

# Resilience to urban heat waves under climate change: a modelling case study for an urban area

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The CLICURB project intended to assess the risks and to consider solutions addressing the challenges of climate change (CC) in cities, using the urban area of Porto as a case study. An integrated analysis of CC, air quality, heat fluxes and urban development was elaborated, allowing for the inclusion of adaptation strategies in the city's planning and in the decision making process. The presence of green spaces, the use of green roofs and surfaces with high levels of solar reflection in buildings, are among the most effective measures for reducing the temperature in urban areas and were taken as resilience factors for the study.

To study the impacts of the resilience measures on surface temperature, air quality and heat fluxes, a cascade of numerical models, from the global to microscale was applied to a heat wave in future climate (2050), under a CC scenario (Representative Concentration Pathway RCP8.5).

Five scenarios were compared with the base scenario (without resilience measures): double the green areas (S1); application of green roofs (S2); application of white roofs (S3); combination of S1 and S2 (S4); combination of S1 and S3 (S5). The results show that all tested measures lead to increased resilience of Porto to CC, promoting the reduction of temperature, energy released into the atmosphere and ozone concentrations, where the green roofs appear as the most efficient resilience measure.

Given the expected increase of the heat waves frequency and intensity in future climate projections, the investigation of the resilience measures and its effectiveness to mitigate the changes in the urban metabolism, is of great importance for urban planning stakeholders and decision-makers. Two of the main outputs of CLICURB project are the book ([http://arquivo-gemac.web.ua.pt/arquivo-clicurb/CLICURB\\_livro.pdf](http://arquivo-gemac.web.ua.pt/arquivo-clicurb/CLICURB_livro.pdf)) with the main results achieved over the project and the urban atlas (<http://atlas-clicurb.pt/>), where the citizen can find the future projections in terms of climate, fluxes and air quality in Portugal and in Porto urban area.

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