EIHP

Interreg Mediterranean

EUROPEAN UNION

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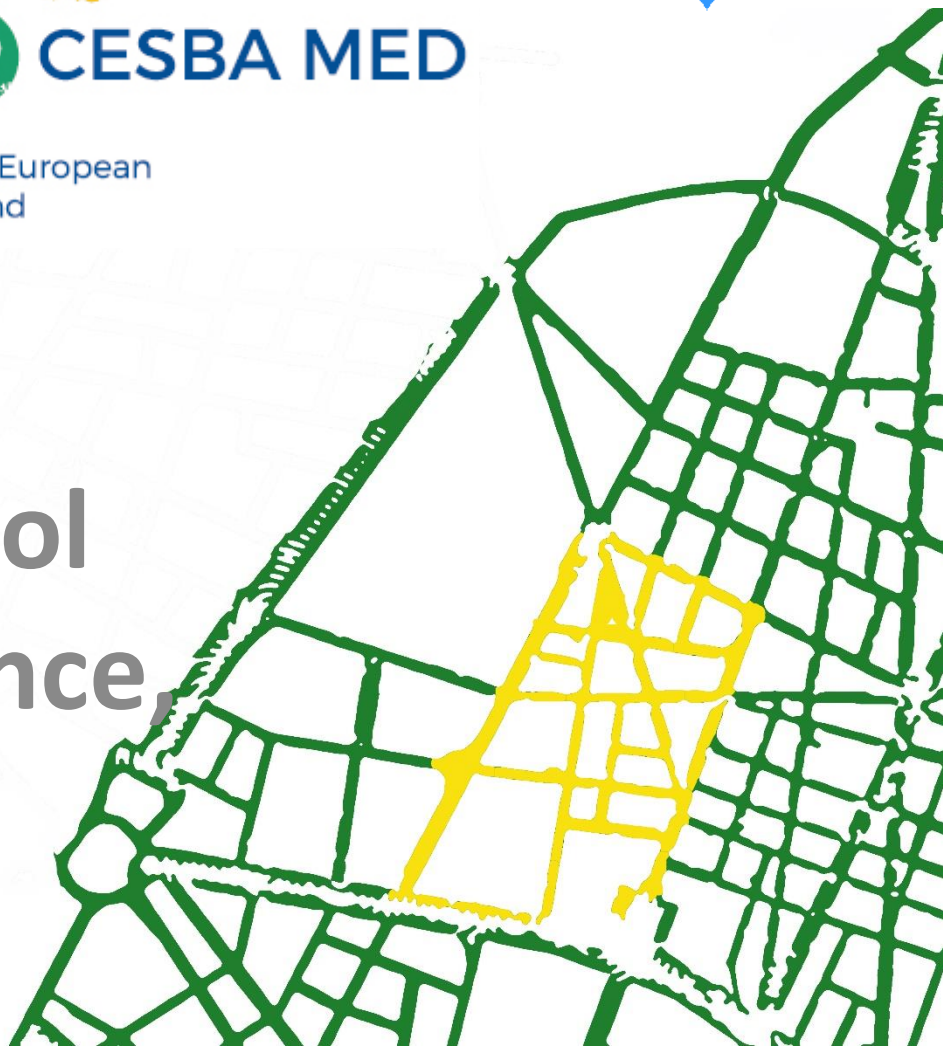
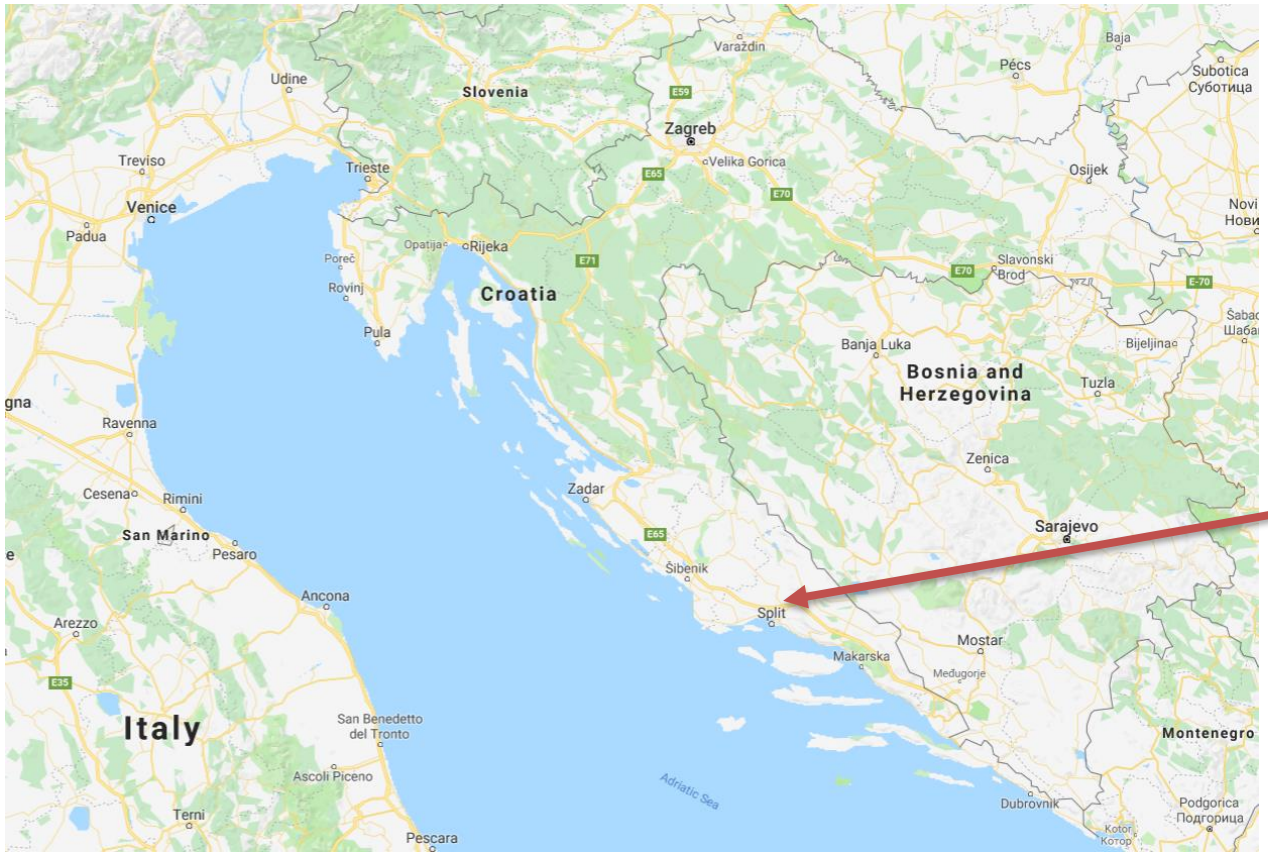
Project co-financed by the European Regional Development Fund

Elementary school renovation, Mravince, Croatia



Location of elementary school



Location of elementary school

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Micro location of elementary school in Mravince

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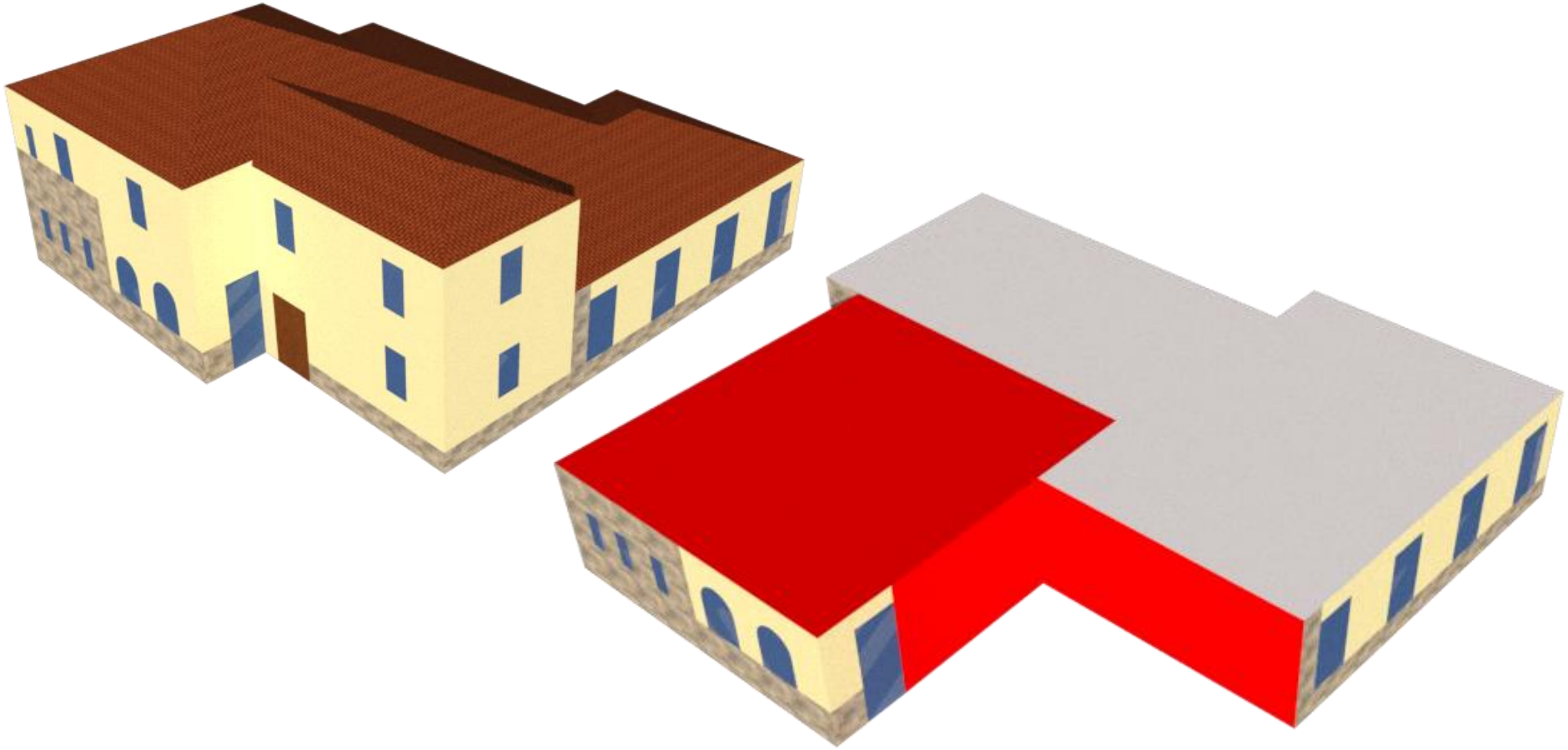
Features of location

- Warm Mediterranean climate
- A lot of sunny days
- Population is growing in Mravinci – especialy young families with children
- Lack of urban planing in past
- Lack of knowledge in present projects

Technical data of school

- 400 m² - 237 m² in use of school, 74 users
- Building date from mid 1950-s – characteristic construction system from that time
- Second floor – apartment for ex janitor
- Heating on pelet boilers (18,1 kW) and electrical heaters (6,7 kW)
- No cooling system installed in building
- Inssuficient lightning

Visualization



Main problems of shool

- Insufficient financial resources
- Relatively old building with limited renovation plans
- Newly installed local pellet boiler (only in classrooms)
- Few local electrical heaters on location
- Low lightning quality in entire school
- Mould on some walls and ceiling
- School need reconstruction to fullfill its main task – comfortable , quality and healthy enviroment for education of students

Main problems of shool

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Constrains

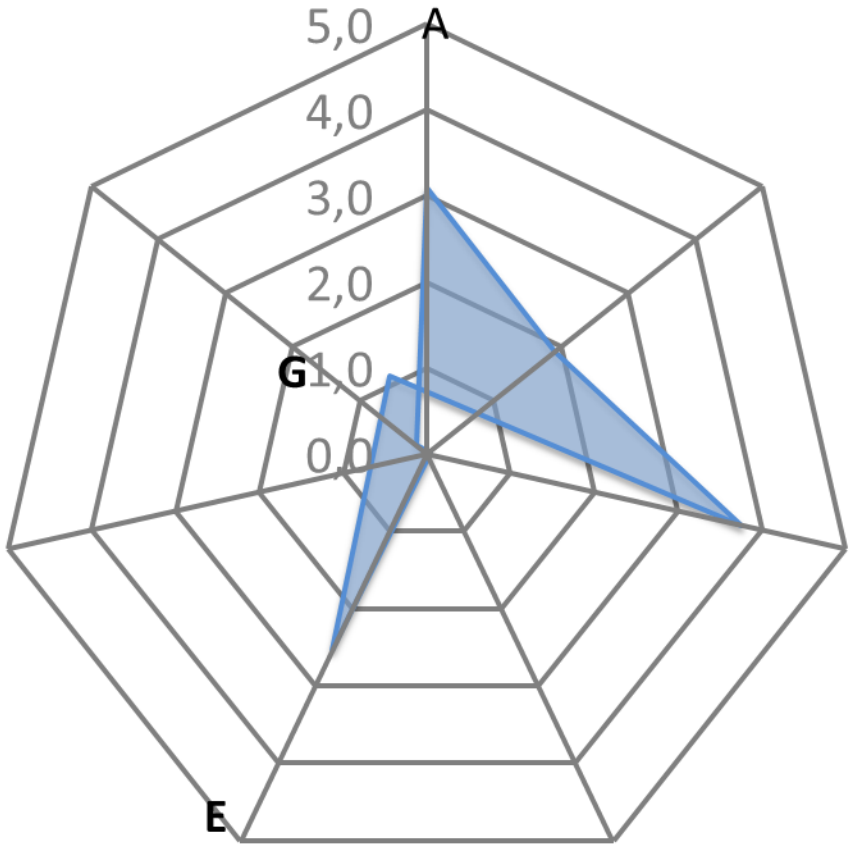
- Public building and lack of financing instruments
- Old building constructed with local material
- Low cost for energy – low motivation for retrofit – low savings
- Aestetic concept

Ambitious and goals

- Main reason for choosing this building is to ensure quality, healthy and comfortable environment for students.
- To educate local population how to retrofit building to NZEB standard and to implement circular economy in process
- To ensure that new generation of students will be more environmental friendly
- Reusing devices and furniture from school on other location

Current status

A	Site Regeneration and Development, Urban Design and Infrastructure	7,7%	3,1
B	Energy and Resource Consumption	52,0%	1,9
C	Environmental Loadings	19,8%	3,8
D	Indoor Environmental Quality	6,6%	-1,0
E	Service Quality	3,2%	2,5
F	Social, Cultural and Perceptual Aspects	5,2%	0,0
G	Cost and Economic Aspects	5,5%	0,2
Weighted project score			**1,99**



Optimal retrofit scenario

As optimal retrofit scenario is chosen integral retrofit, to maximize synergy of retrofit measures.

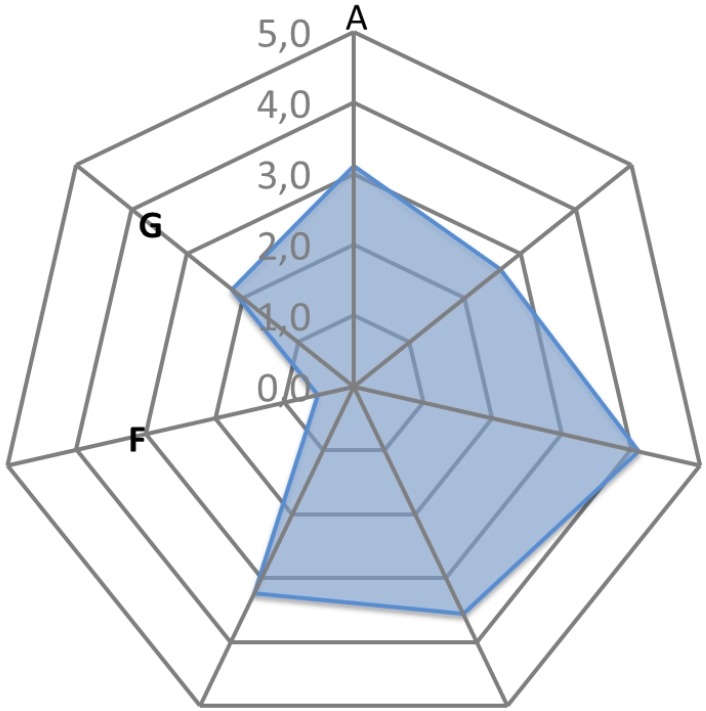
- Retrofit of entire building envelope. Windows should be produced by local manufacturers (wooden windows) – implementation of circular economy
- After lowering energy demand, on location should be installed heat pump to ensure renewable energy source on location and comfort in winter and summer period (heating and cooling), as well as healthy environment – new ventilation system
- New legal framework ensure installation of **PV modules** on roof, mainly to produce electrical energy on location for consumption on location.
- Installation of new LED lightning system 1,5 kW) with motion and illumination sensors to optimize consumption.

Optimal retrofit scenario

- Total cost - approximately 160.000 € (400 €/m²)
- Currently under decision phase
- Need similar approach of retrofit even from technical regulation point of view
- Education of students – main goal
- Lowering total operational cost by half from 10 to 5 €/m²/yr – highly efficient devices and envelope
- Lowering total CO_2 (from to 3,89 kg/m²) and energy (from 50,39 to 26,32 kWh/m²)

Self-assesment score for optimal scenario

A	Site Regeneration and Development, Urban Design and Infrastructure	7,7%	3,1
B	Energy and Resource Consumption	51,6%	2,6
C	Environmental Loadings	19,6%	4,1
D	Indoor Environmental Quality	7,3%	3,6
E	Service Quality	3,2%	3,2
F	Social, Cultural and Perceptual Aspects	5,1%	0,5
G	Cost and Economic Aspects	5,5%	2,2
Weighted project score			**2,92**



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Assesment tool

- CESBA MED Assesment tool
- New approach at planning of new building, reconstruction or even planning whole neighbour
- Time consuming for the first time but very indicative every time after that
- Possibility of adaptive using of tool in nearby areas

Thank you for attention!!

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