

**TECHNICAL NOTE****429 - Energy Simulation Of A Vernacular Raw Earth Construction, In South Alentejo – A Case Study**

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The construction of raw earth buildings is increasing in the South of Portugal. This type of construction offers a sustainable advantage. In fact, by using natural systems – which represent low embodied energy in extracting and construction process and that can also be easily reversible in the demolition process afterwards – the architecture contributes to reduce the environmental impacts of the entire life cycle assessment of the construction.

However such buildings, due to the fact of recover ancient techniques, which were conceived for ancient patterns of comfort, do not always provide the same comfort levels that are actually expected. Modern life requires new levels of comfort and this affects also the energy consumption of buildings. To reduce the energy consumption of buildings Energy Building Performance Directive – 2002/91/CE, imposes rules to construction so that houses can achieve the comfort levels with less possible energy consumption. This European directive has been already transposed to the Portuguese thermal codes for buildings.

With the aim of validating this type of construction in terms of the needed requirements to comply the Portuguese thermal code, an evaluation of a raw earth building, already constructed, in the Portuguese South region of Alentejo, was done. Since this building was constructed before the new thermal codes were published, it doesn't conform all of their requirements, particularly in terms of the flat thermal bridges and energy consumptions. However, some simple construction systems could be implemented so that the building can comply with the new codes.

Simulations with energy plus program have also been done, with the aim of compare inside comfort variable PMV of different construction solutions. A set of conclusions have been developed in terms of construction systems and natural materials that can help raw earth buildings to comply with the new thermal codes.



West side of the Case Study



East Side of the case study