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Potential benefits of retrofitting green roofs in Yuzhen Quarter, Plovdiv, Bulgaria

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Green roofs can provide a number of benefits in urban areas, including mitigation of heat islands, reduction of urban air pollution, CO₂ sequestration, noise reduction, water retention, absorption of pollutants in rainwater runoff, acid rain buffering, etc. The aim of the current study is to map the land cover and assess some of the potential benefits of retrofitting green roofs in a residential area in the second largest city in Bulgaria – Plovdiv. The survey covers Yuzhen (South) Quarter, with an area of 31.33 ha.

According to the General Development Plan of Plovdiv, 73% of Yuzhen Quarter is a residential area with required greening between 20 and 60%. Only 2% of it are designated as green area for public use. A detailed mapping in GIS environment, based on available satellite images showed that impervious surfaces cover 61% of the surveyed area. Green areas cover about 28% and are mainly grass communities of ruderal and synanthropic species on highly compacted soils. Trees are mainly planted along the streets and between buildings.

Flat roofs currently cover 15% of the studied area (25% of the impervious surface). The assessment of the possible effects of retrofitting of all flat roofs in Yuzhen Quarter, Plovdiv, showed a significant potential to mitigate some of the major adverse effects of urbanization. If the roofs are greened, for example, with *F. rubra*, 11% of the PM₁₀ in the area can be removed. Sequestration and energy savings will reduce the CO₂ by 205 242 kg/year. Greening of the flat roofs in the survey area may decrease the summer temperatures in the quarter at a street level. In Plovdiv, even a small temperature reduction will decrease the number of days with heat stress or reduce the heat stress levels.

Keywords: Green roofs, urban areas, PM₁₀, CO₂ sequestration, heat stress