



UrbEM: Urban Environmental Model for fast and accurate air quality assessment.

BuildWind is a Belgian SME specialized in the development and use of numerical simulation tools to predict airflow, heat transfer, and contaminant transport inside and around buildings.

One of the most promising approaches to overcoming some of the limitations of currently applied techniques in our field is the combined use of artificial intelligence and computational fluid dynamics. This may allow creating models that retain most of the accuracy of CFD simulations but that can be executed in a very short time and with limited computational resources. Preliminary studies indicate that such a strategy can be successful.

Our project **UrbEM** aims at creating a software able to accurately predict the local environmental conditions (wind speed, temperature, pollutant concentration) in a city using machine learning to generate a predictive model of urban air quality based on data from computational fluid dynamics simulations, weather stations, and pollution measuring sensors.

UrbEM is part of larger, international (Celtic-Next) project, SPICECO, in which BuildWind is a partner. The SPICECO consortium is developing a collaborative platform and related applications for smart-cities. UrbEM will be integrated into SPICECO and hopefully other smart-city platforms.

The 12th SHAPE program provided us with precious computational resources and support, so that we could generate a large amount of simulation data in a much shorter time than with our own HPC machines. This allowed us to better focus on validating and optimizing our wind models and simulation code and advance faster and better with the development of our technology.

Alessandro Gambale, CEO of BuildWind

Alessandro Gambale holds a Master's Degree in Aerospace Engineering from "La Sapienza" University, Rome (Italy). He worked for the "Von Karman Institute for Fluid Dynamics" (Belgium) and for UMONS University (Belgium) within a research program of the International Energy Agency. Since 2014, he has been involved in several startup projects and co-founded BuildWind in 2018.

