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ASSESSMENT OF THE POTENTIAL FOR INCREASING THE ENERGY EFFICIENCY IN THE COOLING SECTOR

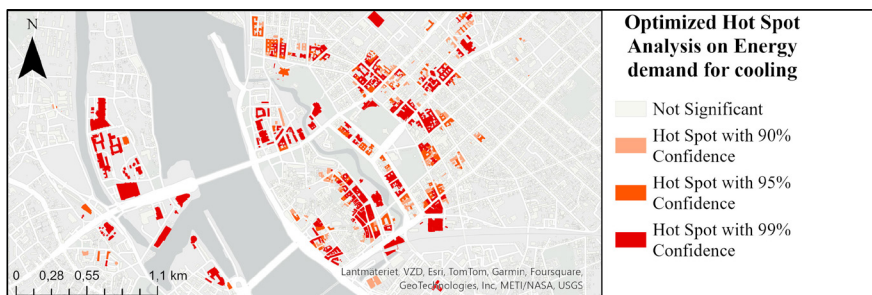
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Abstract – Cooling supply to ensure the indoor microclimate is becoming more important as global average air temperatures rise. With growing societal demands for higher thermal comfort and increasing individual cooling solutions in the building sector, global energy consumption for cooling is increasing accordingly. Scientific literature and studies estimate that the demand for cooling energy will have a significant impact on global energy demand in the future. In compliance with the European Union goal of achieving climate neutrality by 2050, it is essential to find solutions for reducing energy consumption in the building sector, which is already among the largest energy consumers and greenhouse gas emission producers. Replacing individual cooling solutions with district cooling in urban areas, where higher energy density can be reached, is one of the solutions for decarbonizing the building sector. To spatially assess the feasibility of district cooling in certain areas, energy demand mapping can be performed. Within this research mapping is carried out using a geographical information system (GIS) tool. The purpose of the mapping is to identify the places in the city of Riga with the highest district cooling potential. Spatial assessment using a GIS tool can be done in different ways – mostly it depends on the available data. The spatial data (buildings) of the cadastral information system and additional detailed information about buildings were obtained from the Latvian open data portal. Information on the type of use of the building, indoor area and the age of building was attached to each building on the map. Then, building energy certificate data containing information on specific energy consumption for cooling (kWh/m² per year) was obtained from the same portal. By processing the data of energy certificates of buildings, excluding outliers, a specific index was obtained for different types of buildings. For the residential sector, the age of the building is also used. Using cadastral data on the indoor area of buildings and the type of building use, the theoretical cooling demand in Riga is calculated and results are quantified and displayed visually. By visualizing the results with the GIS tool, hot spots with the highest cooling energy demand were detected. Results can be further used to calculate the technical and economic justification for the district cooling solutions in specific areas as well as assess the energy efficiency that would be provided by implementation of district cooling solutions.

Keywords – Buildings; climate; district cooling; energy demand; GIS; mapping



Statistically significant hot spots with higher density of energy demand for cooling in the part of city of Riga.