

# COOLING OUR CITIES: A DECISION SUPPORT TOOL FOR REDUCING URBAN HEAT

## PROJECT OVERVIEW



## KEY POINTS

- Cities are vulnerable to temperatures, and the task of cooling them has proved challenging.
- The CRCLCL is developing a decision-support tool that bridges the gap between research and practical application in urban microclimates by helping governments, developers and planners to mitigate vulnerability to urban heat island effects.

## THE OPPORTUNITY

Cities and their communities are vulnerable to extreme temperatures, especially when it comes to the elderly and the young. In recent years, the frequency, intensity and duration of extreme weather events have increased in Australia. For example, Richmond in north-western Sydney reached 47 degrees during heat waves in February 2017. Urban microclimates are affected by various factors, including population growth, waste heat from industry and transport, greenfield and infill development, densification and urban renewal.

The task of cooling cities, thereby improving outdoor thermal comfort and reducing energy consumption, has proved challenging. To develop heat mitigation strategies, we need to answer the following research questions:

- Can innovative urban development approaches reduce the heat island effect and minimise the impact of climate extremes on outdoor thermal comfort, human health and energy consumption?
- To what extent do urban form, parks, greenery, waterways, cool roofs and urban heat dissipation technologies help reduce urban heat island effects?
- What scenario analysis and decision-support tool are needed by governments and developers who do not possess the required technical knowledge to select the optimal mitigation techniques?



### CRC for Low Carbon Living

The CRC for Low Carbon Living (CRCLCL) is a national research and innovation hub that seeks to enable a globally competitive low carbon built environment sector and is supported by the Commonwealth Government's Cooperative Research Centres (CRC) programme.

With a focus on collaborative innovation, the CRCLCL brings together property, planning, engineering and policy organisations with leading Australian researchers. The CRCLCL develops new social, technological and policy tools for facilitating the development of low carbon products and services to reduce greenhouse gas emissions in the built environment. For more information visit [www.lowcarbonlivingcrc.com.au/](http://www.lowcarbonlivingcrc.com.au/)



## RESEARCH & STAGES

Our research methods include:

- Identifying one or more precincts in NSW with different urban forms, densities and roof and paving materials as exemplars.
- Monitoring and characterising the microclimate of exemplar precincts over warm seasons, including trends and progress toward mitigation performance targets.

- Designing a series of advanced mitigation options to address specific problems identified; Urban Heat Island (UHI) mitigation strategies and possible cooling interventions will be explored under varying urban form and building material scenarios.
- Predicting what-if scenarios of UHI mitigation performance under standard climate conditions; Providing 3D visualisation of analysis outcomes through a web-based platform.
- Integrating building information models (BIM) and precinct information models (PIM) with GIS to enable automated form classification and material identification; Supporting building and urban data interoperability.
- Developing optimal UHI mitigation solutions or strategies to meet multi-objective performance targets.



## THE TOOL

Our Microclimate and Urban Heat Island Mitigation Decision-Support Tool will:

- Provide governments and the built environment industry with a systematic and structured scenario analysis to inform urban policy, development assessment and planning practices related to potential building and urban interventions. The scenario analysis it provides can be used to cool streetscapes and cities, decrease energy consumption, protect the health of the vulnerable, and improve comfort.
- Integrate scientific models with a range of mitigation techniques to perform urban heat island mitigation analysis across both building and urban scales. It will consider building coatings and roofs, urban form and density, greenery and infrastructure.
- Develop an Urban Heat Island Mitigation Performance Index to support governments in establishing performance targets for their planning controls. The Index will indicate the impact on street level temperature, health and mortality, precinct level energy consumption and other factors.

## VALUE PROPOSITION

The tool will provide:

- A convenient, intuitive and efficient way for governments, developers and planners to mitigate vulnerability to urban heat.
- Support for evidence-based decisions and strategies relating to low carbon and climate adaptation in urban development.
- A bridge between research and practical application in urban microclimates.

## FURTHER INFORMATION

For more information about this project, please contact:

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## PROJECT PARTNERS

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- Swinburne University of Technology
- City of Sydney
- Greater Sydney Commission
- NSW Office of Environment and Heritage (OEH)
- UrbanGrowth NSW
- BlueScope Steel
- AECOM
- Stockland
- Western Sydney Regional Organisation of Councils
- Southern Sydney Regional Organisation of Councils
- Parramatta Council
- Waverley Council
- Inner West Council
- Campbelltown City Council
- NSW Spatial Service