



'Cool' paving materials make summer in the city more comfortable

Using 'cool' materials to construct roads and walkways is an effective way of lowering urban temperatures to make cities more comfortable in hot weather. According to a recent study, surface temperatures were reduced by 12°C and ambient temperatures were reduced by 1.9°C after cool pavements were installed in a city park in Greece.

Cities are known to exhibit the 'urban heat island' effect, in which urban temperatures are higher than those of the surrounding rural areas. The phenomenon is created through a combination of heat released from human activities, such as air conditioning and traffic, in addition to decreased air flow and increased heat absorption by buildings, roads and other structures. In the future, climate change is likely to exacerbate the heat island effect with more frequent and extreme heat waves.

One way to reduce the effects of the urban heat island is to use materials that minimise the absorption of solar radiation. Advanced materials that are highly reflective to the sun's radiation and readily emit heat can be used on buildings and covered spaces. This study assessed the impact of replacing conventional pavements with cool materials in a large city park in Athens, Greece.

The park's microclimate is influenced by the sea on one side and by heavy traffic on a main road to the south. About 4500 m² of existing pavement, made of asphalt, concrete and dark paving materials, has been replaced with cool paving surfaces as part of park renovations.

Pale yellow paving blocks with a high reflectivity were chosen as the replacement material. White materials would have reflected more of the radiation from the sun, but the resulting glare and visual contrast would be too strong. The initial high reflectivity of the yellow pavements would also be better for withstanding the accumulation of dust and sea salt, which reduce the reflectivity of the paving material over time.

The researchers measured the climatic conditions before and after the pavements were replaced and evaluated the change in temperatures.

In the central area of the park, the cool pavements had a noticeable effect: the highest daily temperatures were reduced by 1.9°C and the surface temperatures were lowered by 12°C. The cool pavements had little impact on temperatures in the park area next to the coast, as the influence of the sea already had a cooling effect.

In addition, the comfort of visitors to the park has improved since the cool pavements were installed. In hot weather, comfort conditions that could be described as 'Extremely Hot' before fitting the cool pavements could now be described as 'Very Hot' and close to the 'Quite Hot' zone. The number of visitors to the park has increased and visitors have said that they are satisfied with the heat comfort levels in the park.

The impact of cool pavements depends on local conditions and effectiveness can be reduced, for example, by strong winds. In addition, cool pavement materials have less effect during cooler summers and are not expected to lower temperatures during winter months.

Source: Santamouris, M., Gaitani, N., Spanou, A. *et al.* (2012) Using cool paving materials to improve microclimate of urban areas – Design realization and results of the flisvos project. *Building and Environment*. 53: 128-136.

Contact: msantam@phys.uoa.gr or sanmat@b-online.gr

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