure 10 : An envelope after reinforcing

Figure 11 : Mounting the mineral wool

Figure 12 : Thicker-than-possible thermal insulation of walls

Figure 13 : One more picture of the envelope before…

Figure 14 : …and after

Figure 15 : Prominent MED info table

Figure 16 : A new façade and some new pretty drawings

Figure 17 : Children rooms before 1

Figure 18 : Children rooms before 2

Figure 19 : Children rooms after – new floors, ventilation with recuperation

Figure 20 : Ready for kids

Figure 21 : The kindergarten Loptica before and after

3.2. Photos of Innovative solution in Spain

Figure 22 : Magatzem de Cucó exterior view

Figure 23 : Magatzem de Cucó interior view

Figure 24 : Windows before works

Figure 25 : Old windows removed

Figure 26 : Mounting new windows (innovative solution) 1

Figure 27 : Mounting new windows (innovative solution) 2

Figure 28 : New windows 1

Figure 29 : New windows 2

Figure 30 : New windows from outside

3.3. Photos of Innovative solution in Italy

Figure 31 : Assembly of internal wall acoustic insulation panels

Figure 32 : Assembly of internal wall anti-tilt system

Figure 33 : Aerial view of completed structures

Figure 34 : Interior design 1

Figure 35 : Interior design 2

Figure 36 : Didactic and sensory solutions

3.4. *Photos of Innovative solution in Portugal*

Figure 37 : New windows on historical building 1

Figure 38 : New windows on historical building 2

Figure 39 : Ventilation system inside the historical building 1

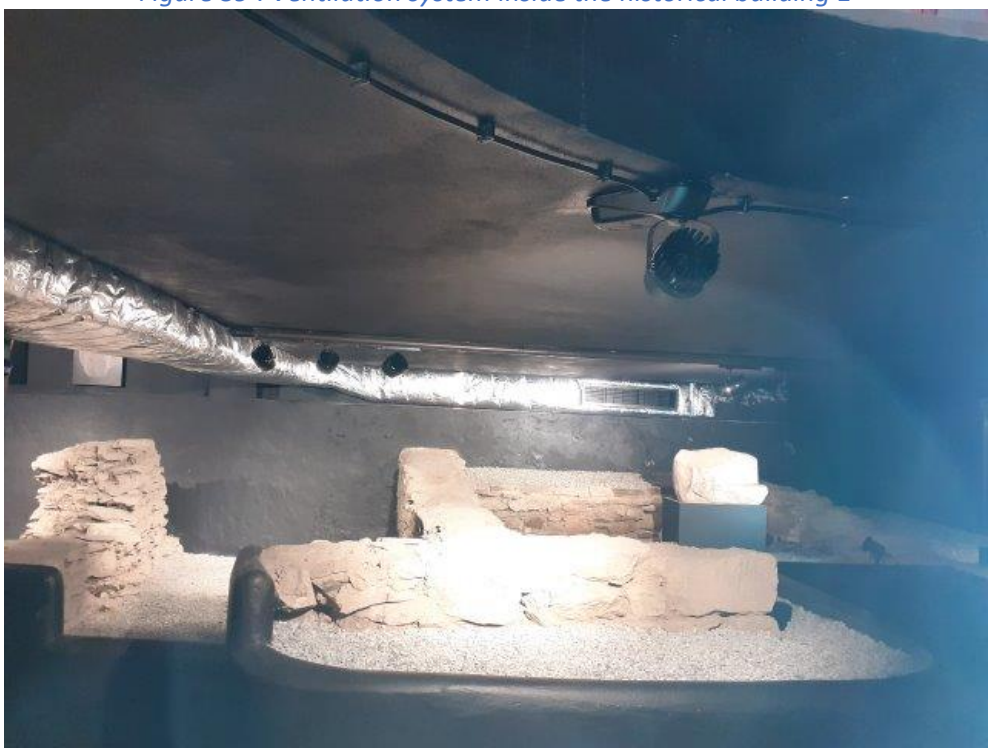

Figure 40 : Ventilation system inside the historical building 2

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