Kohlerhaus

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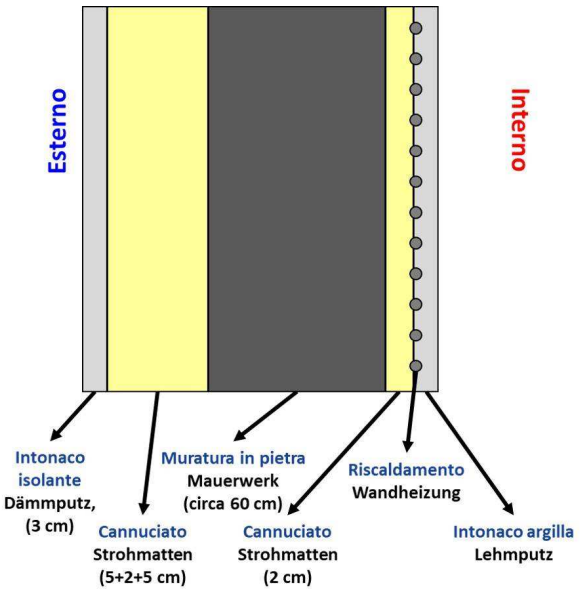
External and internal insulation with reed mat

Walls

What is the solution?

A massive stone wall was renovated with a combination of external and internal insulation using reed mats and insulating plaster. Additionally, the heating system was replaced by a radiating wall system. On the outside, 12 cm of reed mats and 3 cm of insulating plaster were used and internally 2 cm of reed mat and clay plaster were applied.

Cross section of the wall build-up, available pictures of the solution:



Wall stratigraphy

Construction phase - external insulation thickness

Construction phase - internal insulation + radiating wall heating

External view of the completed renovation

Why does the solution work in terms of compatibility with conservation, moisture safety and energy improvement?

A natural material for the insulation of the wall was chosen to respect the existing stone wall. Moreover, the architect tried to reconstruct the external aspect of the wall that was in 1784: the window framing and the type of plaster are part of this choice. The coupled use of external and internal insulation makes the solution moisture safe. The wall heating system in the ground floor intends to stop the rising damp.

Description of the context:

The building where this solution is applied is a big residential house, part of the

building is dated 14th century. The use of the building changed a lot of times. With the last renovation ten flats were designed: one is permanently occupied, the others are holiday apartments.

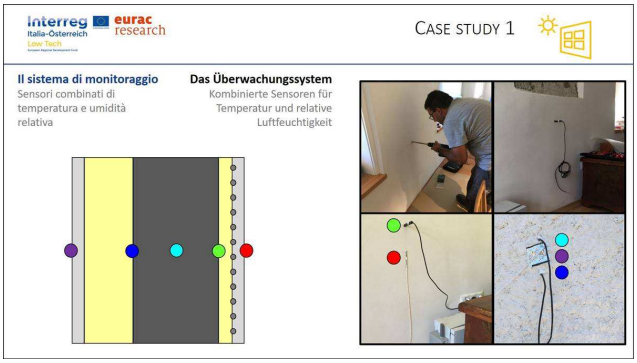
Pros and cons of the solution:

The main advantages of this solution are the use of natural material and the low risk of interstitial condensation because the wall is warmer thanks to the external insulation. The solution cannot be use if the external wall is decorated and changes the volume of the building, the depth of the openings changes. Another disadvantage is that the material is prone to decay in case of water infiltration.

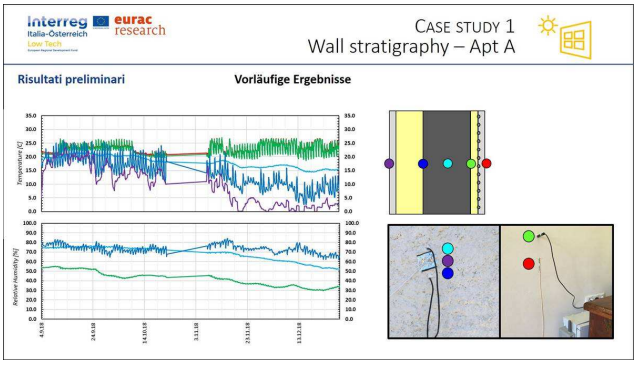
Type of data available (level of information, simulation):

The architect did a deep research about the history of the building. The building is monitored within a research project. Inside the building the temperature, relative humidity and the CO2 level are monitored in the sleeping room and in the living room inside two flats and outside the temperature and humidity are monitored. The wall structure is also monitored: temperature and Humidity are monitored between external insulation and stone wall, within the stone wall, between internal insulation and stone wall and the internal and external surface temperature. In situ was done a U value measurement. For the monitored information see attached file.

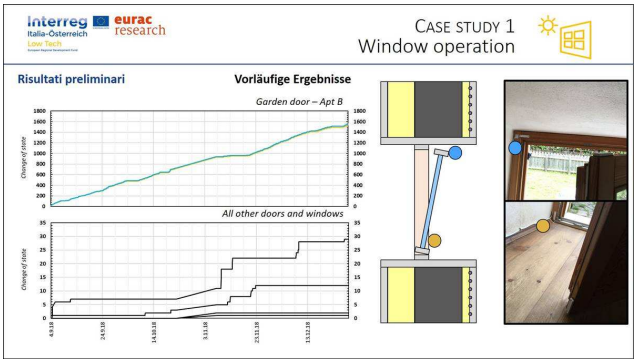
Is there any related publication? If yes, please provide any available link or document for further reading



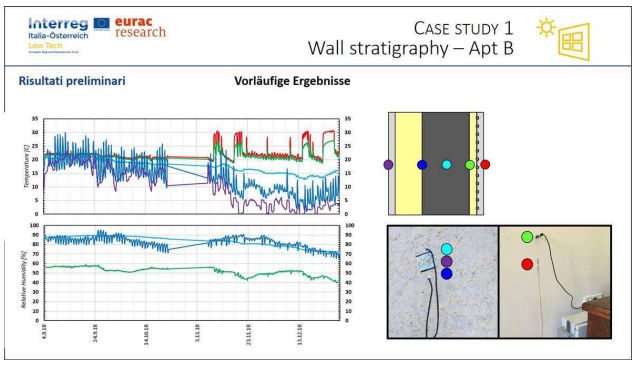
Monitoring system of the construction



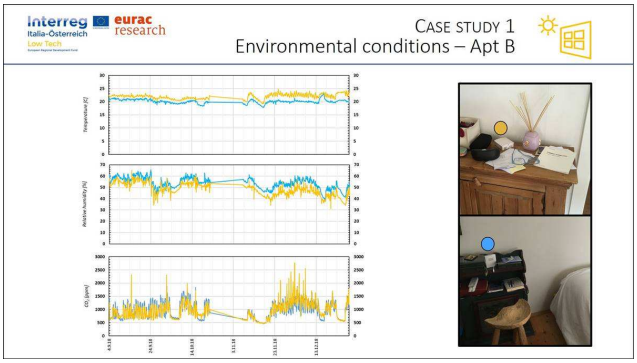
Some results of the construction monitoring system



Some results of the user behaviour monitoring system



Some results of the construction monitoring system



Some results of the environmental conditions

https://www.hiberatlas.com/smartedit/projects/97/Low-tech case studies.pdf
Monitoring system Project Low Tech

Link to best practice example (Hiberatlas):

https://www.hiberatlas.com/en/kohlerhaus--2-97.html