

PROJECT RURES

D.T2.2.6 Report of PA 5 to test EE in office
building and further exploit RES in Medjimurje
region

June, 2019





1. Introduction

Project index number and acronym	CE933 RURES
Responsible partner	PP9 Medjimurje Energy Agency Ltd, PP13 Public institution for the development of the Medjimurje County REDEA
Project website	http://www.interreg-central.eu/RURES
Pilot action number and title	15 Energy efficient administrative building in Čakovec
Pilot action location	Bana Josipa Jelačića 22, 40 000 Čakovec, Croatia
Delivery date	28.6.2019.

2. General information on the pilot action

The building in which the pilot investment has been implemented is situated in the ex-military complex in Čakovec, Medjimurje County. The building has around 600 m² of net floor space area with three floors and according to energy audit is classified as D energy class building. Four public institutions have their offices in the building (Medjimurje Energy Agency Ltd., Public institution for the development of the Medjimurje County REDEA, MIN Ltd. and Family Center of Social Work Center) which all have a large number of users searching for their services. Within the pilot investment itself, in the building described above, a solar collector system for hot water and heating support has been installed, indoor lighting system reconstructed with LED technology based luminaires and with the addition of motion sensors in the hallways and staircases, smart metering system for all energy sources installed and inefficient kitchen appliances with new ones of A+++ energy class replaced. First step in preparing pilot investment was to hire external experts that made feasibility studies for the planned EE and RES measures. The second stage of the investment preparation was to hire external experts to develop technical documentation needed for smooth implementation of the pilot investment. This developed technical documentation is used to conduct public procurement for the equipment and installation of the same. It is also used to present technical data within this report. With the implementation of all of the mentioned measures, the building will consume less energy and thus become more energy efficient. Since it is a public building accessible to wide range of users (employees, service users from private sector, political decision makers, natural persons...), the results of this pilot investment will have a wide impact on raising awareness and



it will also be used as a best practice example of an energy efficient public building that is using renewable energy sources in the rural area of Medjimurje County.

Technical characteristics of the implemented pilot action:

- **solar collector system for hot water and heating support**

- indirectly heated standing water tank with two heat exchangers (boiler + solar)
 - volume: 200 liters
 - boiler water flow: 1.5 m³ / h
 - dimensions: 710x580x1400 mm
 - weight: 80 kg
 - max. working pressure: 6 bar
- 3 vacuum solar collectors
 - gross area: 1.84 m²
 - absorber area: 1.69 m²
 - max. pressure: 10 bar
 - dimensions: 1650x1120x108 mm
 - weight: 36 kg
- solar pump group
- solar expansion vessel
 - volume: 35 liters
 - pressure: 10 bar
- plate heat exchanger
- high-efficiency circulation pump
- Cost: 15.886,97 €

- **indoor lighting system**

- 274x LED luminaire, 10W, 2-pin (G-24), 4500K, 850 lm
- 37x LED luminaire, 6W, 2-pin (G-24), 4500K, 485 lm
- 14x LED luminaire, 6W, E27, 3000K, 485 lm
- 18x LED tube, 18W, G13, 4500K, L=1200 mm, 1600 lm
- 5x motion sensors, 230V, 500W, range 10m, 360°
- 2x motion sensors, 230V, 500W, range 10m, 180°
- Cost: 6.667,56 €

- **smart metering system for all energy sources**

- Cost: 3.253,66 €

- **replacement of inefficient kitchen appliances with new ones of A+++ energy class**

- 2x Refrigerator, freestanding with built-in freezer
 - Net volume (with freezer): 300 - 350 l
 - Energy class: A +++
 - Max noise: up to 45 dB
 - Annual consumption: up to 165 kWh
 - Low-freeze, automatic dehumidifying
 - Led lighting, electronic
 - Temperature adjustment
 - Cost: 1.551,71 €
- 2x Dishwasher, built-in



- Energy class: A +++
- Drying class: A
- Dish capacity: 14 - 16
- Voltage: 220-240V / 50Hz
- Annual water consumption: max. up to 2900 L
- Annual consumption el. energy: max. up to 245 kWh
- Water consumption per cycle: max. up to 12 L
- Consumption el. Energy per cycle: max. up to 0.82 kWh
- Noise: up to 46 dB
- Start delay, automatic door opening
- ECO Drying, LED Indicator Salt, dispenser
- Dimensions: width 60 cm
- Cost: 1.474,05 €
- 1x Electric hob
 - Working area - glass ceramics: 2 separate working zones
 - 1xØ145 mm, up to 1200W
 - 1xØ180 mm, up to 1800 W
 - Dimensions of the installation space - max. up to 300x65x525
 - Adjustable 6-9-degree strength
 - Touch, Stop & Go
 - Connection power up to 3.0 kW
 - Cost: 402,62 €
- 2x Microwave
 - Voltage: 230V / 50Hz
 - Power: 800-1200W
 - Ceramic coating inside
 - LED display
 - 6-degree strength
 - Cost: 374,28 €
- 2x Electric kettle
 - Capacity: 1.5 - 1.7 L
 - Voltage: 230V / 50Hz
 - Power: 2200-2400W
 - Water level indicator
 - Automatic shutdown
 - Overheat protection
 - Cost: 83,56 €
- TOTAL COST: 29.694,41 € (including VAT)



3. Timeframe of the pilot action

Start date	January 3 rd 2019.
End date	May 14, 2019.
Remarks on timeframe:	

4. Information on preparation of the pilot action

First step in preparing of pilot investment was to hire external experts that made feasibility studies for implementing EE and RES measures in Medjimurje region, HR (D.T1.3.5). The measures for which the feasibility studies have been developed were identified from Medjimurje County Energy Efficiency Action Plan for Period 2017-2019. At the 4th Local Support Group meeting external experts from The North-West Croatia Regional Energy Agency, Mr. Babić and Mr. Miletić presented two feasibility studies. Also, during the RURES project we developed Pre-investment report of Energy efficient administrative building in Čakovec Medjimurje region (D.T2.1.6) which was related to the pilot action and presented on 5th Local Support Group meeting.

The second stage of the investment preparation was to hire external experts to develop technical documentation needed for smooth implementation of the pilot investment. This developed technical documentation is used to conduct public procurement for the equipment and installation of the same. The 6th Local Support Group meeting was designed as internal LSG meeting regarding public procurement about the pilot investment. Representatives from MENEА and REDEА presented technical documentation due to the investment and explained whole process for the procurement. Also, LSG members discussed and identified possible relevant entities to which REDEА sent the documentation for public investment.

According to the national legislation there was no need for acquiring any additional permits or development of any additional documentation for the installation of the equipment in the building.

Regional nature gas and water suppliers were noted on the fact that there will be meters installed on their watermeter and gasmeter and they gave their consent. No additional official approvals were needed for smart metering system.



5. Information on implementation of the pilot action

First step in implementing of pilot investment was conducting public procurement for the equipment and installation of the same. The public procurement documentation has been developed by PP13 REDEA and the procedure itself has been published on 3. 1. 2019. In accordance with the requested equipment, the procurement documentation has been developed in a way it contained 4 different procurement groups, one for each planned measure. The procurement was considered, according to Croatian national law, as small value public procurement, so there was no need to publish it on the national public procurement portal. The procurement documentation has been sent to 3 potential bidders who were identified after conducting the market research and the deadline for delivering the bids was set to January 18th 2019.

After that, second step in implementing of pilot investment was contracting the contractors. Three different contractors were contracted, one for indoor lighting modernisation, one for kitchen appliances and the installation of the solar collector system and one for energy metering system. The contracts with the chosen providers were signed in the period from 7. 2. 2019. - 25. 3. 2019. After the signing of the contracts they had from 30 to 60 days (depending on the measure) to deliver and install the procured equipment. The handover of the works took place in the PP13 premises on 30. 4. 2019.

It is important to note that, except this report, during the RURES project we developed Output fact sheet (O.15.1 Energy efficient administrative building in Čakovec) and Investment fact sheet (I5 Energy efficient administrative building in Čakovec).

At the 8th Local Support Group meeting pilot representatives from REDEA presented the pilot investment. Also, with the expert assistance from the director of the Medjimurje, Investments, Real Estates Ltd., the tour of the implemented pilot investment has also been organised for all of the participants.



6. Cost of the pilot action

Planned cost of the pilot action as in the last approved project Application Form (in Eur)	33.000,00
Planned ERDF funding rate (in %)	85%
Planned ERDF funding (in Eur)	28.050,00
Total real cost of the pilot action (in Eur, excl. VAT)	23.755,53 €
Total real ERDF funding of the pilot action in Eur	25.240,25 €
Notes (if necessary):	



7. Comparability of the pilot actions (according to the results of the pilot actions)

<p>The impact of the pilot action (local, regional, national, global)</p>	<p>Through the implementation of the defined measures, energy consumption and CO₂ emissions will decrease thus providing benefits for the environment on the local level. The building with its implemented energy efficiency measures will become good practice example to other similar public buildings in rural areas and thus provide wider environmental as well as economic impact.</p>
<p>Number of potential users</p>	<p>40</p>
<p>Number of population in city/municipality</p>	<p>112,371</p>
<p>The ratio of investment cost and potential users (€/per user)</p>	<p>658,78</p>
<p>The ratio of investment cost and city/municipality population (€/per capita)</p>	<p>0,92</p>
<p>Impact on the population - No of potential users/Total population * 100 (%)</p>	<p>0,14</p>



8. Transferability of the pilot action

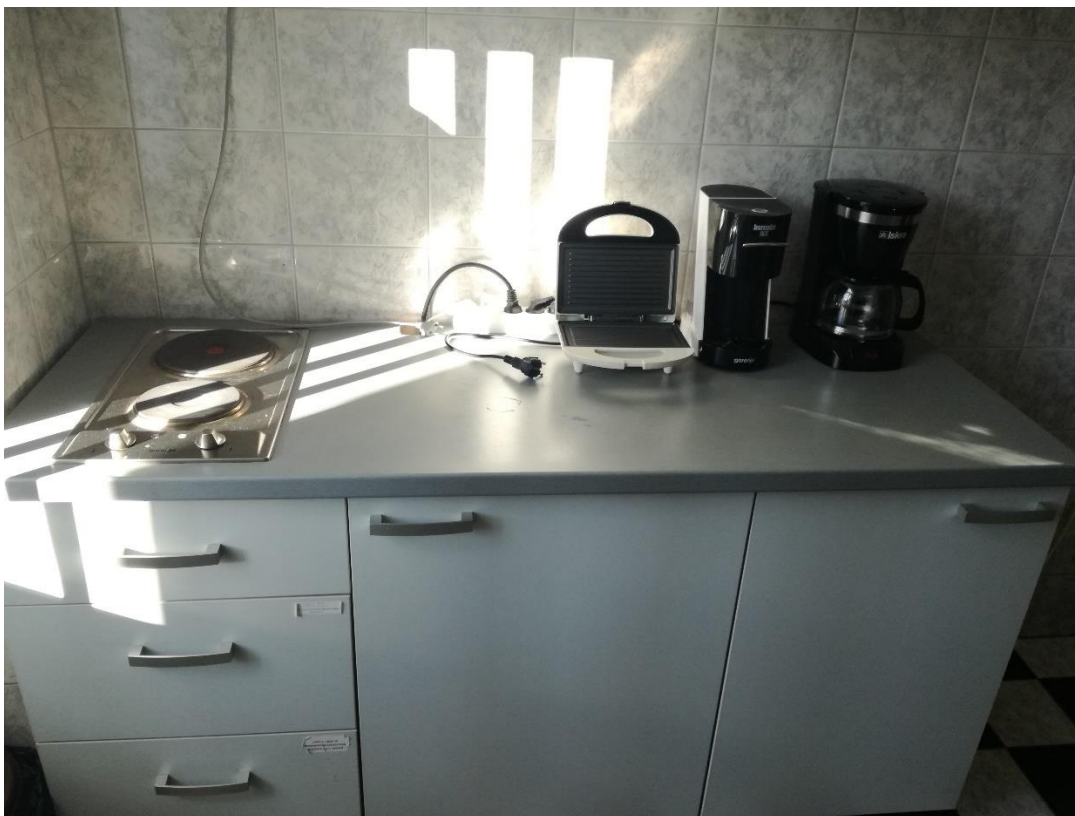
Refurbishing of public buildings in order for them to become more energy efficient is an activity that is current in most of the European countries. This is especially so in the countries of former Eastern European block (ex-communist countries) where many buildings were built in the 60's and 70's with not much thought on making those building energy efficient. A lot of inhabitants were moving from rural to semi-urban and urban area at that time and there was a necessity for building new, both residential and public buildings (kindergartens, schools, courts, etc.). Apart from that, the fuel for heating was also rather cheap and they gave little thought on the future repercussions on such form of buildings.

In Medjimurje region, where this pilot investment is implemented, the climate is classified as continental. This sort of climate is characterized by cold winters with significant precipitation and hot and dry summers. This kind of climate is also present in most parts of the Central Europe region so here defined pilot solution can in this context be transferred to any public building in this area. Furthermore, it is necessary in such climate conditions to construct well insulated buildings that can keep the indoor temperature between 19°C and 25°C so that the comfort of the residents stays the same with the energy consumption kept at minimum level.

Following all of the mentioned above, the investment implemented in this project on a public building in Čakovec, can easily be transferred to any other public building in Eastern European block. Apart from the measures implemented in this pilot, there are often other investments implemented to enhance energy efficiency of public buildings such as renovation of facades, installation of new highly efficient windows and doors, refurbishment of roofs and so on.

9. Photos of the pilot action

Before





During



After





10. Conclusion and further suggestions

For the pilot investment, it is implemented solar collector system for hot water and heating support, indoor lighting system with LED technology based luminaires and with the addition of motion sensors in the hallways and staircases, smart metering system for all energy sources and replacement of inefficient kitchen appliances with new ones of A+++ energy class.

With the implementation of all of the mentioned measures, the building will consume less energy and thus become more energy efficient. The building users live in a healthier environment, especially employees who spend 8 or more hours a day in the offices. Clients and visitors are able to see how an old, fairly inefficient building is transformed into an example of good practice when it comes to refurbishment of public buildings.

Moreover, the investment implemented in this project on a public building in Čakovec, can easily be transferred to any other public building in Eastern European block.

From all of this, it is apparent how much the implemented investment has a wide range of positive impacts on various factors such as energy factor (e.g. lower energy and water consumption, reduce the CO2 emissions), economic factor (e.g. reduce the costs of utilities), social factor (e.g. a better working environment for employees and an example of good practice for the users and general public) and so on. The greatest benefit of implementing previously described pilot investment is to further educate the local population and raise awareness of energy efficiency and renewable energy sources.