RESEARCH FOUNDATION
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Environmental Impact of Fires in the Built Environment: Emission Factors

Most fires occurring in the built environment contribute to air contamination from the fire plume (whose deposition is likely to subsequently include land and water contamination), contamination from water runoff containing toxic products, and other environmental discharges or releases from burned materials. The environmental impact also has economic consequences for communities and regions and while the direct and indirect costs of fire on a community can be devastating, they are not usually reported at a local scale beyond an account of the human deaths and injuries and the amount of property destroyed or damaged.

As a start to calculate the true cost of fire to society, the Foundation undertook a study that developed a research road map identifying needed research to be able to quantify the environmental impact of fire from the built environment and its economic consequences. This study identified the need to develop updated emissions factors (EF) for atmospheric emissions and couple this to the development of acceptable EF for emissions to water and soil considering both pure substances and relevant mixtures.

Project Goal & Approach

The goal of this project was to update existing EFs for a range of fire conditions and develop new EFs for relevant building materials to produce a database that can be built upon with future research.

LEARN MORE: Download the final report here.

Summary Observations

This report provides information concerning updated EFs for a range of fire conditions and materials and explores methods to develop some new EFs. Details of which material have been studied was determined through a combination of factors, including typical materials used to describe buildings in LCA models, materials identified in a separate French research project (funded by the French Ministry of the Environment in the context of the annual funding for INERIS), and a database of prior experiments characterizing a number of existing materials.

Special focus was placed on scaling to investigate the predictive capabilities of small-scale test methods for development of EFs for large-scale conditions. This report provides details of large-scale and small-scale experiments conducted at INERIS (France) and small-scale experiments conducted at Lund University (Sweden), in 2019-2020 spanning a period of approximately 18 months. In addition to conducting experiments to confirm existing data and develop new data, a database of existing experimental data relevant for the development of EFs has been created containing some 90 products and materials. This database represents the first up-to-date published resource with a collation of emission factors for a broad variety of species to the best knowledge of the authors.

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