

'First Real-World' Cool Paint Study Completed

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In what is described as a first of its kind real-world study, researchers at Nanyang Technological University, Singapore, have reportedly found that the use of cool paint coatings in cities can help pedestrians feel up to 1.5 degrees Celsius cooler (2.7 degrees Fahrenheit).

According to the university (<https://www.ntu.edu.sg/news/detail/cool-paint-coatings-help-city-dwellers-feel-up-to-1.5-degrees-celsius-cooler-study-finds>), cool paint coatings contain additives that reflect the sun's heat to reduce surface heat absorption and emissions. They are also used to mitigate the Urban Heat Island effect, in which urban areas experience warmer temperatures than surrounding areas.

NTU researchers say that, to date, most studies of cool paint coatings have been either simulation-based or tested in scaled-down models, making its understanding of real-world application limited. However, now the first of its kind real-world study was conducted in the tropics to comprehensively evaluate how well cool paint coatings work in reducing city heat.

The team reportedly coated the roofs, walls and road pavements of an industrial area in Singapore. They found that by comparison with an adjacent uncoated area, the coated environment was up to 2 C cooler in the afternoon, with pedestrian thermal comfort level improving by up to 1.5 C.

These temperatures were measured using the Universal Thermal Climate Index, an international standard for human outdoor temperature sensation that takes into account temperature, relative humidity, thermal radiation and wind speed.



Nanyang Technological University

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“Our study provides evidence that cool paint coatings reduce heat build-up and contribute to the cooling of the urban environment. This is a minimally intrusive solution for urban cooling that has an immediate effect, compared to other options that often require major urban redevelopment to deploy,” said lead author Dr. E V S Kiran Kumar Donthu (https://www.ntu.edu.sg/docs/default-source/corporate-ntu/hub-news/cool-paint-coatings-help-pedestrians-feel-up-to-1.5-degrees-celsius-cooler-in-urban-setting-ntu-singapore-field-study-finds.pdf?sfvrsn=d66e7faf_1).

“Moreover, by reducing the amount of heat absorbed in urban structures, we also reduce heat load in buildings, consequently reducing indoor air-conditioning energy consumption.”

Four rectangular buildings were selected for the study, as they created two parallel “street canyons,” or narrow streets flanked by buildings, in an industrial estate west of Singapore managed by JTC Corporation.

One canyon, called a “cool canyon,” was coated with cool paints on the roofs, walls and road pavement, while the other canyon remained as it was as a “control” for the experiment. Using environmental sensors, the NTU team monitored the conditions in the two canyons over two months, which included air movement, surface and air temperature, humidity and radiation.

The researchers say they found that during a 24-hour cycle, the cool canyon saw up to a 30% reduction in heat released from the built-up surfaces, resulting in the air temperature in the cool canyon being cooler than the conventional canyon by up to 2 C during the hottest time of the day, at around 4 p.m.

As a result, NTU notes, pedestrians in the cool canyon can feel up to 1.5 C cooler. It was also found that air temperature in the cool canyon was lowered because less heat was absorbed by and stored in the building walls, roofs and roads.

Compared to conventional roofs, the roofs with the cool paint coating reportedly reflected 50% more sunlight and absorbed up to 40% less heat as a result, during the hottest time of a sunny day. The coated walls also prevented most of the heat from entering the industrial buildings, the team explains.

“Findings from the study are not just relevant for cities in Singapore where it is hot all year round, but for other urban areas around the world too,” said lead investigator and associate professor Wan Man Pun.

“With global warming, people will increasingly look for ways to stay cool. Our study validates how cool paint coatings can be a strategy to reduce the urban heat island effect in future.”

In the future, the team reportedly plans to focus on how the cool paint coating holds up over time in the same experiment location.

The research is being supported by JTC Corporation and Singapore’s Housing and Development Board. The findings were recently published in the journal *Sustainable Cities and Society*.