

The project is a response to the phenomenon of the increasing number of landfill fires in recent years in Poland. The recognition of the qualitative and quantitative impact of landfill fires on the environment and population health will be based on comprehensive studies of emission of selected pollutants and its impact on atmospheric air quality. Multidirectional analysis of the emissive, immisive, meteorological, and statistical data will be the base for the development of the unique and universal methodology of landfill fire impact assessment on the atmospheric air quality. The methodology will let to verify in a reliable way the wide media reports about the environmental harmfulness of landfill fires.

The data of the State Fire Service about the landfill fires (including illegal landfills) will be used in the project. Application of mathematical models and computer simulations will let recognize direction and range of pollutant dispersion from these fires. The project will let to estimate the total emission of selected pollutants and estimate the number of people who were exposed to the additional concentration of pollutants due to landfill fires (particularly concentration of suspended particle matter PM10).

Two experimental setups are planned during the project – the laboratory experiment and field experiment. The aim of these experiments is the complementation of the emission factors and the range of the small-scale fire. The experiments will be conducted in the fire laboratory and on the training ground of The Main School of Fire Service. Different types of waste will be burned in the experiments (plastics, bio-waste, paper, treated wood, plywood, wooden chipboards, furniture elements, etc.) and the air will be monitored using low-cost sensors of particulate material.

All methods and models produced during the project will be validated using computational fluid dynamics and a comparison of the results with the results of experiments. The proper analysis of the measurements and their uncertainties will be crucial for the project.

The results of the project will have significant benefits on environmental engineering, mining, and energetics as basic research in the field. The research is also socially significant in the context of the awareness of the consequences of waste storage and its dangers. Although the project is based on the data about landfill fires in Poland, the universality of the applied methods will let to adapt them to every region of the world.