

Assessment of air quality and microclimate in EU selected cities pre-infrastructure solutions

Deliverable 6.1

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The objective of the deliverable is to produce a quantitative assessment of *current* climate and air quality conditions in iSCAPE cities, providing a synthesis of climatic conditions and air quality pre-intervention of Passive Control Systems (PCSs) in each city.

Mean meteorological conditions are obtained by calculating the annual average from hourly recordings over 5 years for wind speed and wind direction, and 10 years of hourly air temperature and daily precipitation. In each city all the considered monitoring stations belong to governmental agencies and, therefore, follow the acquisition and dissemination standards of European legislation.

Mean conditions are represented with graphs and histograms to provide an immediate snapshot of climatic conditions and to serve as background for the interpretation of the distribution of PM10, PM2.5, NO2 and/or NOX as well as ozone. Those compounds are presented as concentration maps with high resolution maps generated for each site.

The combination of meteorological data and concentration maps create a baseline for the PCS interventions at each site, with mutual results showing that pollution concentrations are directly associated to the presence of anthropogenic activities, and filtered by atmospheric circulation.

In Bologna, Guildford and Vantaa it is evident that the primary contribution to pollution distribution is at roads and junctions, which is also valid for Bottrop Motorway junctions that stand out as one of the most polluted points and which influences pollutant distributions.

Dublin and Vantaa perceive both wet (precipitations) and dry (winds) pollutant removal, while low pollutant concentrations in Hasselt are solely a consequence of wet removal.

This report also provides novel information regarding heat waves and urban heat island (UHI) for the two larger sites within iSCAPE i.e. Dublin and Bologna. These two large cities are affected, as noted in iSCAPE deliverable D1.4¹, by the UHI phenomenon that during the summer period may exacerbate climatic conditions when a heat wave is occurring.

To better tailor iSCAPE PCS interventions it is crucial to consider the behaviour of air temperature distribution under heat wave conditions. To this end novel numerical simulations are validated and used to illustrate the “expected” spatial distribution of air temperature within the city and relative UHI quantified.

Despite Dublin being much larger than Bologna, the effect of building density and built thermal properties is such that Bologna’s UHI is much larger and show stronger diurnal variation. This indicates clearly that southern European cities may consider larger employment of PCSs to mitigate both air quality and climate.

The full report will be published in February 2018



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¹ iSCAPE Report on Climate Change and air quality interactions (D1.4)
https://www.iscapeproject.eu/wp-content/uploads/2017/09/iScape_D1.4_Report-on-climate-change-and-air-quality-interactions.pdf