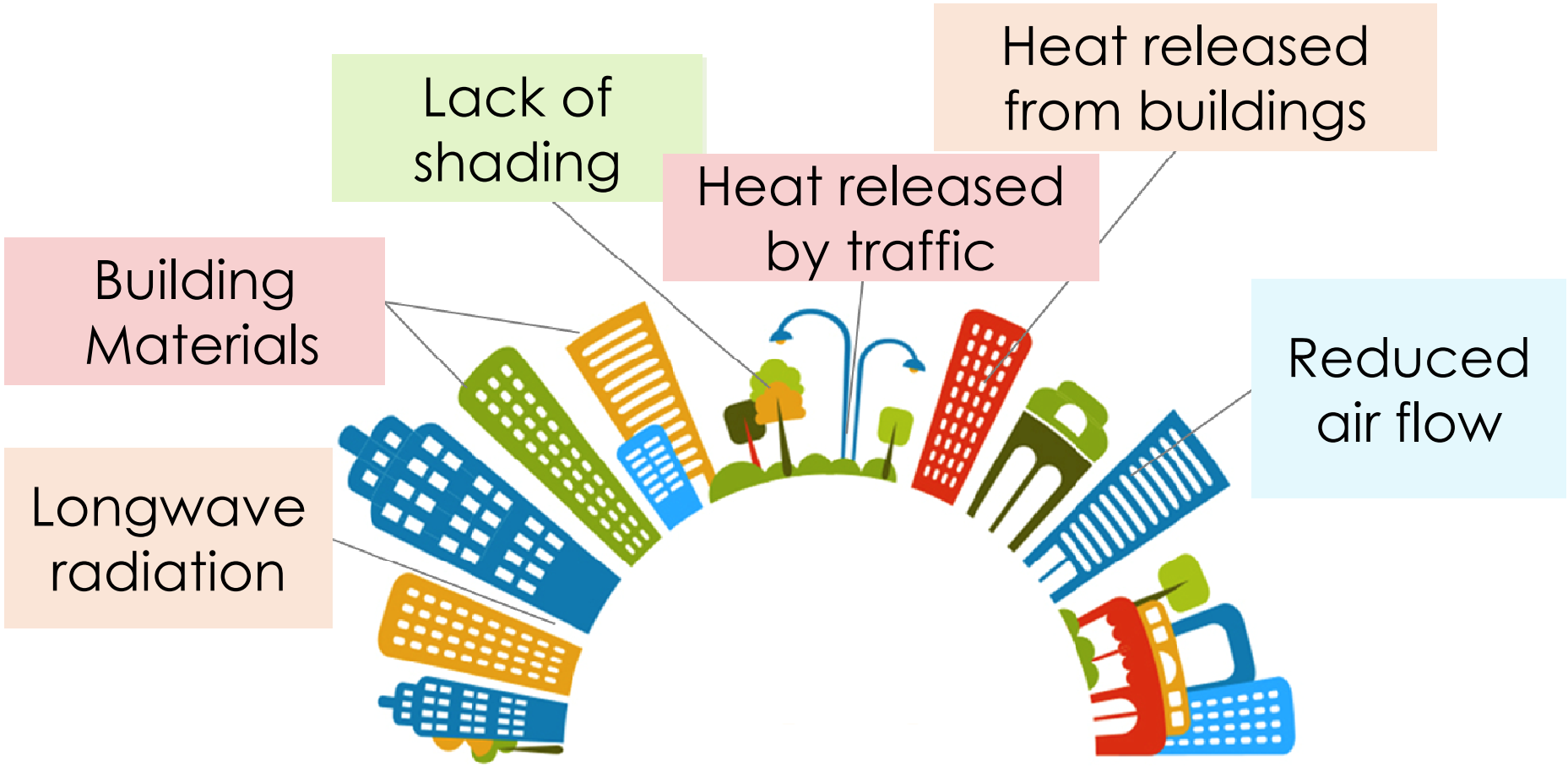
Creating a Cooler Phoenix

Arizona State University

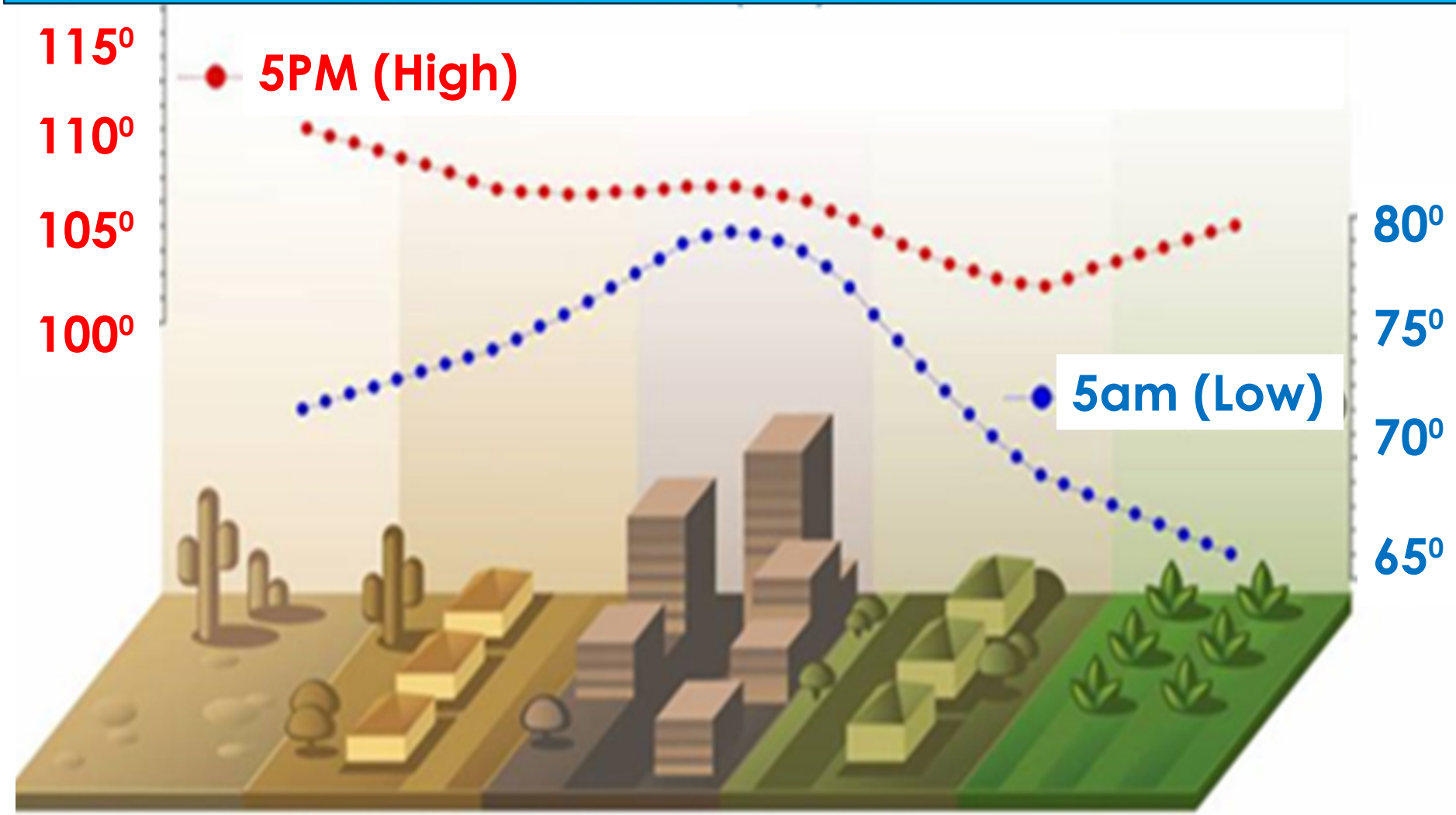
May 18, 2017

Causes of the Urban Heat Island

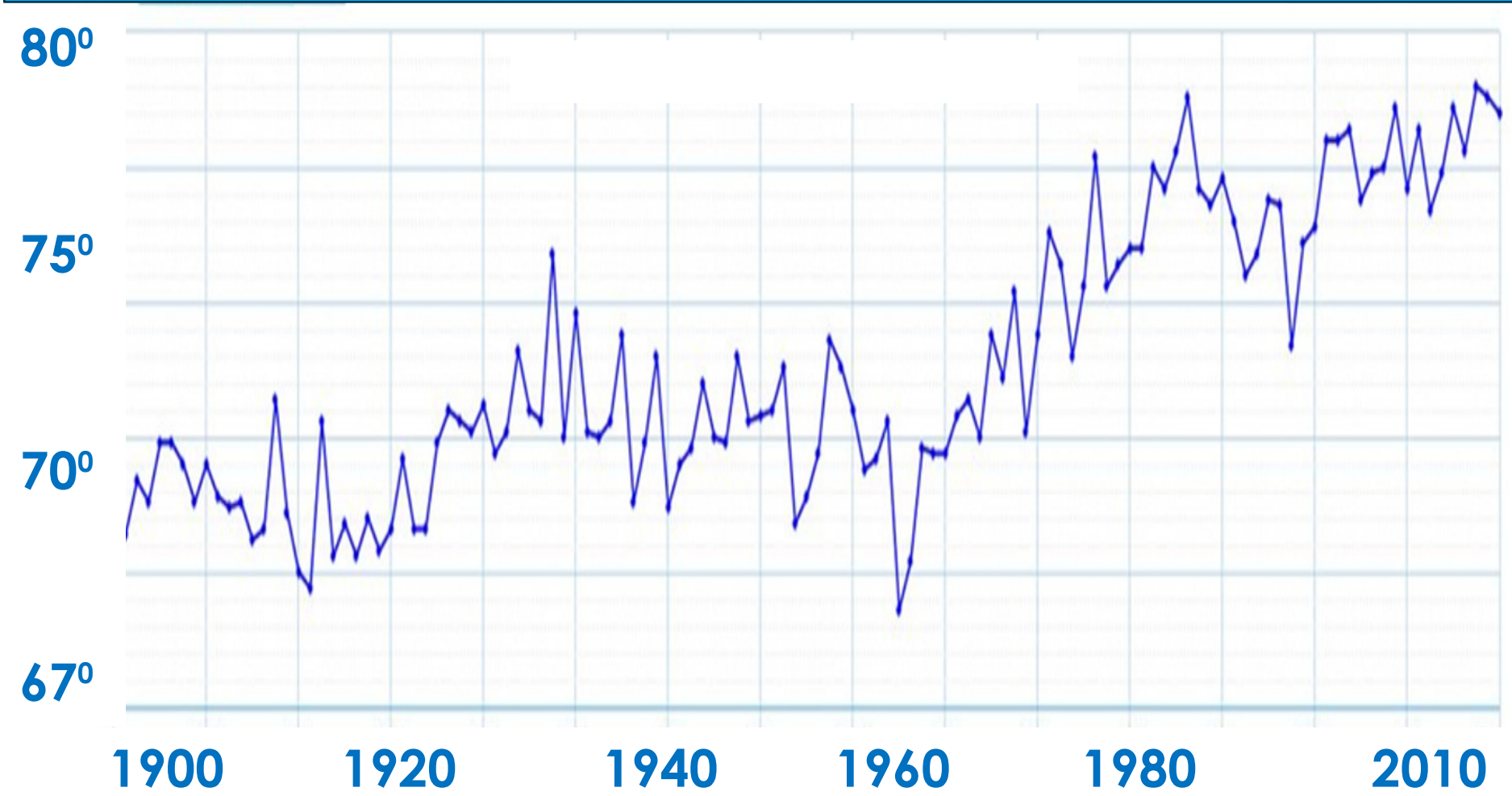


http://ilmastotyokalut.fi/files/2014/12/UHI_explained.png

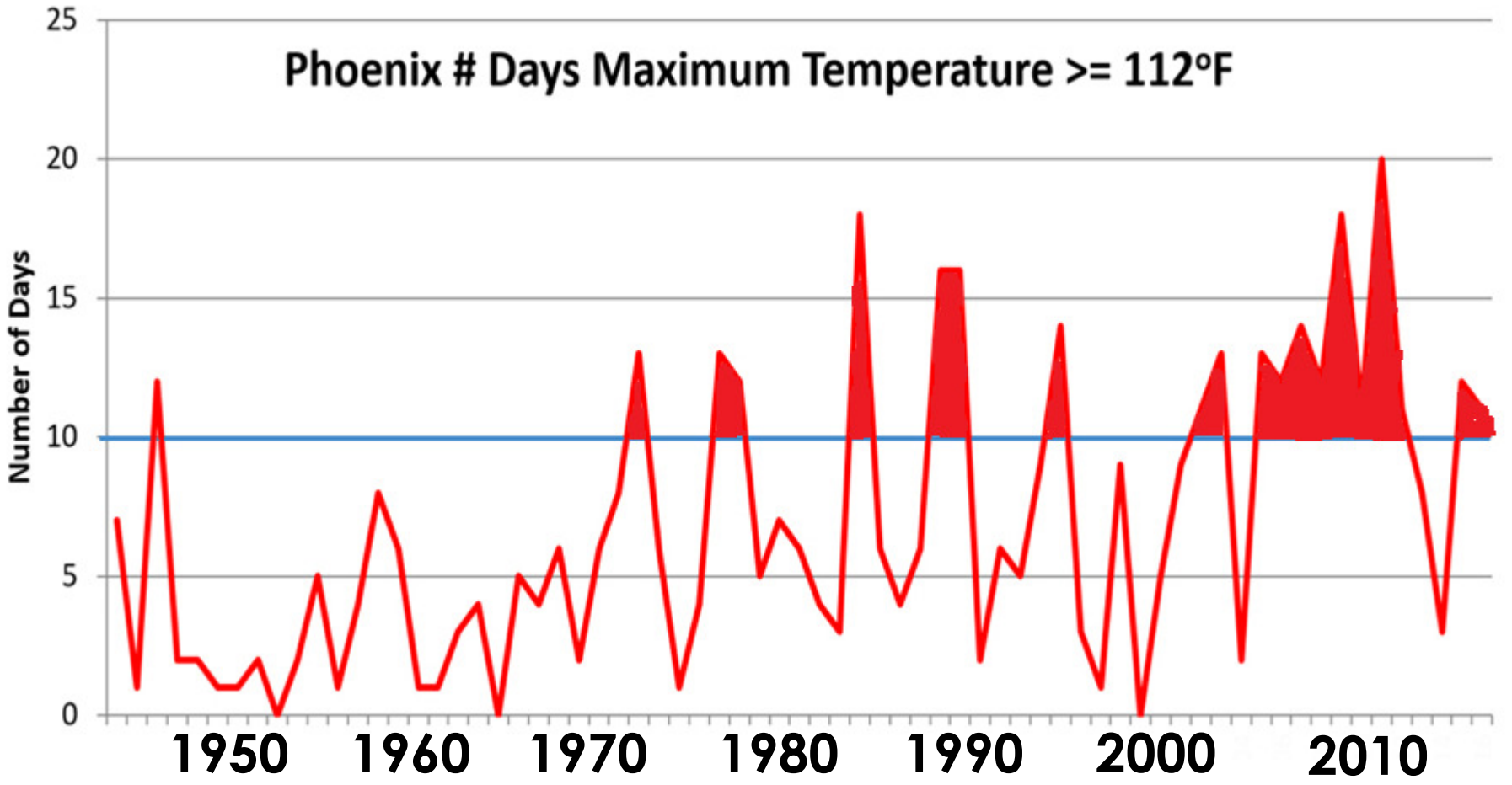
Urban Heat Island (UHI) Effect



Phoenix AZ Mean Average Temperature
1895 - 2016

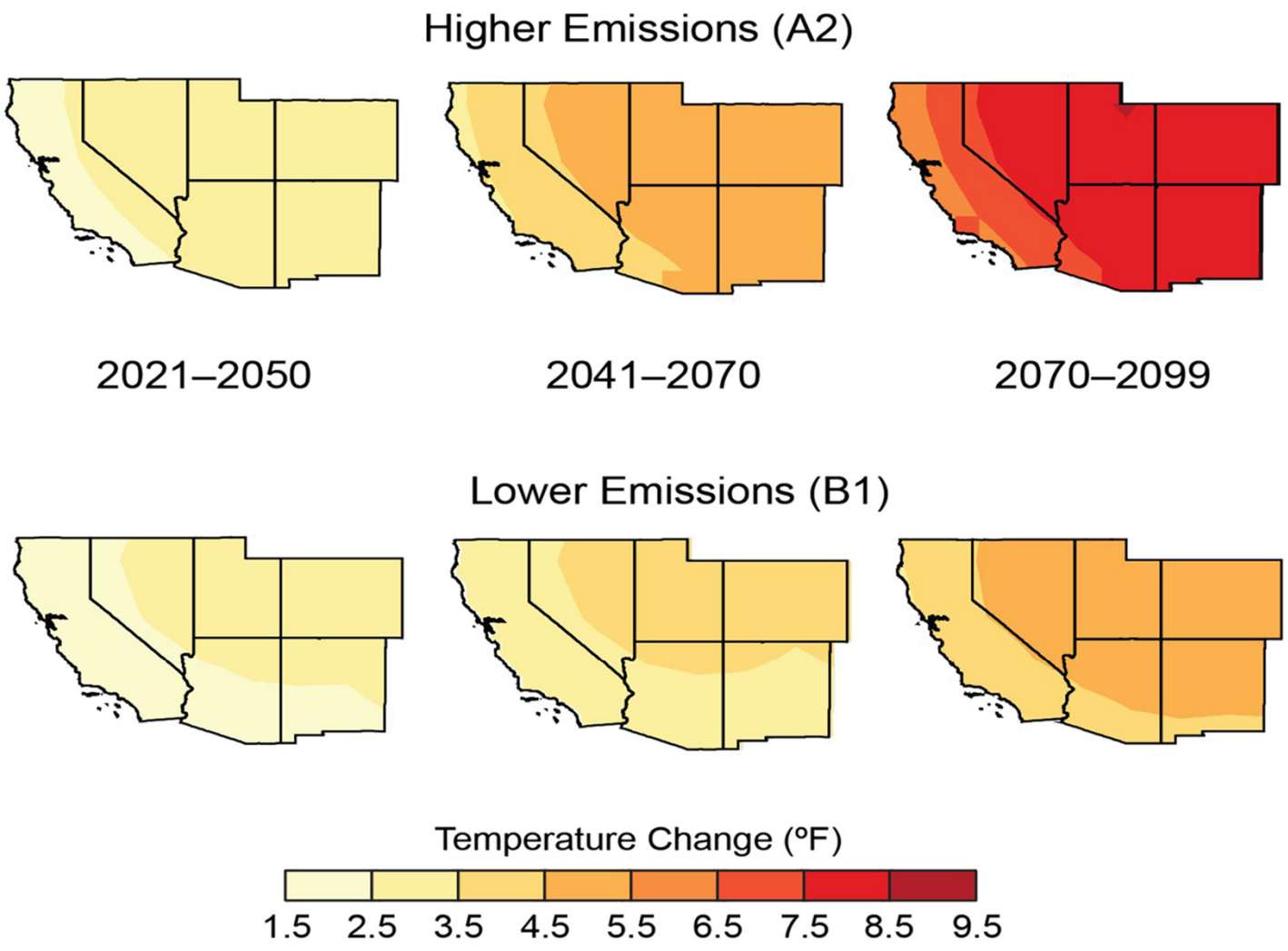


More hot days



Arizona State Climate Office

Projected warming



Southwest National Climate Assessment
http://nca2014.globalchange.gov/report/regions/southwest#intro-section-2

Effects of Heat on Urban Systems

Water Use

Zone 10

Economy

Ashley McKnight/GPCC)

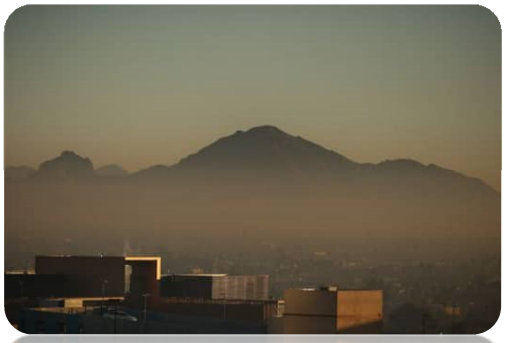
Public Health

Phoenix Children's Hospital

Energy Demand

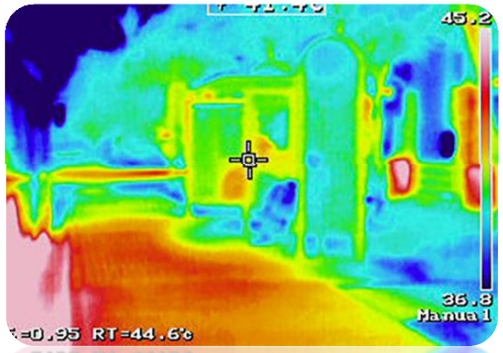
AZ Capital Times

Air Quality



Chad Bricks/12 News

Thermal Comfort



Hondula et al

Principles for Creating a COOLER PHOENIX

Principles for Creating a Cooler Phoenix

Principle 1:

Different and the same

- **Extreme heat**
- **Urban heat island**

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Extreme Heat

Urban Heat Island

CARBON NEUTRAL BY 2060:

Becoming a Carbon Neutral City

operating on 100% clean energy

Seek comfort from the heat

Reduce night-time temperatures

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Principle 2:

Urban heat island and extreme heat

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One solution

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Principle 2:

The Urban Heat Island and Extreme Heat do not have a uniform impact across Phoenix and strategies to respond to its effects will vary from one location to another.

- **Urban form**
- **Street Orientation**
- **Wind**
- **Vegetation**
- **Materials used in buildings/pavements**
- **On-site design**

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Principle 3:

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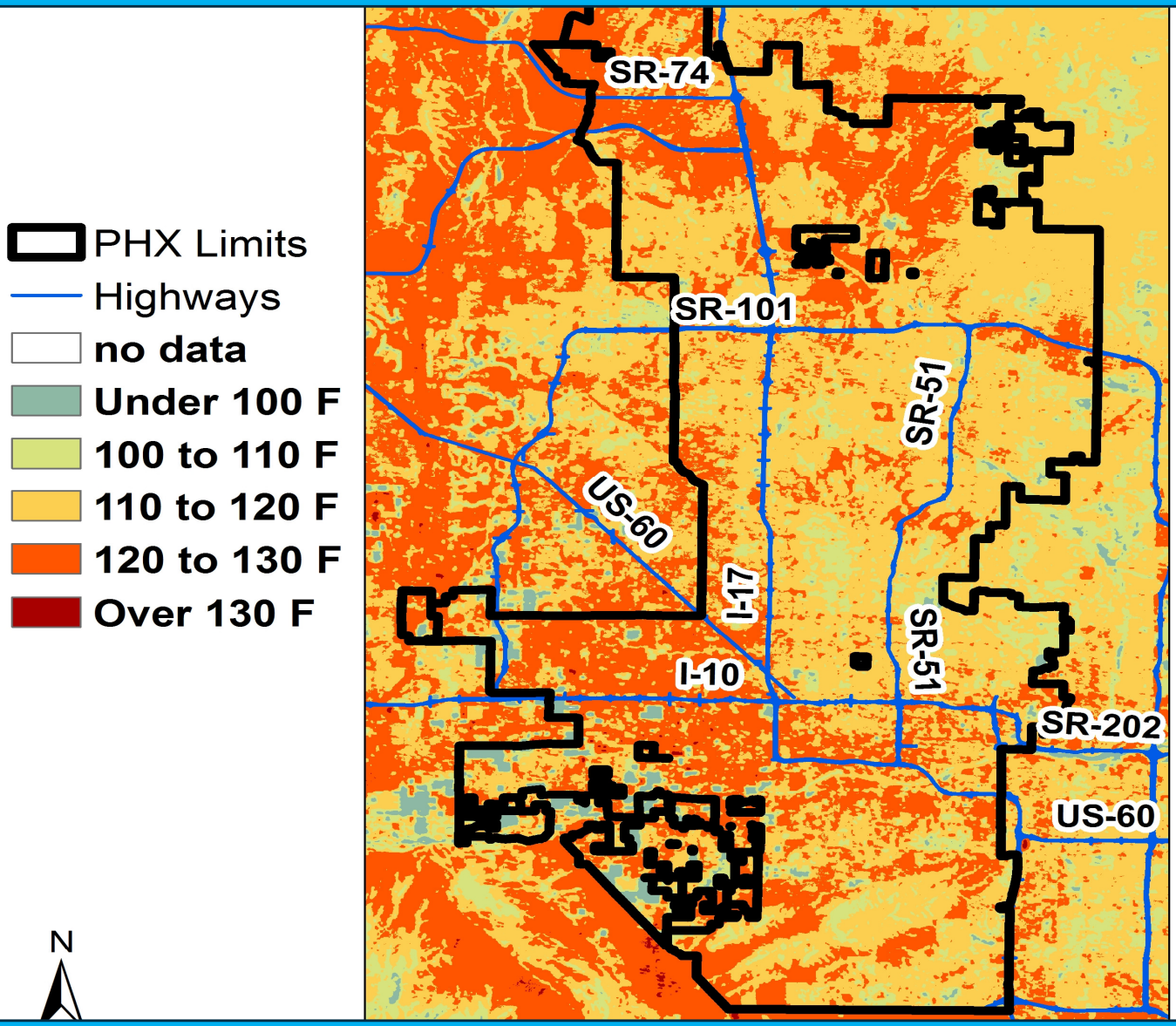
Principle 3:

Prioritize

(a) The hottest areas of Phoenix

Estimated surface temperature at noon – June 26



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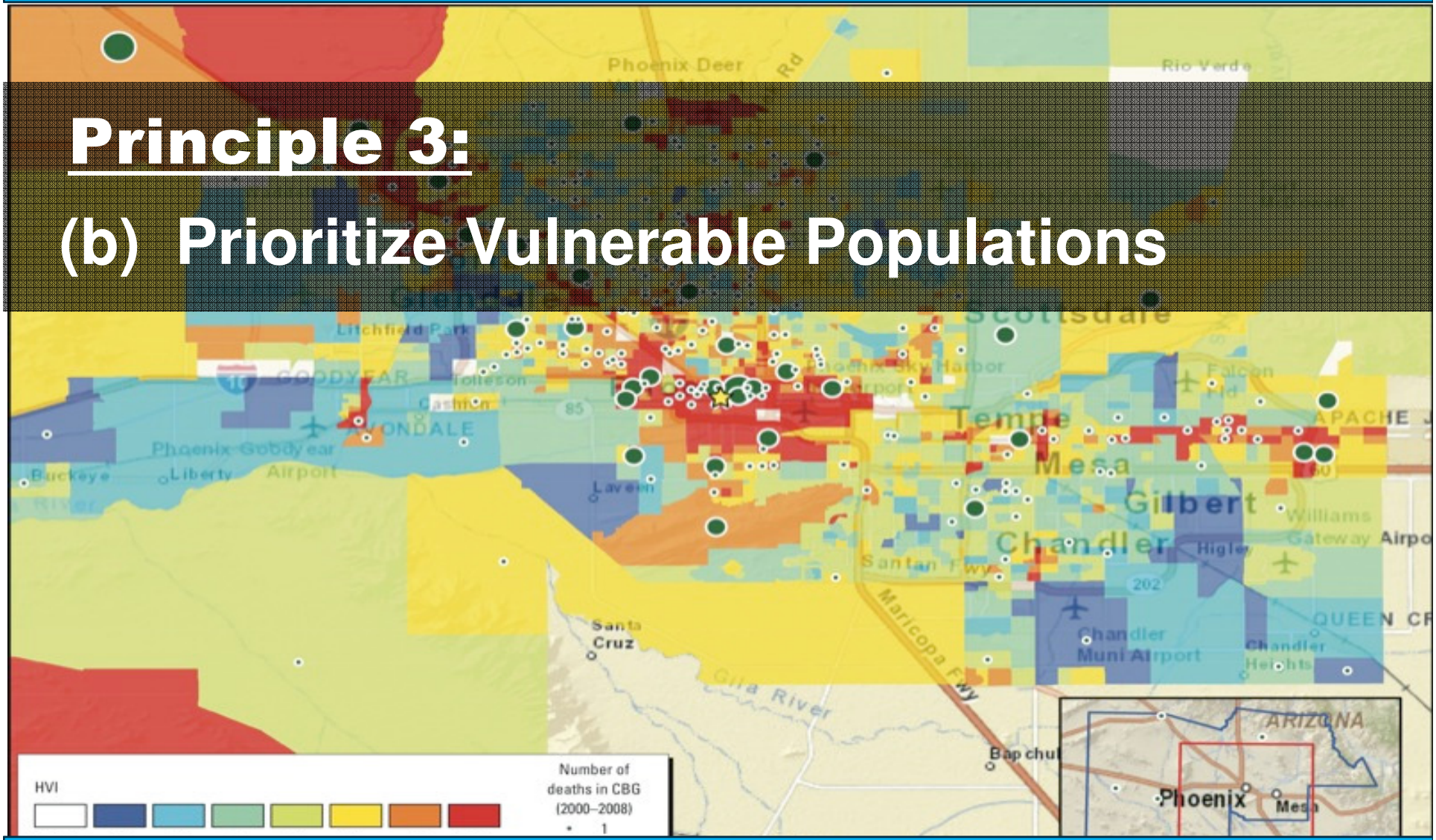
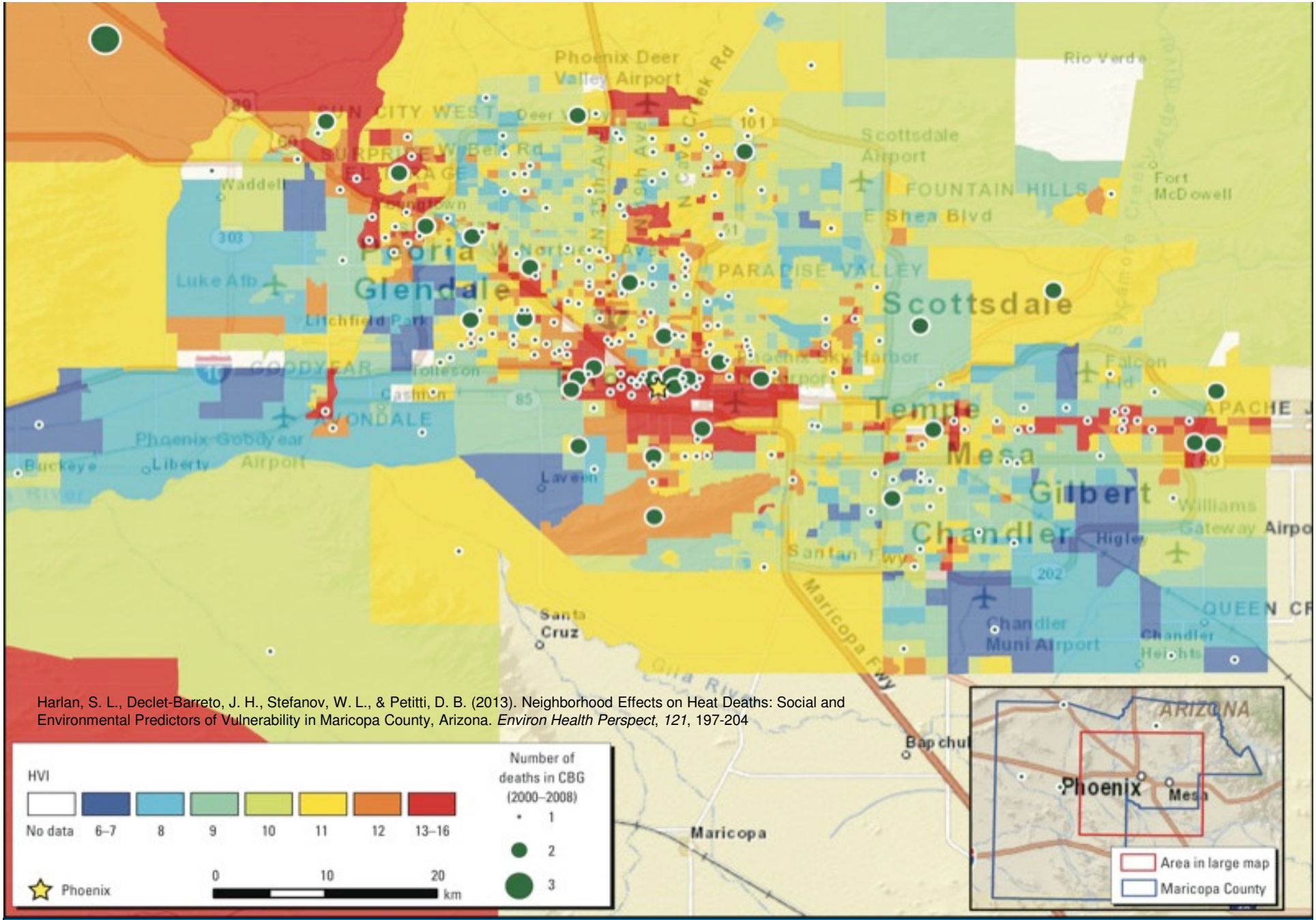
Principle 3:

(b) Prioritize Vulnerable Populations





Harlan, S. L., Declet-Barreto, J. H., Stefanov, W. L., & Petitti, D. B. (2013). Neighborhood Effects on Heat Deaths: Social and Environmental Predictors of Vulnerability in Maricopa County, Arizona. *Environ Health Perspect*, *121*, 197-204

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Principle 3:

(c) Prioritize high-use public routes

Ixnayonthetimmay

Patrick Breen

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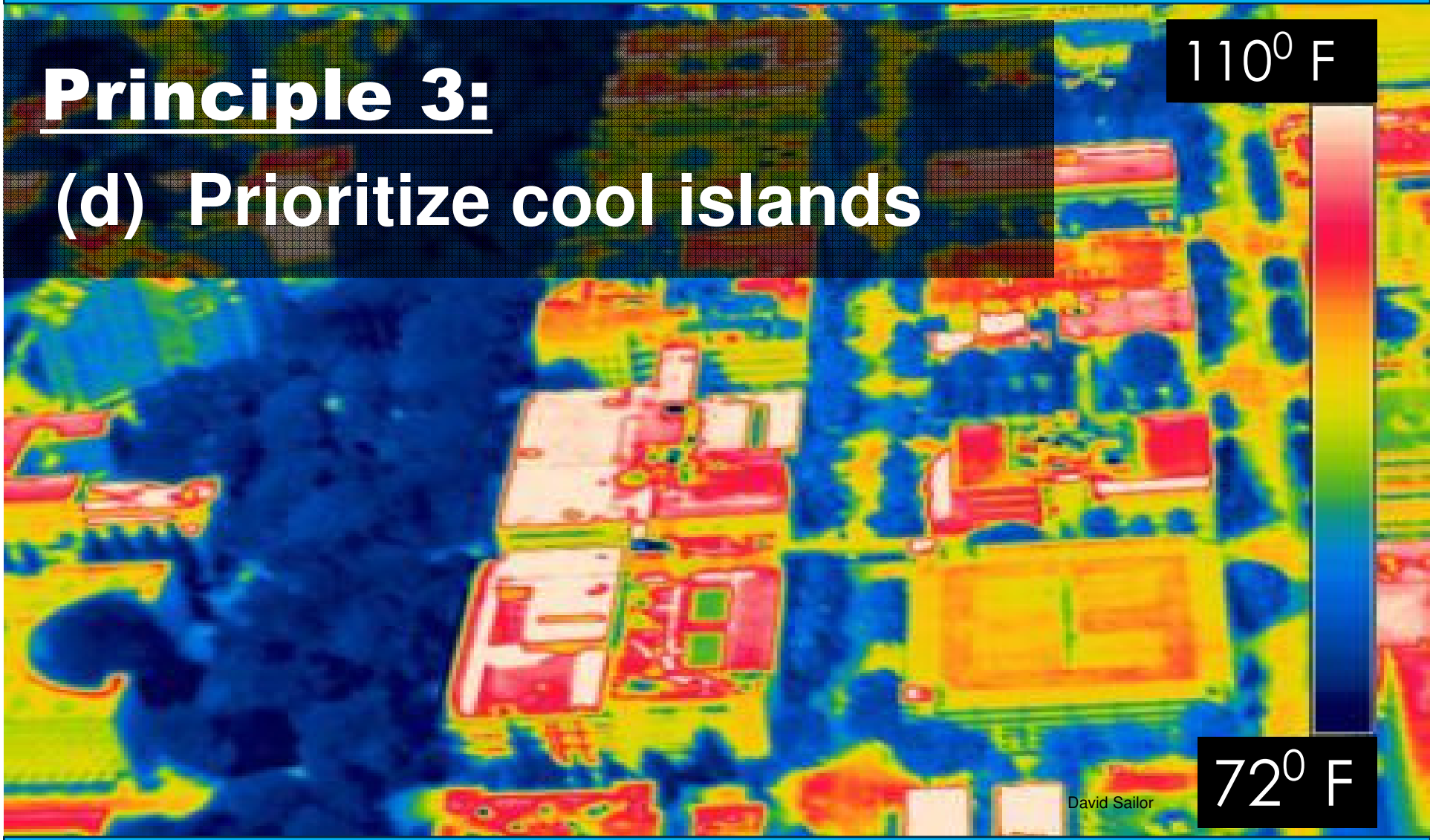
Principle 3:

(d) Prioritize cool islands



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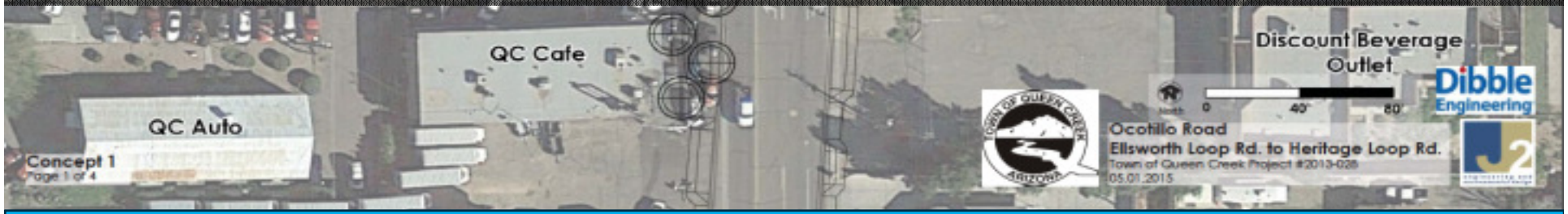
Principle 3:

(e) Prioritize Projects in the design stage



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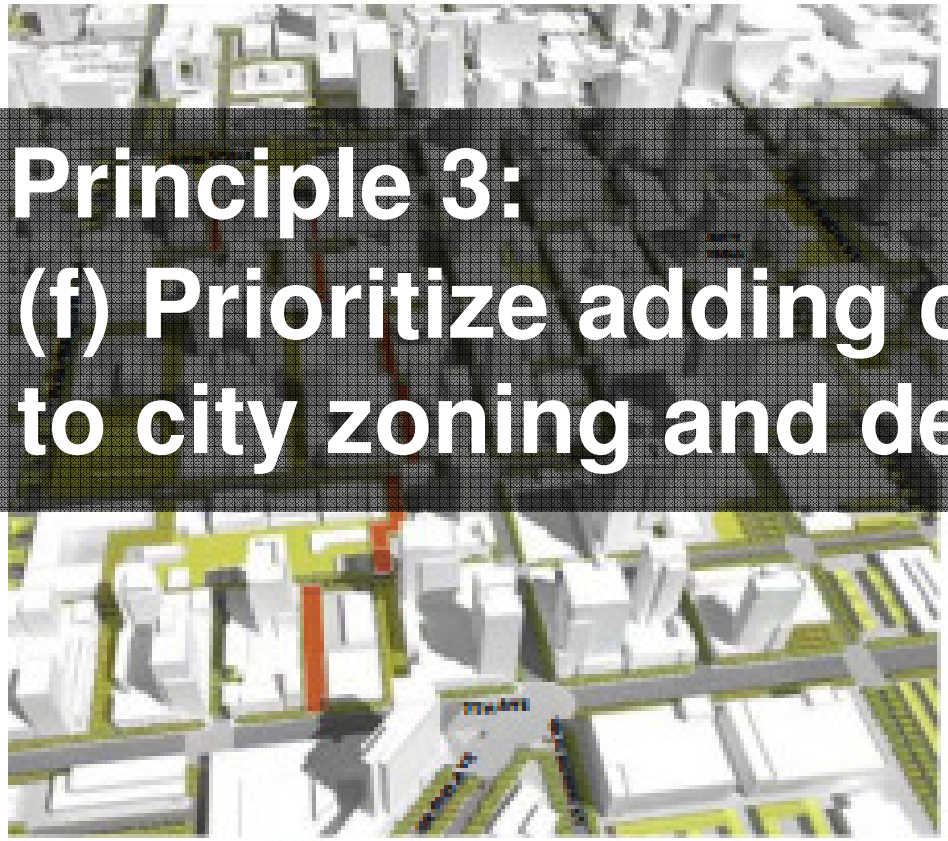
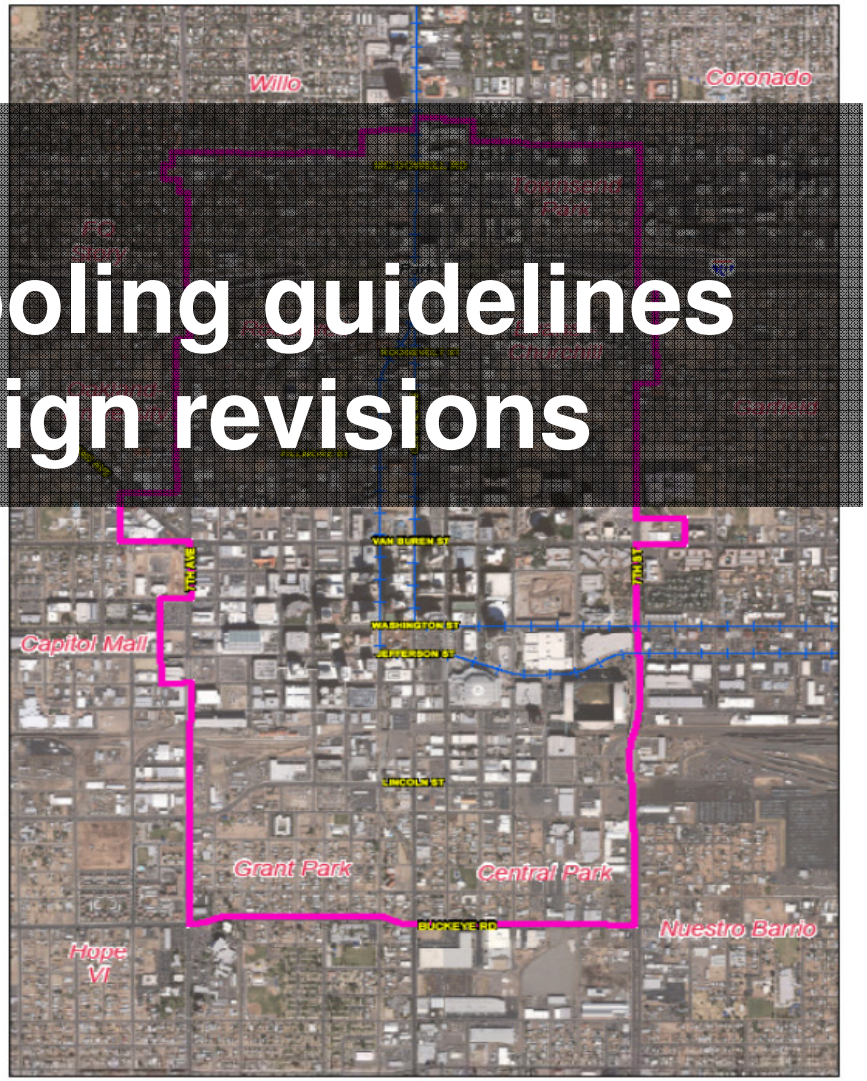
Principle 3:
(f) Prioritize adding cooling guidelines to city zoning and design revisions



Downtown Phoenix as envisioned with a network of comfortable and walkable Green Streets.



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Principle 4:
Foster Broad Public Support

Recommendation:

ASU is offering to bring expertise, resources and institutional knowledge to the City of Phoenix to coordinate strategies and actions to limit the adverse impacts of the Urban Heat Island on City operations, constituents, and customers.

ASU Julie Ann Wrigley Global Institute of Sustainability
Arizona State University

ASU Decision Center for a Desert City
Arizona State University

ASU Urban Climate Research Center
Arizona State University

ASU School of Geographical Sciences and Urban Planning
Arizona State University

UREx SRN

ASU School for the Future of Innovation in Society
Arizona State University

ASU School of Human Evolution and Social Change
Arizona State University

ASU School of Public Affairs
Arizona State University

ASU School of Earth and Space Exploration
Arizona State University

ASU School of Sustainability
Arizona State University

Central Arizona-Phoenix Long-Term Ecological Research
CAP LTER

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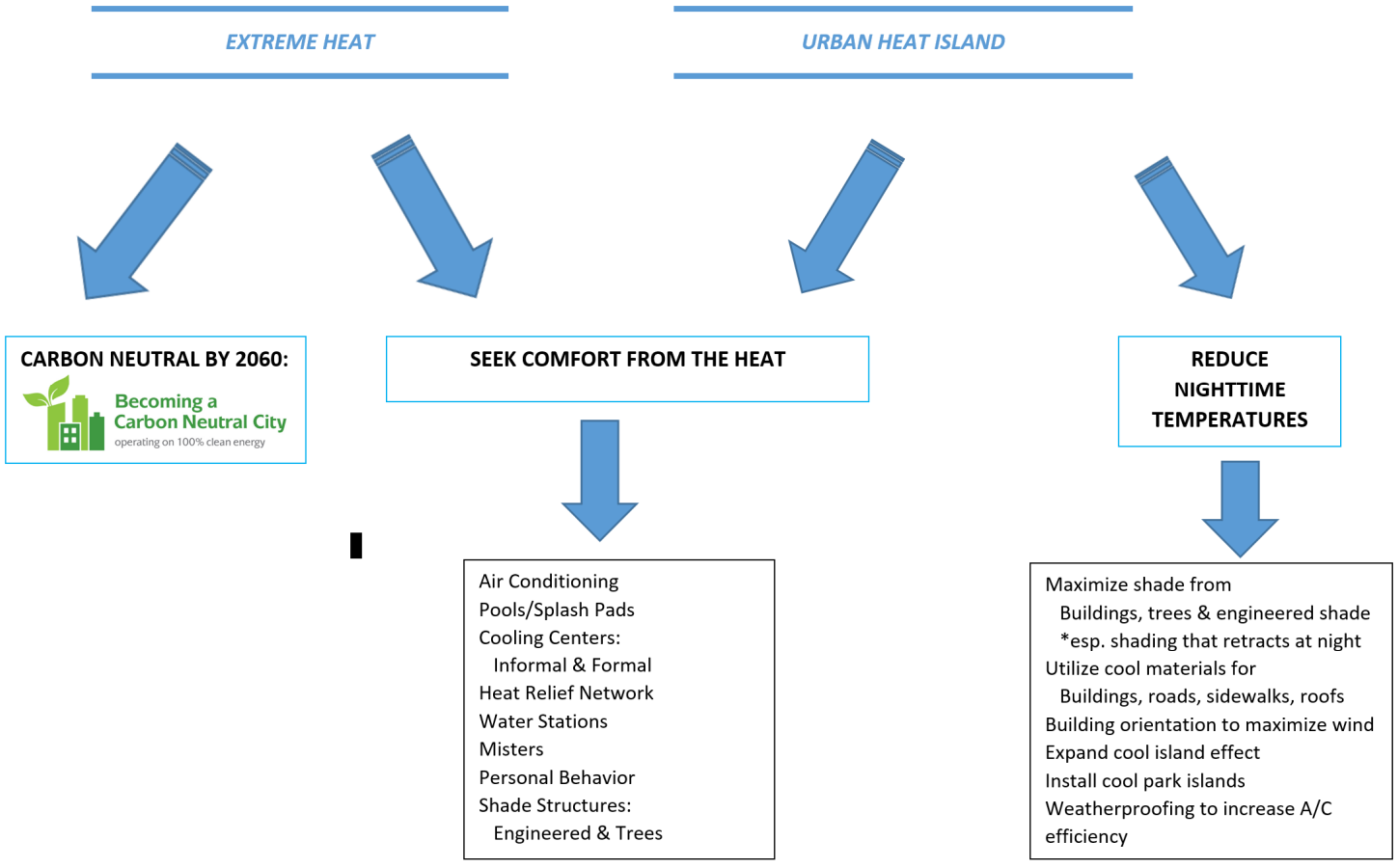
Questions?

Contact: Melissa Guardaro

Melissa.Guardaro@asu.edu

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