CERIS : Civil Engineering Research and Innovation for Sustainability

InduForestFire – Interdisciplinary Methodologies for Protecting Industrial Zones Against Forest Fires

Summary

The large forest fires recorded in the last few decades in Europe and in particular in Portugal showed the fragility of the urban areas, including the industrial sites existing in the urban-forest interface. So, it should pay attention on the protection and construction of communities and its buildings safe in relation to fire but also educating the population towards the use appropriate self-protection measures. The urban-forest interface areas were largely affected by forest fires with high loss of human lives, but above all with high financial losses which encompasses the social drama of the loss of jobs by interruption of laboration of industries The regulatory provision which requires a fuel management in the environment of up to 50 m around the dwellings or up to 100 m around the communities requires a scientific analysis, since in certain scenarios these distances can be exaggerated and in other cases may be insufficient. This fuels management is usually represented by a circle, when in many cases it would make more sense to have other drawing depending on the configuration of the community. In Portugal we find urban areas with a regular and elongated grid and other more complex with a circular grid composed by a non-regular distribution of streets and buildings. In this research project was created a model, based on the expected fire behavior, for determining the area of fuels management that best suits each industrial site. This study focused on the existing industrial sites by analyzing those that have had fires in recent years, as well as those that although they haven't had fires, present a high fire risk. There were already some research projects dedicated to fire risk in urban-forestry interface areas, however, those which were engaged to industrial sites in this interface areas were quite non-existent. In this perspective, this innovative research project aims to create guidelines for the construction of industrial sites and their buildings with a view to mitigate the forest fire risk by combining the components of the construction system and its surroundings. So, at the level of the surroundings it was defined features in order to prevent a forest fire from reaching the industrial site. These characteristics can pass by the definition of protection tracks without vegetation or with vegetation more resistant to fire ignition, construction of barriers for preventing fire spread or definition of special features of fire resistance and reaction for the buildings adjoining the industrial sites, giving them a buffer function to fire spread to the interior of the site. At the level of the construction itself it was studied the best constructive solutions that prevent the ignition and fire development, not only in the choice of the most suitable materials for an improved fire reaction but also in the definition of constructive solutions for mitigating the probability of fire spread to the interior of the building or to its adjacent buildings. It was also analyzed the fire spread within the industrial site and with this studied the best constructive mesh for the industrial site in terms of arrangement of the streets and buildings. The research developed within this project was applied by the municipalities defining policies for the construction and protection of industrial sites. These policies were defined both to the existing as the new sites from North to South of Portugal, however the study was focused mainly on the Center of Portugal. In a final stage of this project it was proposed documents that might constitute a project of regulation for fire safety of industrial sites in interface urban-forestry areas. Thus, this project of interdisciplinary nature included in the Consortium 4 partners. The Itecons (project leader) and the Polytechnic Institute of Coimbra, each with complementary skills and competences, were the main scientific partners. Additionally, there was an important role played by ANPC (governmental body responsible for the fire safety and civil defense of the country), by allowing access to data necessary to produce the fire propagation simulations of past fires and by making the link between the scientific results and their practical application. The fourth member of the Consortium was the Intermunicipal Community of the Region of Coimbra, an organization that integrates the main municipalities affected by the 2017 forest fires. Their role was to provid data on building damages, land use/land cover, and, similarly to ANPC, to make the link between the scientific results and their application in the territory by possible regulations and ordinances. The development of new policies and regulations for the area is of upmost importance. The project has lasted for three years, allowing to obtain data on vegetation growth in land plots where fuel management has been introduced following, or not, the technical guidelines imposed by law.

Project Reference

PCIF/MOS/0129/2018

Leading Institution

Itecons – Instituto de Investigação e Desenvolvimento Tecnológico para a Construção, Energia, Ambiente e Sustentabilidade (Portugal)

Partners

IPC – Instituto Politécnico de Coimbra (Portugal), CIM-RC – Comissão de Coordenação Intermunicipal da Região de Coimbra (Portugal), ANEPC – Autoridade Nacional de Emergência e Proteção Civil (Portugal)

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Funding

FCT – Fundação para a Ciência e a Tecnologia

Period

2020-2023

Total

299 542.50€

CERIS

Coimbra Hub: 139 330.00€

Project Website

www.induforestfire.pt