

Drivers and barriers to heat stress resilience in the urban context

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Heatwaves in Australia now

- Heatwaves are the most **deadly natural hazard** (Coates 2014)
- Cooling demand drives **peak electricity demand** (Australian Electricity Market Operator, 2011), contributing to soaring **electricity prices** and **energy poverty**
- **Air-conditioning (AC)** is one of the **most frequently used adaptation** techniques
- **Negative impacts** of AC:
 - Increased carbon emission
 - Increased dependence on it (Candido, 2010)
 - Warming up the outdoors

Heatwaves in Australia in the future

- Heatwaves are exacerbated by **Urban Heat Islands** with 89% of Australians living in **cities** (UN DESA 2011)
- The **frequency and intensity** of heatwaves are rising due to climate change (Nairn and Fawcett 2013)
- Population is **ageing**
- New buildings with high insulation and air-tightness rely even more on **AC**

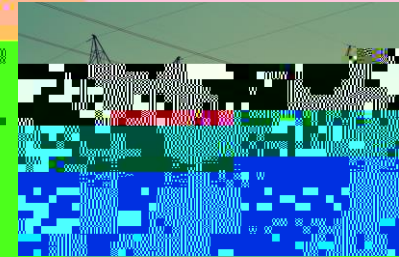
>>> **A wicked, interdisciplinary problem.**

Framework for the population heat stress resilience

Adaptation

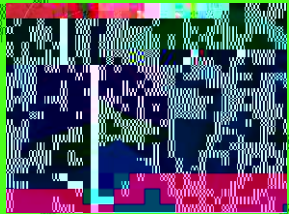


Electricity

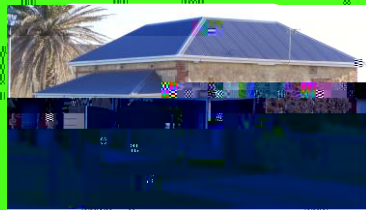


RESILIENCE

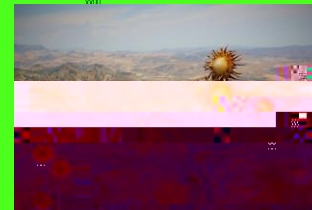
IMPACTS



Vulnerability



Built environment



Water



Ambulance

Methods

1. Impacts

Time-series and regression analyses in Adelaide and Sydney

Daily data of: electricity consumption, demand; water demand and morbidity

2. Population resilience

Online survey

Representative sample from Adelaide (N=393) and questions about: demography, built environment, retrofitting activity, adaptation, heat-related health problems.

3. Heat stress resistance of buildings

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Results, online survey on heat stress resilience

- The **health of one fifth** of the population was impacted by a medium heatwave.
- **Three quarters of dwellings** were reported having insufficient heat stress resistance.
- **Tenants** tended to have more health issues and live in less heat stress resistant homes
- Homes with roof insulation had less health issues
- >>>
Implement
the Energy Performance Certificate



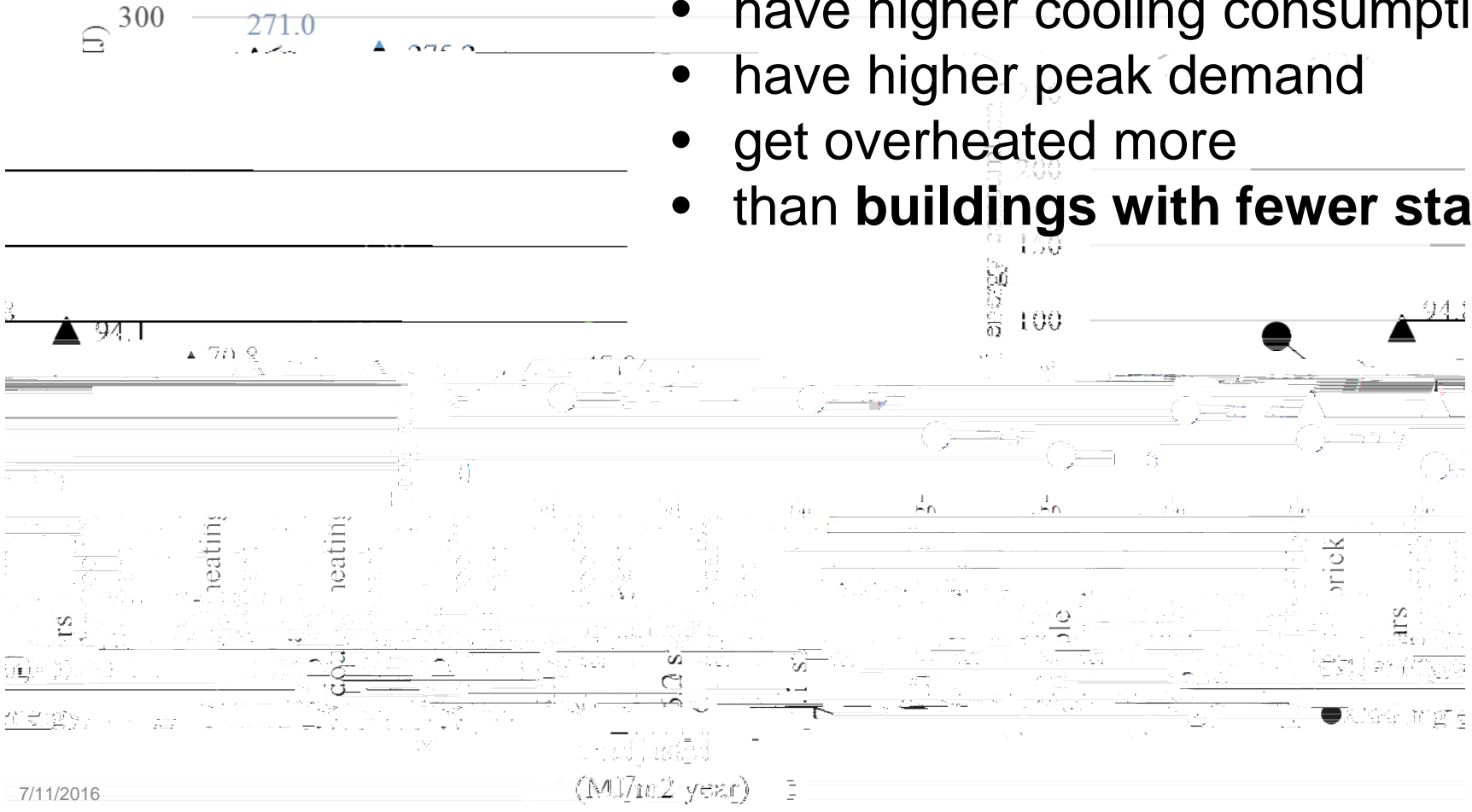
Results, online survey on heat stress resilience

- **Pre-existing health conditions** predicted higher vulnerability and they were oblivious of their vulnerability
 - In contrast, **older people adapt more** and live in more resistant homes
 - 6-9% of the population lives among poor housing conditions and suffers from **energy poverty**
-

Results: AccuRate simulation

Homes with more stars can

- have higher cooling consumption
- have higher peak demand
- get overheated more
- than **buildings with fewer stars**



Thank you for your attention!

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CRC LCL research project webpage

<http://www.lowcarbonlivingcrc.com.au/research/program-2-low-carbon-precincts/rp2005-urban-micro-climates>

PhD talk in the Science Show on the ABC RN, 2nd
April, 2016,

<http://www.abc.net.au/radionational/programs/scienceshow/coping-with-heatwaves/7291978>
