ZEROCO2
Interreg Europe

Study on transformation of one building to Near Zero CO2 emission Building due to energy use

MOLISE REGION

Interreg Europe
European Union | European Regional Development Fund

- *Chose small scale (200 m^2– 400 m^2) public building,*
- *In order to reach ZEROCO2 target it is better if you chose a building that is already energy renovated (does not have to high energy consumption), but it is not mandatory.*
- *Use public accessible software for calculation purposes (e.g.: TRIMO expert*

1. Short presentation of the building with:

- Building of a Municipality
  Municipality of Matrice (CB) – MOLISE – ITALY
  Address: P.zza dei Caduti , 34
  RIF. Cat. FG. 12 p.lla 380

See the attached schedules for more information.

1.1 Energy performance calculation (use free accessible online tools). If you have the data on real consumption, you can present this.

	Building status
Energy need for heating kWh/a	**21380,00**
Energy need for cooling kWh/a	**0,00**
Use of electricity kWh/a	**4569,00**
CO2 emissions kg/a	**2207,00^e + 3769,35^t = 5976,35**
Building energy class (A – G)	**D**

2. Measures for achieving ZEROCO2 target

- **POSSIBILITY OF INTERVENTION**

VARIANT 1: INSTALLATION BOILER + REPLACEMENT OF WINDOWS

VARIANT2: INSULATION Extrados LAST FLOOR + SYSTEM COAT + soffit INSULATION FROM BASEMENT FLOOR

VARIANT 3:
INSTALLATION BOILER REPLACEMENT WINDOWS + SOLAR PANELS INSULATION + Extrados LAST FLOOR + SYSTEM COAT + soffit INSULATION FROM BASEMENT FLOOR + VMC

- **ENERGY EFFICIENCY MEASURES EXPECTED**

1. **Isolation extrados last floor:**

Laying of low density rock felt with steam brake.
Insulating attic = 160 mm
U = 0,23 W/mqK
INVESTMENT = 1800 €

2. **External insulation system:**

Dual density hardboard
Insulating attic = 50 mm
U = 0,50 W/mqK
INVESTMENT = 12700 €

3. **Soffit slab insulation to the basement**

High density hardboard.
Insulating attic = 30 mm
U = 0,65 W/mqK
INVESTMENT = 2000 €

4. **Installing new fixtures**

Laminated wood window with three layers and heat insulating profile and double glass 4-16-4 low-e with argon gas.

U = 1,23 W/mqK
INVESTMENT= 20800 €

5. **Controlled Mechanical Ventilation System**

System with recovery of heat and humidity with 130% yield. Recovery over the distribution network, installation and commissioning.
INVESTMENT = 8600 €

6. **Replacing natural gas boiler**

Boiler mural compact gas condensing integrated with solar thermal system with accumulation.
Sup. Solar Thermal = 4,4 mq
35 ° tilt angle panels
Battery capacity = 35 lt
INVESTMENT = 12200 €

7. Installing photovoltaic panels

Laminated panels without high-performance frame. Anodized aluminium frame.
Sup. Tot = 20 mq
INVESTMENT = 10800 €

- **FORSEEN COSTS FOR THE IMPLEMENTATION OF OPPORTUNITY 'FOR ENERGY SAVINGS UNDER:**

VARIANT 1: 33000 €

VARIANT 2: 16500 €

VARIANT 3: 68900 €

3. Comparison

	Building- current status	Building – NZCO2EB measures Variant 1	Building – NZCO2EB measures Variant 2	Building – NZCO2EB measures Variant 3
Energy need for heating kWh/a	**21380,00**	**14908**	**13261,00**	**9068,00**
Energy need for cooling kWh/a	**0,00**	**0,00**	**0,00**	**0,00**
Use of electricity kWh/a	**4569,00**	**4569,00**	**4569,00**	**179,00**
CO2 emissions kg/a	**5976,35**	**4667**	**4395**	**1644**
Operating costs per year (EUR/a)	**500**	**300**	**100**	**400**

4. Conclusion

The analysis of Costs-Benefits brings to identify the variant 3 as the best opportunity for saving energy. Considering the global approximate investment of € 68 900, in the next 30 years to the measures in question will materialize treasurer's savings in the bill amounted to € 148,156 and save on energy requirements as follows:

Energy needs before the intervention = 25949 kWh / year

Emissions of di CO2 before the intervention = 5735 kg/year

Optimizing energy consumption = 16702 kWh / year

Optimization CO2 emissions = 4091 kg / year

energy needs after the intervention = 9247 kWh / year

Heat demand for heating after surgery = 6 kW

CO2 emissions after the intervention = 1644 kg / year

TOTAL INVESTMENT FOR EFFICIENCY = € 68,900

Optimization of the system due to the interventions listed above 58%.