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IMPACT OF CLIMATE CHANGE ON THE HEATING DEMAND OF BUILDINGS. A DISTRICT LEVEL APPROACH

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Abstract – In the 21st century, the importance of energy generation and carbon emissions in developing countries is indisputable. In the whole wide world, the building stock is responsible for the two fifths of the total world annual energy consumption. Considering the predictions regarding future climate due to climate change, a good understanding on the energy use due to future climate is required. The aim of this study was to evaluate the impact of future weather in the heating demand and carbon emissions for a group of buildings at district level, focusing on an area of London in the United Kingdom. The methodological approach involved the use of geospatial data for the case study area, processed with Python and Anaconda through Jupyter notebook, generation of an archetype dataset with energy performance data and TABULA typology and the use of python embedded in QGIS to calculate the heating demand in the reference weather data, 2050 and 2100 in accordance to RCP4.5 and RCP 8.5 scenarios. A validated model was used for the district level heating demand calculation. On the one hand, the results suggest that a mitigation of carbon emissions under the RCP4.5 scenario will generate a small decrease on the heating demand at district level, so similar levels of heating generation must continue to be provided using sustainable alternatives. On the other hand, following the RCP 8.5 scenario of carbon emission carrying on business as usual will create a significant reduction of heating demand due to the rise in temperature but with the consequent overheating in summer, which will shift the energy generation problem. The results suggest that adaptation of the energy generation must start shifting to cope with higher temperatures and a different requirement of delivered energy from heating to cooling due to the effect of climate change.

Keywords – Energy performance; future climate scenarios; geospatial data; OS MasterMap; TABULA typology; Urban Building Energy Modelling (UBEM)