Predicting natural ventilation potential in idealised urban neighbourhoods across Chinese climate zones

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Natural ventilation is widely used for low-carbon building design. Its potential is influenced largely by the building's micrometeorological context. Traditionally, weather data used in building energy simulation are observed at rural sites which are far from the site of interest and not representative of the area's surroundings. Here we combine the Surface Urban Energy and Water Balance Scheme (SUEWS) and the building energy simulation tool, EnergyPlus, to predict the natural ventilation potential (NVP) in buildings located in urban areas in five representative Chinese cities in different climate zones. The meteorological data required by EnergyPlus (e.g. air temperature, relative humidity, wind speed profile) are modelled by SUEWS. The dense urban areas (building fraction λ_P = 0.6) have an overall warmer and less windy environment compared to rural areas. In summer, the urban-rural natural ventilation hour differences are -3% to -85% (cf. rural) across all climates, while in spring/autumn differences are -25% to 42%. The method is intended to improve the accuracy of NVP prediction using EnergyPlus in cities.