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Microclimatic effects of idealized urban planning projects on their surrounding area

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Over the past years, microclimate simulations and analyses became an important tool for the impact assessment of different planning scenarios of real estate projects on a local site. Based on the results of evaluated scenarios, the need for (additional) climate adaptation measures can be identified and improved design concepts might be realized. While this process led to several positive developments and best practice examples, the impact of a building project on the microclimate of the surrounding areas in spatial proximity to the development area is often still neglected. Especially if formerly green areas are sealed, cold-air production areas are lost, or cold-air corridors blocked. Even positively assessed microclimate studies for the local site itself, can have a negative effect on the microclimate of the surrounding area. While large urban planning projects (e.g., area size > 15 ha) in Austria require environmental impact assessments, policy makers and administrative units lack objective criteria to request spatially extended microclimate analyses for medium sized projects that not only affect the development area but also the neighbouring quarters.

In the prevalent research project, “Development of a criteria catalogue for requiring extended microclimate analyses”, funded by the Climate and Energy Fund and carried out under the program "Austrian Climate Research Programme Implementation", potential microclimatic impact of urban planning projects on their surroundings during autochthonous weather conditions in summer is evaluated through sensitivity experiments with the urban climate model PALM-4U. Based on the concept of Local Climate Zones (LCZ), idealized real estate projects are set up in two locations (inner city and periphery) of the city of Linz (Austria). For each location, the following selected characteristics of static input data are varied: (1) size of building site, (2) building footprint, (3) building height, and (4) degree of soil sealing. By comparing simulation results to the reference scenario of an unsealed, green area, the potential impact in terms of intensity and spatial range is assessed.

Results of the sensitivity experiments are used to compile a compact set of criteria, which allows policy makers and administrative units to request spatially extended microclimate analyses to evaluate effects of medium sized urban planning projects on the district-wide microclimate if impacts are expected.