

## House-Refuge – Development of Better Practices and Rules for Constructions and Surroundings in Areas Prone to Wildland-urban Interface Fires

### Summary

The large fires of 2017 in Portugal have highlighted some needs, that have long been discussed: - the population should consider self-protection measures because, in catastrophe scenarios, the civil protection means may not be able to attend to all occurrences; - despite of being built in concrete, bricks or stones, the typical Portuguese constructions have some vulnerable aspects that can and should be adjusted; - in the situation of wildfire, if well designed and maintained, a traditional house can become a good place of refuge, individual or community. The normative that requires fuel management in the Wildland-Urban Interface (WUI) up to 50m (isolated constructions) or 100m (communities) requests scientific support, since in certain scenarios these distances may be exaggerated, and in other cases they may be insufficient (e.g. buildings in canyons). The representation in a circle of these areas is not always adequate as other configurations often make more sense (e.g., an ellipse for dwellings and communities on slopes). This project intended to create a model based on the expected fire behaviour, according to the typical meteorology and topography, that can determine the area of fuel management that best suits to each location. In these studies, the use of active technologies (e.g. sprinkler systems) to mitigate the fire effects when passive measures are insufficient or difficult to meet due to urbanization, ecological value, etc. were considered. There are several research projects focusing on the fire risk in constructions and others directed to the spread of fire in the buildings' surrounding areas, however, the scientific developments that combine these two components are quite poor. In this perspective, the House-Refuge Project created guidelines for construction in order to mitigate the risk of wildfires by combining the two components of the system - construction and surrounding area. Thus, at the level of the surroundings, the characteristics to prevent the fire reaches the constructions were defined. These characteristics included fuel breaks and/or barriers that prevent the fire spread, among other solutions. At the level of the construction itself, the best constructive solutions that avoid ignition and fire development after the fire reaches the building was studied (e.g. used materials, architectural and civil engineering solutions, etc.) The conversion of such

developments into legal obligations was not so easy since the simple definition of rules is sometimes poorly understood, accepted or accomplished by the population. Given that some of the measures proposed in the project may aggravate this difficulty, the House-Refuge included a methodological analysis on the legal scope, thus increasing the likelihood that the measures proposed are not merely theoretical, but may have effective and practical application. It is considered that the insurance industry could be a solution to this problem if the fire risk in the WUI becomes evident in the equation for determining the insurance costs and so a model was developed with this aiming. Considering the risk dynamics (e.g. vegetation growth in the surrounding area) and the need of the periodic determination of the insurance cost, which required a periodic monitoring to the ensemble construction-surrounding that can be expensive, a procedure based on documentary evidence (e.g. photos) of good management of the house-surroundings was developed. Hence, a model allowing the evaluation of the fire risk of a construction was developed. This model considered the following factors: 1) constructive aspects; 2) characteristics of the surroundings (fuels, topography, normal climatological, etc.); 3) existence of active measures of self-protection of housing. Once again, a legal-policy analysis was carried out aiming at the effective implementation of that evaluation. The project also foreseen the implementation of measures proposed in several buildings under construction, many of them still in the aftermath of the wildfires of 2017, and in the construction of community shelters. Thus, it was considered that the project had four basic values: 1) WUI fires, an area led by ADAI, whose experience in research on wildfires is nationally and internationally recognized; 2) constructive aspects, an area coordinated by Itecons, which also has leadership in the research on building engineering sciences; 3) legal, policy and insurance aspects, dealt with by the University of Coimbra Legal Research Institute, through a team of legal experts in several areas of law; and 4) proximity to citizens and construction projects, led by AVIPG, which is coordinating several social projects aiming at the support of the victims of wildfires in the reconstruction of houses and in the building of community shelters.



### Project Reference

PCIF/AGT/0109/2018

### Leading Institution

ADAI – Associação para o Desenvolvimento da Aerodinâmica Industrial (Portugal)

### Partners

Itecons – Instituto de Investigação e Desenvolvimento Tecnológico para a Construção, Energia, Ambiente e Sustentabilidade (Portugal), UC – Universidade de Coimbra (Portugal), AVIPG – Associação de Vítimas do Incêndio de Pedrógão Grande (Portugal)

### CERIS Principal Investigator

João Paulo C. Rodrigues  
([jpaulocr@dec.uc.pt](mailto:jpaulocr@dec.uc.pt))

### CERIS Research Team

Julieta Maria Pires António, Cristina Calmeiro dos Santos, Deives Junior de Paula, Fernando Pedro S. S. Dias Simão

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### CERIS

Coimbra Hub: 80 300.00€

### Project Website

[adaí.pt/houserefuge](http://adaí.pt/houserefuge)