

## Fireproof protection of dwellings against wildfire

### Summary

The fundamental objective of this work is the rehabilitation of old dwellings for enhance their resistance to wildfire event by using non-combustible façade concept. This material will go through multiple fire tests in order to evaluate its behaviour. A better understanding of thermal properties, fire resistance, and fire reaction can help to slow down the fire spread in wildland urban interface (WUI) communities. Structures ignite in a WUI fire through three different pathways: direct flame contact, radiation heat transfer, and firebrand accumulation.

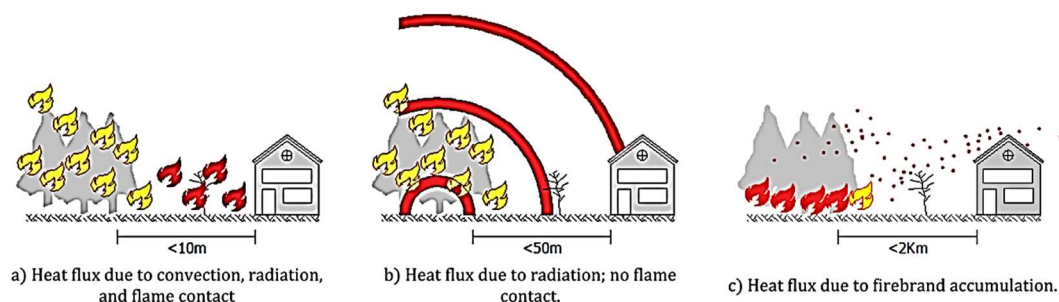
A finite element model employing thermal transient non-linear analysis will be developed to validate the thermal outputs obtained from the previous fire tests. In addition, the consequences of an indoor fire will be compared with those of a wildfire using a 3D finite element model through a thermal-mechanical coupled analysis.

The motivation for this initiative stems from the significant impact of two of Portugal's largest wildfires in 2017, which underscored the need for updated legislation on forest fire protection. However, the revised legislation primarily focused on forest-related management, neglecting the characteristics of dwellings and the safety of individuals during wildfire. Therefore, innovative solutions are imperative to safeguard both residents and structures. To address this issue, the use of constructive solutions with non-combustible materials is proposed, particularly focusing on fortifying the border areas between the exterior and interior of buildings, which are vulnerable spots.

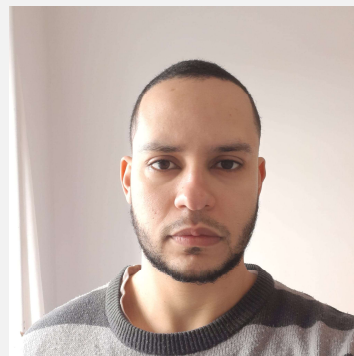
Finally, for this study, since dwellings are viewed as a shelter for protection and should not be evacuated, they also require a higher reaction to fire class according to European standards.

### Keywords

Wildfire, fireproof, dwellings rehabilitation, non-combustible materials, transient thermal analysis, Finite Element Method (FEM).



Types of wildfire heat flux transmission.



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