D.T3.4.7 REPORT ON PILOT ACTIONS

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The eCentral project summary

Addressing poor energy performances of public buildings is at the core of EU's Energy Efficiency Directive and Energy Performance Building Directive but also one of growing financial issues in Central European countries. To address that eCentral project will support key stakeholders to realize benefits of newly implemented building standard – nearly zero energy building (nZEB). eCentral project will prove that nZEB approach, although innovative, is optimal and cost-effective solution for renovation and construction of public buildings. Project aims to capitalise on results of previous and ongoing EU initiatives. Austria has a proven track record with nZEB renovation projects and will be leading other implementing partners (CRO, SLO, HUN) by example. Transnational cooperation will be used to receive maximum international visibility of selected pilot actions. Main outputs of the project are:

- energy performance certificate (EPC) Tool for public authorities
- deployment and promotion of innovative financing schemes
- training programme and project development assistance for nZEB projects
- building renovation strategies for selected regions
- state of the art pilot nZEB public buildings in selected regions
- established cooperation with scientific institutions and other nZEB initiatives

Transnational Assessment and Support Group, formed from project experts and scientific institutions will act as a support team and provide quality checks of each output. EPC Tool will be developed and used by public sector decision makers and project developers beyond eCentral project lifetime. Trained energy efficiency teams within the regional government will serve as a backbone for conducting future nZEB projects. The European Academy of Bolzano (EURAC), one of the leading centres of expertise on energy efficiency in the Central Europe region, will focus on policy analysis and dissemination of eCentral project results.

1. List of responsible project partners

Energy Agency of Savinjska, Šaleška in Koroška Region (KSSENA) is in charge of overall coordination of WP – T3 with knowledge partners from target countries leading the development of this report together with pilot cities/municipalities:

1. Croatia - City of Sveta Nedelja and North-west Croatia Regional Energy Agency (REGEA)
2. Hungary - Municipality of 18th District and Energiaklub Climate Policy Institute and Applied Communications Association
3. Slovenia - Municipality of Velenje and Energy Agency of Savinjska, Šaleška in Koroška Region (KSSENA)

2. Croatia

2.1. Executive summary

The public private partnership is a long-standing agreement between the (local) government and one or more private partners. The initial investment is covered by the private partner, who also bears the technical risks of construction and the responsibility of providing adequate standards for its users. Both parties benefit from this model: public administrations distribute expenses over a longer period and reduce risks, while the private partner receives regular payment and revenue from the improved energy performance of the building. In Croatia pilot action was focused on testing of public-private partnership (PPP) models for construction of three nZEB public buildings:

A. Kindergarten in Sveta Nedelja
B. Primary and music school with a sports hall in Marija Bistrica
C. Primary school with a sports hall in Municipality of Stupnik

All three buildings were greenfield investments and as such showed great potentials for realization with different PPP models. However, due to shift of investment strategy the kindergarten in Sveta Nedelja was constructed with traditional model of financing (own, city budget), leaving REGEA with a task to develop full PPP documentation for construction of nZEB primary schools in Marija Bistrica and Stupnik.

By the end of the project Sveta Nedelja managed to construct its new nZEB kindergarten which will be opened for public by April 2021 while municipalities of Stupnik and Marija Bistrica received a complete set of PPP documentation for future realization of two primary schools with sports gyms thanks to the eCentral project.

2.2. Description of the Pilot

2.2.1. Construction of kindergarten in Sveta Nedelja

Positive demographic changes in the City of Sveta Nedelja are putting constant pressure on providers of pre-school educational services. The basic economic and financial analysis showed that the construction of a new public kindergarten would be a more reasonable solution than providing further subsidies for children who wish to attend public kindergartens rather than private ones. A better control of pre-school education standards and improvement of overall image as a social sensitive city present additional argument for this solution.

The City of Sveta Nedelja decided to test PPP model on construction of a new public nZEB kindergarten in the Novaki neighbourhood. New kindergarten was initially planned as a modular two-part building for which the City had to decide whether both buildings were needed immediately or just one. A preliminary PPP analysis made within the

feasibility study proved the applicability of Design-Build-Finance-Maintain PPP model in case that both building segments were constructed at the same time.

However, due to political and citizens' pressures to build kindergartens in other city neighbourhoods a consensual decision within the city was reached to make just one kindergarten building in Novaki. This solution practically eliminated PPP as a viable model since constructing of just one building made it a small investment (lower than 2 million EUR), unattractive to private investors and not competitive to traditional financing models. Therefore, the City decided to invest its own funding for construction of the kindergarten while REGEA took over the task of further testing of PPP models in other regions.

With traditional model for construction being chosen, the City procured and developed a main design for construction of nZEB kindergarten in 2019 and secured financing in its budget for 2020. In April 2020, the construction of the kindergarten commenced, and the building is expected to be finished and operation in spring 2021.

2.2.2. Construction of Primary and music school with a sports hall in Municipality of Marija Bistrica and Primary school with a sports hall in Municipality of Stupnik

With Sveta Nedelja choosing a traditional model for procurement of building's construction REGEA had to find new public buildings and locations in Croatia to test PPP actions and in cooperation with regional governments – Zagreb County and Krapina-Zagorje County, two municipalities with pressing needs for construction of primary schools have decided to join the eCentral project as pilot municipalities.

Due to the constant growth of populations in both municipalities and devastating damage caused by the recent earthquake on public buildings, local governments were faced with public demands for higher quality of public services. Existing primary and music school in Marija Bistrica are becoming too small, technically obsolete and are lacking a hall to provide sport and recreation activities for students. On the other hand, Municipality of Stupnik does not even possess a primary school and students are forced to attend school in the City of Zagreb.

To address this growing demand for public school and educational services the municipality planned to construct a new, modern nZEB building in accordance with national educational standards. This way, the municipalities would be able to provide public educational services for up to 600 students. Due to the greenfield character of the investment a number of PPP models could be applied for their realization and REGEA team analysed several of them. An assessment of whether a public-private partnership model is likely to offer better value for the public than traditional public procurement (i.e. value for money analysis (VfM)) was made and it showed that PPP truly was a more cost-optimal solution in comparison to the traditional model. A PPP

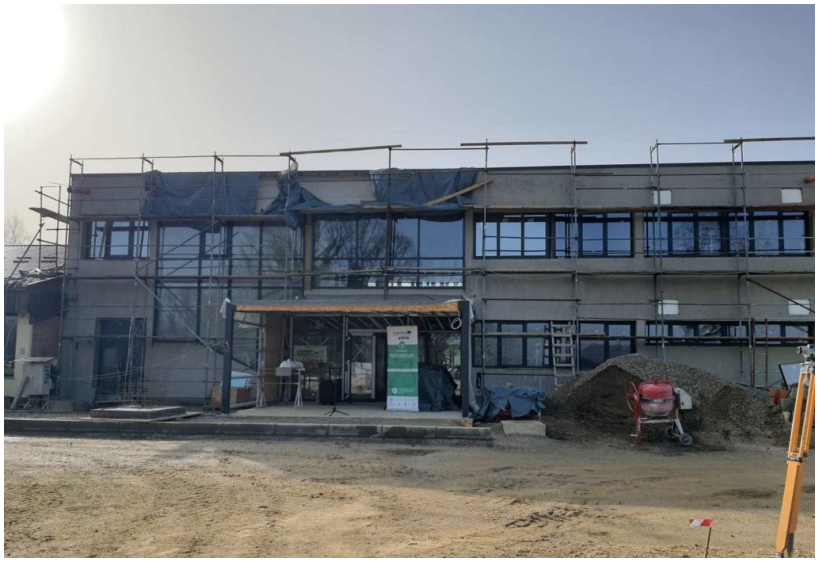
screening report and Public Sector Comparator (PSC) analysis were made to determine which PPP model would be the most adequate and affordable for municipalities. PSC analysis proved that Design-Build-Finance (DBF) model would be more suitable than the traditional model for construction of the new primary schools with sports halls. Next steps in the process included development of DBF model tender documentation which included terms of reference and project contract (with financial structuring, financial model, risk allocation, service standards, payment mechanism, guarantee drafts).

Although the Croatian nZEB standard for educational buildings is set at 55 kWh/m^2 and 30% of renewable energy production, the municipalities jointly decided to go beyond that and required the building to be designed to produce 100% of energy from local renewable energy sources. Continental Croatia does not have one predominant source of renewable energy so different combinations come into consideration (solar, biomass, geothermal).

PPP screening report initially estimated total costs for construction of primary schools with a sports hall and outdoor sport facilities at approximately EUR 8 million (without VAT) in Stupnik and EUR 11 million in Marija Bistrica. The next steps in the development of these projects include formalization of public partnership between the counties and municipalities on division of financial burden (PPP fee) and search for private strategic partner for realization of investments.

2.3. Fact sheet

Building(s)	Kindergarten Slavuj – Sveta Nedelja
Financial instrument	Traditional model – own budget
Energy performance	A
Implemented Measures	EE – Thermal insulation and energy efficient joinery RES - Solar PV plant and solar thermal collectors

PICTURES	

Building(s)	Primary and music school with a sports hall in Municipality of Marija Bistrica
Financial instrument	PPP – Design-Build-Finance model
Energy performance	A
Implemented Measures	N/A
PICTURES	N/A

Building(s)	Primary school with a sports hall in Municipality of Stupnik
Financial instrument	PPP – Design-Build-Finance model
Energy performance	A
Implemented Measures	N/A
PICTURES	N/A

2.4. Main challanges and what we learned

Croatian pilot actions faced a number of challenges. Public-private partnership models are usually applicable for large-sized investments and initial pilot action: construction of Hospice and home for elderly people in Sveta Nedelja was specifically chosen due to its size and financial self-sustainability. Unfortunately, as private partner wanted a dominant control over the ownership of the investment and was not able to secure financial resources for its implementation the investment became unfeasible. PPP projects often fall apart in this phase due to complex contractual agreements and securing of financing for realization of the investment.

The second pilot building in Sveta Nedelja which was chosen for testing of PPP model was ultimately abandoned for realization with PPP model as the overall investment was too

small and unattractive for private investors. The City backed out of the initial concept which included realization of two kindergarten buildings and chose to construct just one building. Political risks as this one is also one of the main reasons why PPP projects are not implemented more frequently, and strong political commitment is the pre-requisite for success of any PPP project.

Potential technological solutions for heating and cooling of new nZEB kindergarten building proved to be the biggest dilemma and difficulty for architects as nZEB standard could be reached with different combinations of EE and RES measures. Therefore, life-cycle costs were studied over a 10, 20 and 30 years in order to properly reflect financial effects of each technological solution. Results of the economic analysis did not show significant differences compared to the financial analysis due to similar environmental impact of each RES solution.

In case of third pilot case - constructions of primary schools in Marija Bistrica and Stupnik, the main challenge is to secure funding for reimbursement of PPP fee. As the PPP screening showed this fee would be too much of a financial burden for municipal budgets and co-financing from either county or national level is needed. Affordability of PPP projects is often a problem for smaller local authorities in case that national PPP scheme is not available.

Public-private partnership models are not suitable for every type of public energy renovation or building construction projects. This model finds its optimal application by means of larger public investments, where capital costs reach 5-10 million euros. In general, public projects, in which the private partner has greater expertise in providing services than the public one, are more suitable for consideration of implementation by means of public-private partnership models.

The high preparation costs of these models and lack or non-existence of standardised documentation still represent the biggest obstacles for the wider application of this model in public sectors in Croatia. Public authorities should not quickly dismiss public-private partnerships as an alternative to traditional models for the implementation of public projects. The basic essence of public-private partnership lies in the risk-sharing arrangement between project partners which defines the level of involvement of the private sector in delivering public services. To ensure a successful application of this model, it is important to realistically and in detail, assess and anticipate, as much as possible, all risks associated with different processes and project stages and then, assign them to the most capable partner in the project. Optimal risk-sharing should ensure the best value for money in implementing these kinds of projects

3. HUNGARY

3.1. Executive summary

Municipality of Budapest 18th district has always been committed to, among other things, a liveable environment, increasing energy efficiency and meeting climate goals. It was one of the first districts in Budapest who was joining the Covenant of Mayors and prepared the city's Sustainable Climate and Energy Action Plan (SECAP).

The Municipality has more than 100 buildings, most of them were built 30-40 years ago and have not been renovated energy-efficient since. Approximately 20% of the buildings have been modernized in recent years. Small part of them was modernized on a complex way and in the other cases individual interventions were made. These cost-efficient interventions were focused for quick payback, none of them was targeting to fulfil the near zero energy demand requirements.

To be able to modernize all the poor conditioned buildings needs large investments on short and medium term. The available financial resources the municipality can ensure are not enough for these investments. In the past, the municipality has been able to use non-refundable resources won on tenders in several cases. Because of Budapest is rated as developed region non-refundable financial sources can be expected only in exceptional cases in the future.

By implementing the pilot projects, the municipality sought to achieve two main objectives.

On the one hand to gain experience about the implementation of technical solutions for the modernization of municipal buildings meeting nZEB requirements, on the other hand to learn how to use of the ESCO model.

Three buildings – one kindergarten and two swimming pools – selected as pilot projects.

Based on the feasibility studies the modernization of the selected buildings according to the nZEB requirements are technically feasible.

An important finding is, that the investments concerning the selected buildings are only worthy for the ESCO, if the municipality is able to provide significant resources to the investments.

The investments could not be realized by the municipality during the duration of the project because the tender documentation for the procurement had not been completed.

The realisation of the near-zero energy modernisation of municipal buildings with the ESCO model will remain in focus even after the completion of the eCentral project as an alternative response to the pandemic resource constriction.

3.2. Description of the pilot

3.2.1. Vackor kindergarten

The kindergarten has been built between 1978-1982 using lightweight construction DVM 12/18, PERMISOL panels as outer walls. The area of the kindergarten is 670 m2, inner high is 2, 85 meter. The current target groups of the building are 98 children, 9 techers and 1 technical staff. Its main features are encompassing walls: PREMISOL external panels, inside partition walls are made of ALBAFAL partition panels. The roof is bitumen waterproofing flat roof. Slabs are wireframe with load bearing corrugated plate. The original windows and doors have metal frame with air closing, double glazing. There is a separate building for the heating system / boiler room that supplies the kindergarten and that is located 10 m from the building. There is 1pcs 52 kW gas boiler and 1 pcs 116 kWgas boilers as cascade system, with specific dispense, two-tubed, traditional radiators heating system. HMV iscreated by a gas fired hot water system, without circulation and with the usage of the same sewer utilities. Currently the energy performance class achieved by the building is almost the the lowest one - II.

3.2.2. Park Swimming Pool

The swimming pool was built in the 1980s. It is one-storeyed building with an inner courtyard surrounded by garden and with flat roofed. There are yearly an average of 74000 visitors. The total heated floor area of the building is 1163.9 m2. Heated air volume 5326m3. The total cooling area is 3034 m2, of which 148m2 is a door and window, 50m2 is a skylight and ~ 700m2 is a polycarbonate roof with a hollow chamber. Among the external boundary structures of the building, the load-bearing walls were built in several stages, so they are of different materials with different thermal technical parameters in accordance with the technologies at the time of construction. Both tracts of the original building are basically reinforced concrete pillars with structural, brick-filled masonry. The plastered outer walls are not thermally insulated. The tract containing the pool area is filled with masonry structures up to a height of 3.00 m, with galvanized steel lattice girders located above it. Its curved roof structure is covered with hollow chamber polycarbonate. The part of the building that includes the service spaces has a flat roof. The design of the flat roof is a single-shell thermal roof has 16 cm thick reinforced concrete slab, with a 10 cm thick polystyrene thermal insulation, with traditional gravel bitumen sheet sealing. Windows and doors are framed in metal and wood with insulated glazing. The heating and DHW production is currently covered entirely by natural gas, from the boiler room. The heat generator is 2 pieces of open-fired gas boilers. The existing heating system is a closed, two-pipe system: a system designed with radiator and underfloor heating heat emitters and air heating. Currently the energy performance class achieved by the building is EE.

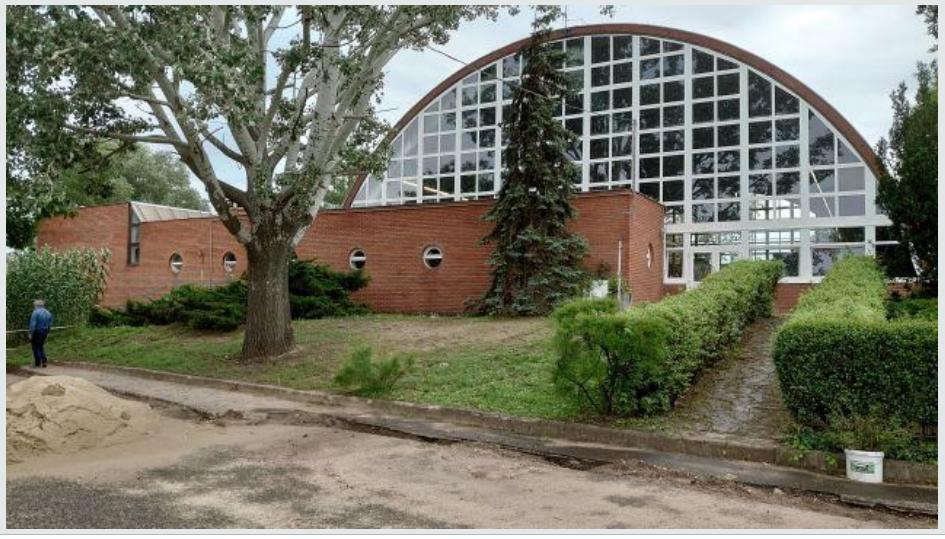
3.2.3. Vilmos Endre Swimming Pool

The building was built in 1990. The building serves 74,446 visitors a year. The partially basement building consists of a single storey building and a flat roof next to the pool area. Both tracts of the building are reinforced concrete column structures with brick embankments. The outer delimiting structures, the load-bearing walls are unsealed bricks covered with reinforced concrete and brick walls. In the tract containing the pool area, there is a 60 cm reinforced concrete and brick parapet structure, the roof is placed on laminated, glued wooden beams. The curved roof structure is covered with bituminous shingles on the outside. The windows and doors are framed with insulated glazing made of metal and wood. End closure of the arched roof structure of the swimming pool with plastic-framed, heat-insulated glazed windows. the heat demand for all heating and DHW production is currently covered entirely by natural gas, from a container boiler building. The existing heating system is a closed, two pipe system designed with radiator and underfloor heating heat emitters and air heating. Currently the energy performance class achieved by the building is EE.

3.3. Fact sheet

Building(s)	Vackor Kindergarten
Financial instrument	ESCO
Energy performance (planned)	BB
Planned Implementing Measures	➢ insulation of the building envelope: walls and roof ➢ replacement of windows and doors with triple glazing technology ➢ use of heat pump ➢ use of RES, through solar panels installation. ➢ monitoring and verification of thermal flows
PICTURES	

Building	Bókay Park Swimming Pool
Financial instrument	ESCO
Energy performance	BB
Implemented Measures	➢ insulation of the building envelope: walls and roof ➢ replacement of windows and doors with triple glazing technology ➢ heat recovery ventilation ➢ use of heat pump ➢ use of RES, through solar panels installation
PICTURES	

Building	Vilmos Endre Swimming Pool
Financial instrument	ESCO
Energy performance	BB
Implemented Measures	➢ insulation of the building envelope: walls and roof ➢ replacement of windows and doors with triple glazing technology ➢ heat recovery ventilation ➢ use of heat pump ➢ use of RES, through solar panels installation
PICTURES	

3.4. Main challanges and what we learned

The biggest challenge for the Municipality was to examine the conditions under which the ESCO model could be used to modernise municipal buildings with nZEB requirements.

The following experiences and results will help with future developments during projects:

1. All the buildings of the Municipality shall have energy certificates.
2. With the EPC Tool developed during the project, the Municipality has been provided with a decision support tool to help
    a. to record the current energy characteristics of the municipality's building stock
    b. to determine the order of the buildings to be upgraded according to the selected criteria.
    c. the selection of technical solutions that meet near-zero energy requirements.
3. Understanding the ESCO model
4. Having an overview of the risks related to the application of the ESCO method.
5. The municipality has got a comprehensive view about the domestic ESCO market, businesses.
6. Which mix of technical solutions help to meet the nZEB requirements in case of buildings of different functions, sizes and energy performance (educational institution, sports facility, cultural and office building).
7. The experience of Croatian and Slovenian partners concerning the PPP and Crowd Funding methods

4. SLOVENIA

4.1. Executive summary

The goal was to renovate an educational building – Lifelong learning University in the city center. Implemented measures have been the partial change of joinery, modernization of interior lightning, roof insulation and installation of solar power plant to reach nZEB standard. Despite a very well-prepared crowdfunding campaign, it failed to reach the pledged amount of money (€ 10 000) to be raised. The current lack of relevant legal framework poses several limits on crowdfunding in Slovenia. Nevertheless, it was the very first project in Slovenia and it paved the way for upcoming projects. Despite a less successful campaign, the Municipality of Velenje renovated the building in accordance with nZEB guidelines.

4.2. Description of the pilot

The pilot action consisted of two parts:
1) Test of a new way of co-financing the renovation of public buildings – crowdfunding,
2) Renovation of the building in accordance with nZEB guidelines.

Crowdfunding
Crowdfunding is a form of online financing in which providers advertise a certain project (in form of a campaign) in order to obtain capital. The required amount is not provided by specialized investors or banks, but by a myriad of different investors. The respective sum for financing is achieved through a high number of comparatively low amounts. A "crowdfunding platform" acts as an intermediary between those seeking capital and their investors.

Slovenia does not have a proper legislation that would regulate crowdfunding. Existing EU laws allow individual countries to implement national legislation for crowdfunding projects that are worth less than 5 million EU, which leads to the lack of transparency and inefficiency of crowdfunding processes. Crowdfunding in Slovenia has not been directly regulated and is for now related to 17 existing laws, mostly linked to contractual or investment law. There is no institution, that would legally regulate crowdfunding in Slovenia. For now, institution that is considered relative for crowdfunding projects is Securities Market Agency, which is a legal entity of public law. Its basic mission is to maintain a safe, transparent, and efficient market in financial instruments. Crowdfunding projects are also under control of Financial Administration of the Republic of Slovenia

(under Ministry of Finance). No policy or regulative changes have been made regarding crowdfunding until 2020.

After selecting a test model of co-financing, the Municipality of Velenje prepared a strategy and action plan for the management of a multi-financial campaign for the energy renovation of the University of Lifelong Learning. The action plan defines the objectives of the campaign, the way to achieve them, the costs and time of the campaign, the choice of the crowdfunding model and the crowdfunding platform, the campaign team, communication channels, etc. In Slovenia, there is only one platform for mass financing, which is intended exclusively for entrepreneurs, municipalities with applicable legislation find it more difficult to cooperate, which was also shown in our case.

Despite a very well prepared campaign, the campaign did not reach the set amount of money (EUR 10,000.00) that had to be collected.

Renovation

The Municipality of Velenje has decided to renovate the Lifelong Learning University Velenje within the eCentral and pilot campaign project. The University of Lifelong Learning is as old as our city - 60 years old and with its programs and content has acted as a link between immigrant miners and their families in their new place. Since its inception, it has been continuously offering interesting and high-quality educational programs, building competencies, relationships and intergenerational dialogue.

The renovation of the Lifelong learning University building perused the objectives of Directive 2010/31/EU on the energy performance of buildings. The Directive requires that all newly constructed public-sector buildings after December 31, 2020 be nearly Zero Energy Buildings (nZEB), the same conditions apply for the complete renovation of all public sector buildings.

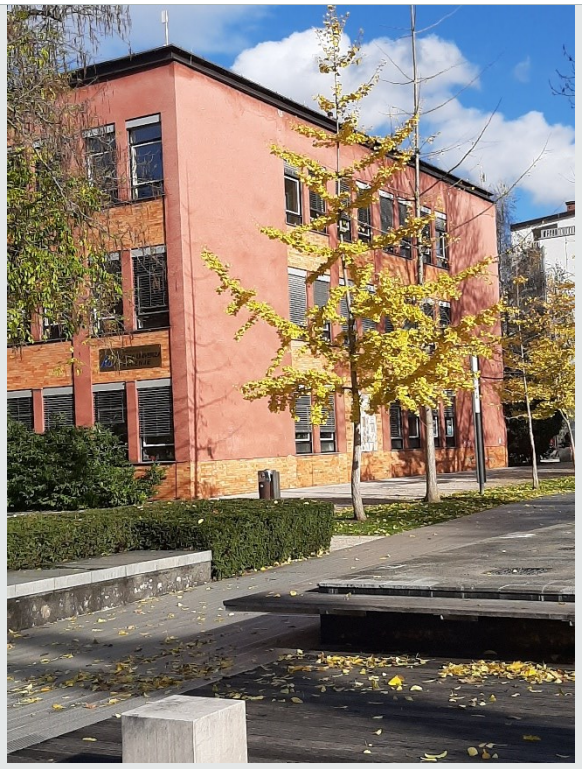
The renovation will take place in two phases. We decided on a two-phase renovation mainly due to the high amount of funds we need, as the building is culturally protected and its facade needs to be restored according to the guidelines of the Institute for the Protection of Cultural Heritage, which provide for the use of special materials and construction. The second phase of the renovation will cover only the renovation of the facade and will be carried out in the coming years.

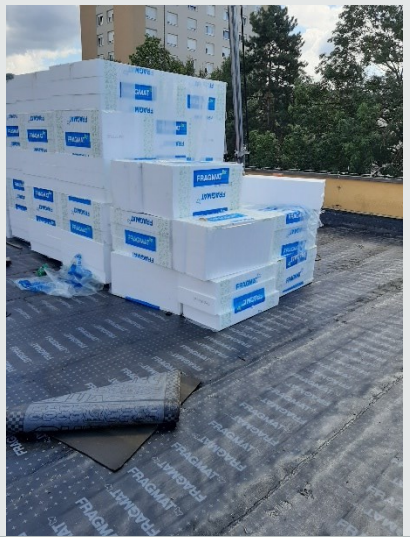
In the first phase, we replaced the lighting in the building and repaired the parts of the building where energy losses are greatest (partial change of windbreaks). We insulated the roof and installed a solar power plant on it, which allows us to use electricity from renewable sources. The goal was to achieve a primary energy consumption of 65 kWh /

m2 or less, which will mark this building as nZEB. This will mean an annual electricity saving of 19,847 kWh (86.3%) and an annual heating energy saving of 27,214 kWh (26.6%). The overall reduction in CO2 emissions is expected to reach 41.1%, and the total annual energy costs are expected to be reduced by around € 3,245 or 42.6%. The investment costs Investment costs in the first phase amounted to EUR 112.946,12.

4.3. Fact sheet

Building(s)	Lifelong learning University
Financial instrument	Crowdfunding, Own resources
Energy performance	• Primary energy consumption of 65 kWh / m2 or less; • Annual electricity savings 19,847 kWh (86.3%); • Annual heating energy savings 27,214 kWh (26.6%); • Total reduction of CO2 emissions 41.1%; • Total annual energy reduction costs EUR 3,245 or 42.6%.
Implemented Measures	• Roof insulation; • Partial change of joinery; • Modernization of indoor lighting; • Installation of solar power plan on the roof of the building.
PICTURES	

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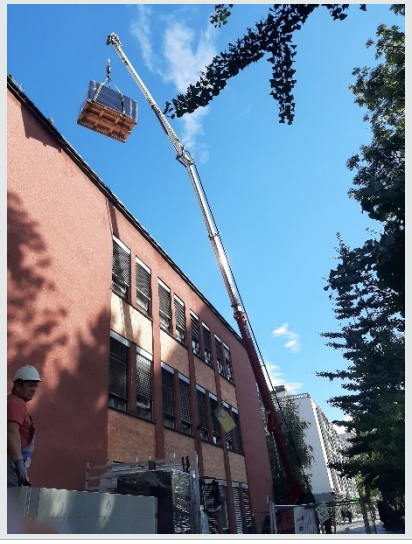

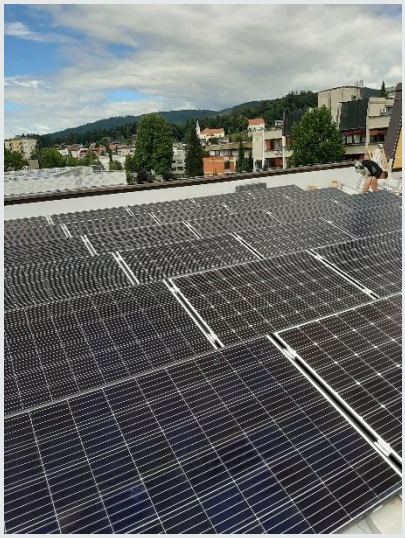

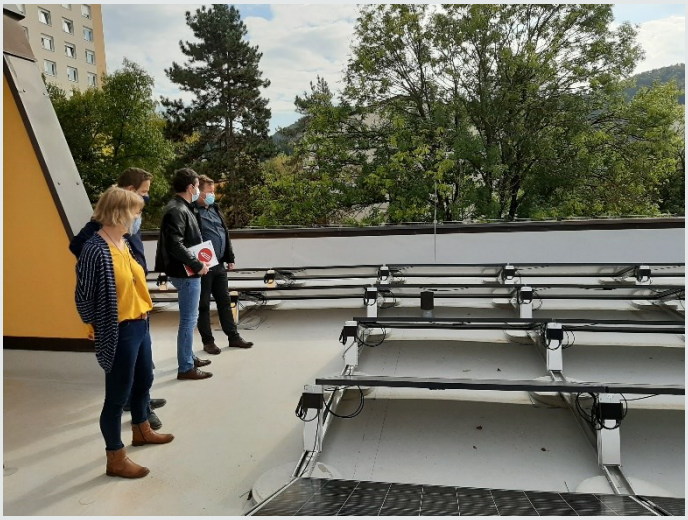

4.4. Main challanges and what we learned

Challenges and barriers:

- Unregulated area, missing legislation,
- Lack of simplicity prevented by laws,
- Lack of visibility of the method of raising money also by legislators,
- Hard to engage citizens for this novelty approach,
- Scepticism of local authorities.

Positive highlights:

- For the first time in Slovenia the fundraising took place in the manner of crowdfunding by citizens for the renovation of a public building and the biggest positive surprise was the good response of citizens and their approval of the campaign itself.
- This was one of the very first such projects in Slovenia (renovation of public building through crowdfunding), so the success wasn't really expected, but we did pave a way for future such projects until someday this kind of citizen involvement will be normalized and supported by all actors as well as legislation.

Our recommendations from practice:

- In particular, we would advise 'detailed examination of the legislation and, if necessary, its adaptation
- Although this specific crowdfunding campaign was not as successful as we hoped, it is important to keep trying to implement such projects to normalize the idea of crowdfunding among citizens and public authorities.