

Urban warming worsening problem in Singapore, action needed while studies are ongoing: Researchers

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Photo: Lina Meisen

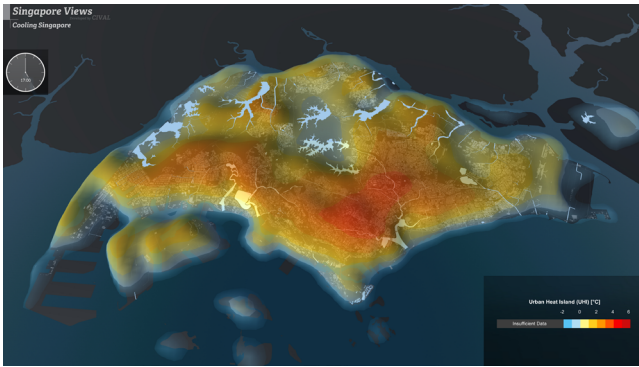
Researchers of the Cooling Singapore project surveyed residents at Punggol East in February and May this year.

Published 12 JULY, 2018 UPDATED 12 JULY, 2018

SINGAPORE — Government agencies and researchers have embarked on studies to make Singapore cooler, with surprising findings already unearthed along the way.

Besides the effects of climate change, Singapore is hotter than it should be because of the urban heat island (UHI) effect.

At certain times of the day, built-up areas can be more than 7°C hotter than areas which are more rural. This is due to heat trapped from energy consumed by air-conditioning systems and vehicles, for instance, the presence of less vegetation, and building materials that absorb and store heat from the sun.



The urban heat island effect across Singapore. PHOTO: Dr Muhammad Omer Mughal and Dr Li XianXiang, Sailin Zhong, CIVIL, Cooling Singapore project

Mr Peter Ho, chairman of the Urban Redevelopment Authority (URA), said that urban warming is a complex problem that poses a long-term risk, but it is “not easy to see”.

Speaking at the Cooling Singapore symposium on Wednesday (July 11), he highlighted that addressing the UHI effect is “vital to maintaining or improving the liveability of our city”.

“As we continue to urbanise, provide jobs and homes to a growing population, urban warming will only increase unless we take steps to address the problem.”

Singapore ranks second in the world in population density, after Monaco, Mr Ho noted. If unchecked, further warming can increase the risk of heat-related fatalities.

Together with the URA and the Housing and Development Board (HDB), researchers began modelling studies this year on areas in the Jurong Lake District, Punggol housing estate and a new area to be developed in the Central Business District (CBD) near Asia Square.

They want to see how different mitigation measures can be applied, and the benefits of each measure.

The researchers said that having plants on the facade of buildings can improve the level of comfort felt outdoors by people within a 4m range, but this has little or no impact at greater distances.

Void decks at public housing blocks can have a positive impact, especially in the late afternoon and evening. And new developments can change air patterns and increase thermal stress, depending on weather conditions.

Some results have been counter-intuitive. For instance, more vegetation does not always improve the comfort felt outdoors by people, because trees can reduce wind speed and increase humidity, the researchers said.

The Jurong Lake District and CBD case studies — done with the URA — aim to get the best “urban parameters” for outdoor thermal comfort, they added. Actions have focused mainly on the orientation and arrangement of buildings, with the aim of considering shadow and spaces for airflow.

The Punggol case study, done with the HDB, aims to analyse the impact of mitigation measures, such as retrofitting, for an existing development.

The researchers have also found that more reflective roofs can achieve up to a 1.29°C reduction in temperature, and increasing density will lead to higher temperatures of up to 1.4°C in certain areas at certain times of the day.

Preliminary findings – which will require more research to validate – showed industrial areas lead to a maximum increase of 0.6°C and the impact on neighbouring areas can reach 0.2°C.

The studies are part of the ambitious Cooling Singapore research project, which started last year and is led by the Singapore-ETH Centre. Funded by the National Research Foundation's Campus for Research Excellence and Technological Enterprise (Create) programme, its collaborators are the National University of Singapore, Smart and TUM Create, which comprises research teams from Nanyang Technological University and Germany's Technical University of Munich.

A 14-member UHI taskforce that includes representatives from the HDB, URA, Land Transport Authority and universities has been set up.

RESIDENTS SAY NO TO COOL BUS STOPS

The project has also captured the voices of residents here.

Researchers held a workshop for 48 HDB dwellers, and surveyed more than 400 Punggol residents face-to-face between February and June this year on their preferred mitigation strategies and activities they would like to do outdoors, among other questions.

Green streetscapes and green facades were among their preferred choices, while nobody was in favour of cool bus stops.

Ms Lea Ruefenacht of the Singapore-ETH Centre, who is one of four researchers on the citizen participation surveys, said that the respondents preferred improving the traffic situation and spending as little time as possible at bus stops.

An online survey will be conducted from next month, and the researchers hope to get about 2,000 respondents, Ms Ruefenacht said.

In the private sector, Singapore District Cooling — a subsidiary of utility provider SP Group — could try out outdoor cooling systems at an event space near the Marina Bay Sands integrated resort with the URA, and at an al fresco cafe later this year, its deputy managing director Foo Yang Kwang said.

On Tuesday, HDB and SP Group signed an agreement to explore the development of a centralised cooling system for flats in the new Tengah HDB town. It is envisaged as a more energy-efficient service to which residents may subscribe, instead of using conventional air-conditioning systems. Based on its calculations, savings of 30 to 35 per cent are possible, Mr Foo said on Wednesday.

The urban warming problem is not only about temperature. Cooling Singapore's principal investigator Peter Edwards said that there is good evidence to suggest it has contributed to a marked increase in the intensity of extreme rainfall.

"Singapore has a very substantial UHI effect and it's getting worse, and it clearly is going to be important to do something about it," he said.

While more research is needed, "the implementation needs to begin now", Professor Edwards said. "We can't wait until the final best research results are in. The research and the implementation will have to go hand in hand."

CLARIFICATION: In the previous version of the story, we quoted Dr Juan Angel Acero of the Singapore-MIT Alliance for Research and Technology (Smart). Cooling Singapore has clarified that his quotes should be attributed to the researchers in general. The finding that industrial areas lead to a maximum increase in temperature

of 0.6°C and the impact on neighbouring areas can reach 0.2°C is preliminary, and more research is needed to validate it.

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