



Cool Roofs and Pavements: A Strategy for Adaptation

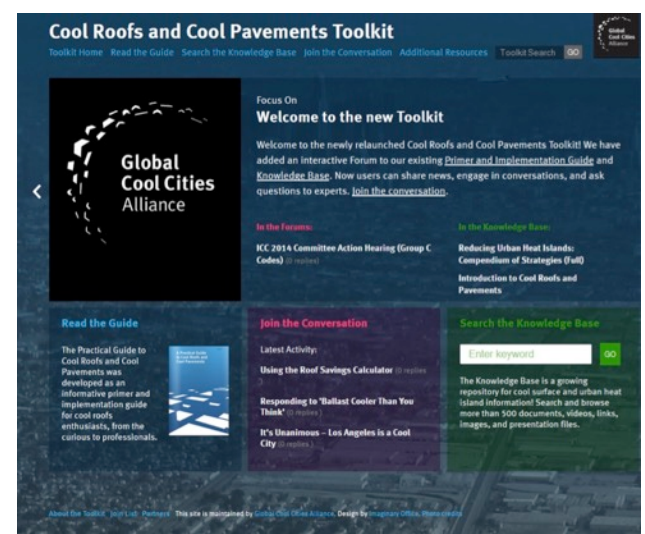
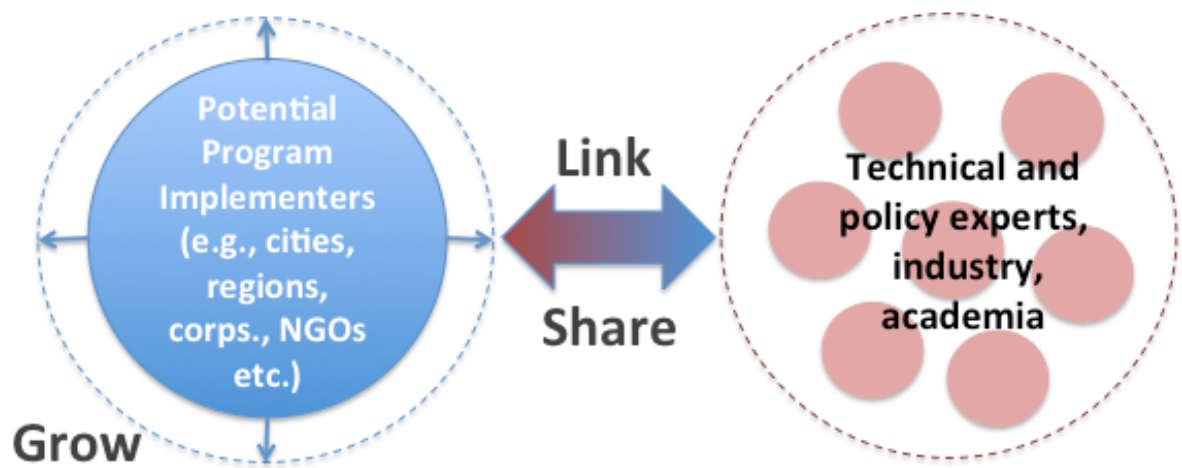
National Adaptation Forum

Kurt Shickman
May 14, 2015

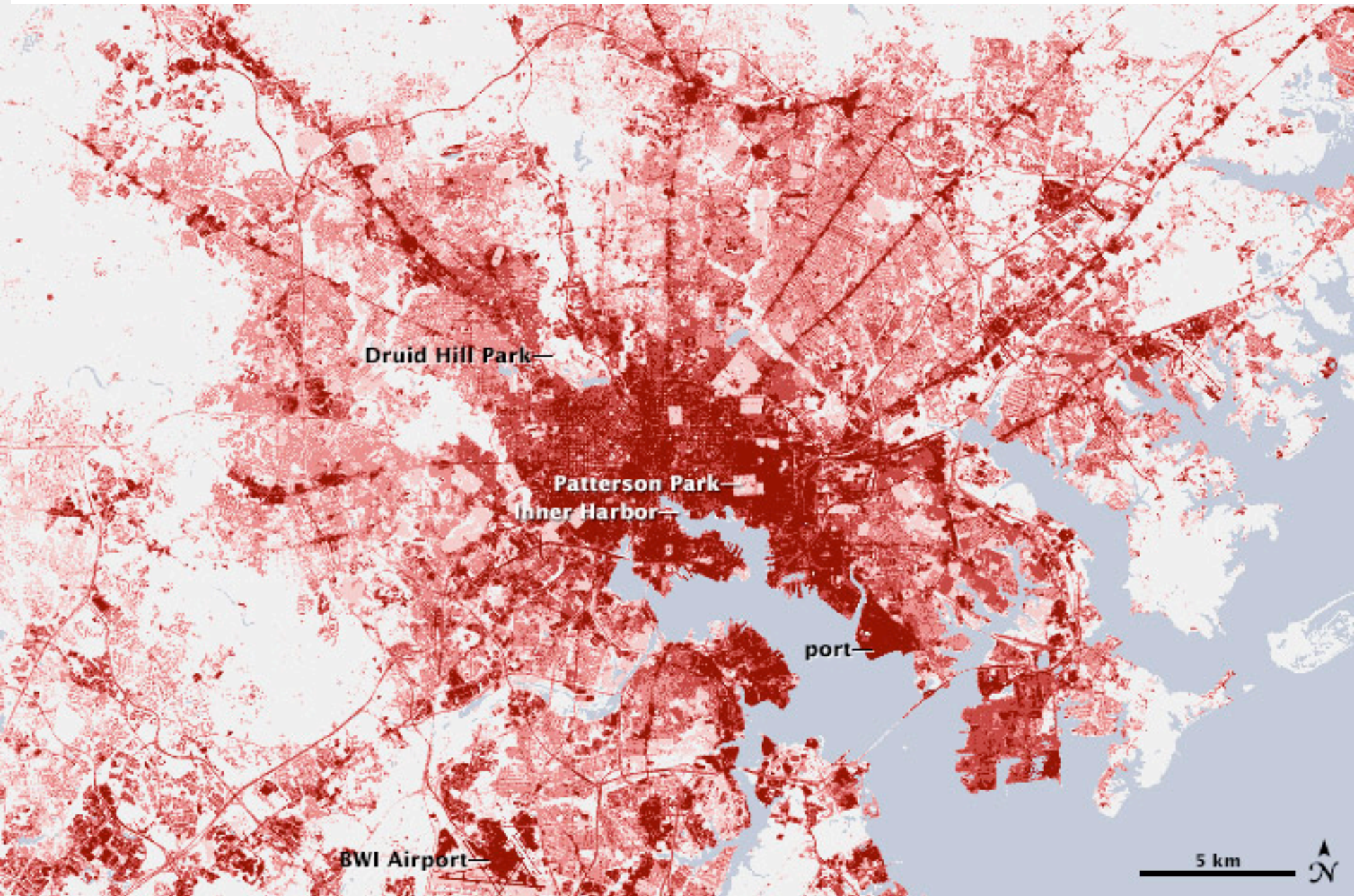


Global Cool Cities Alliance (GCCA)

The Global Cool Cities Alliance is dedicated to advancing policies and actions that reduce excess urban heat in order to cool buildings, cool cities, and to mitigate the effects of climate change through global cooling.

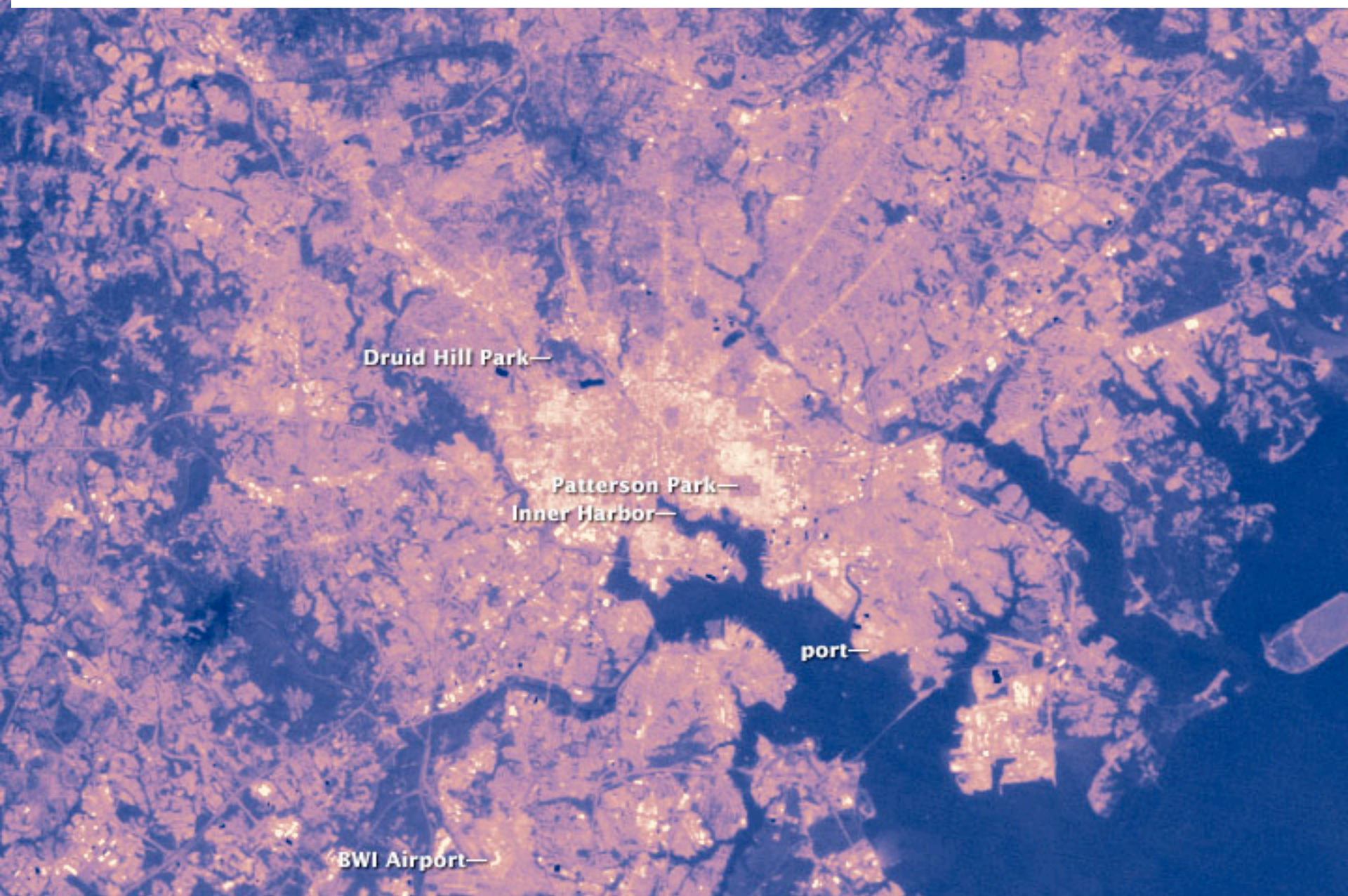


What causes urban heat islands?

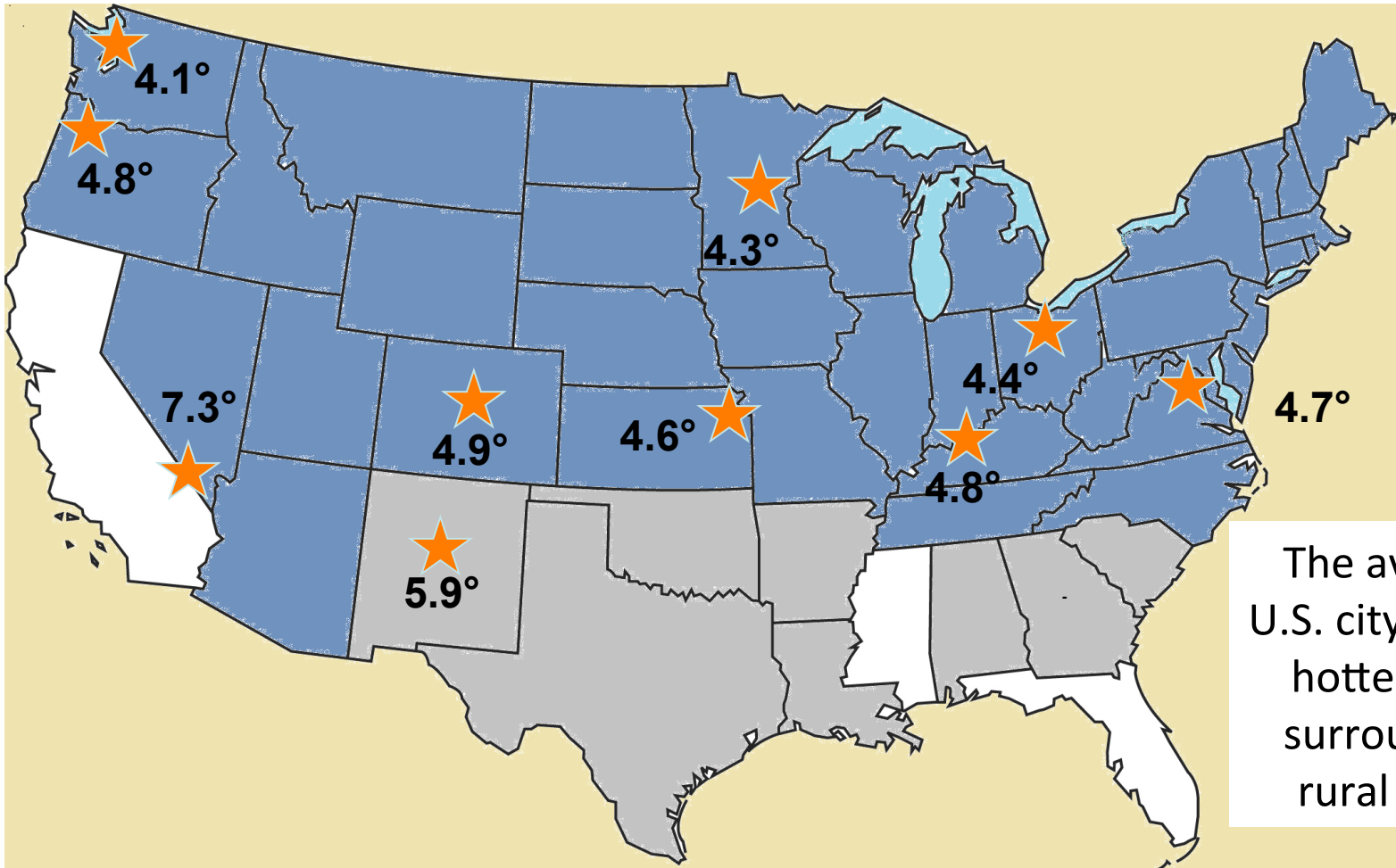


Source: NASA

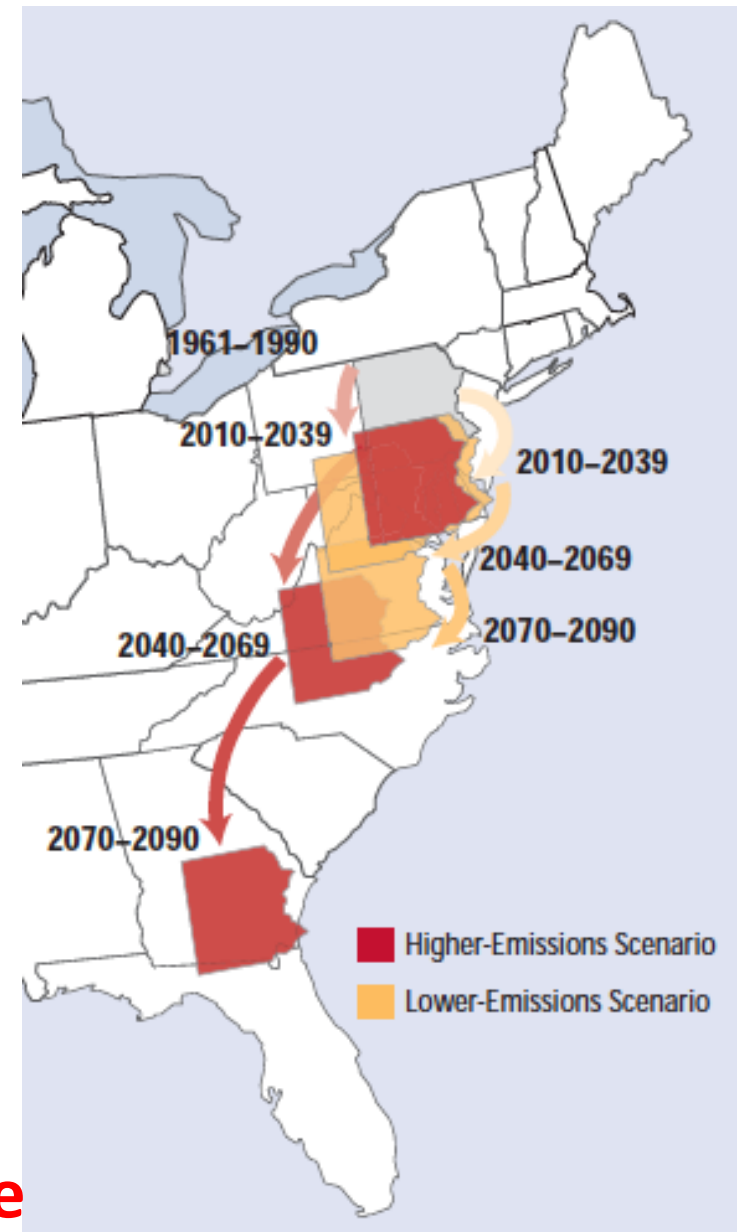
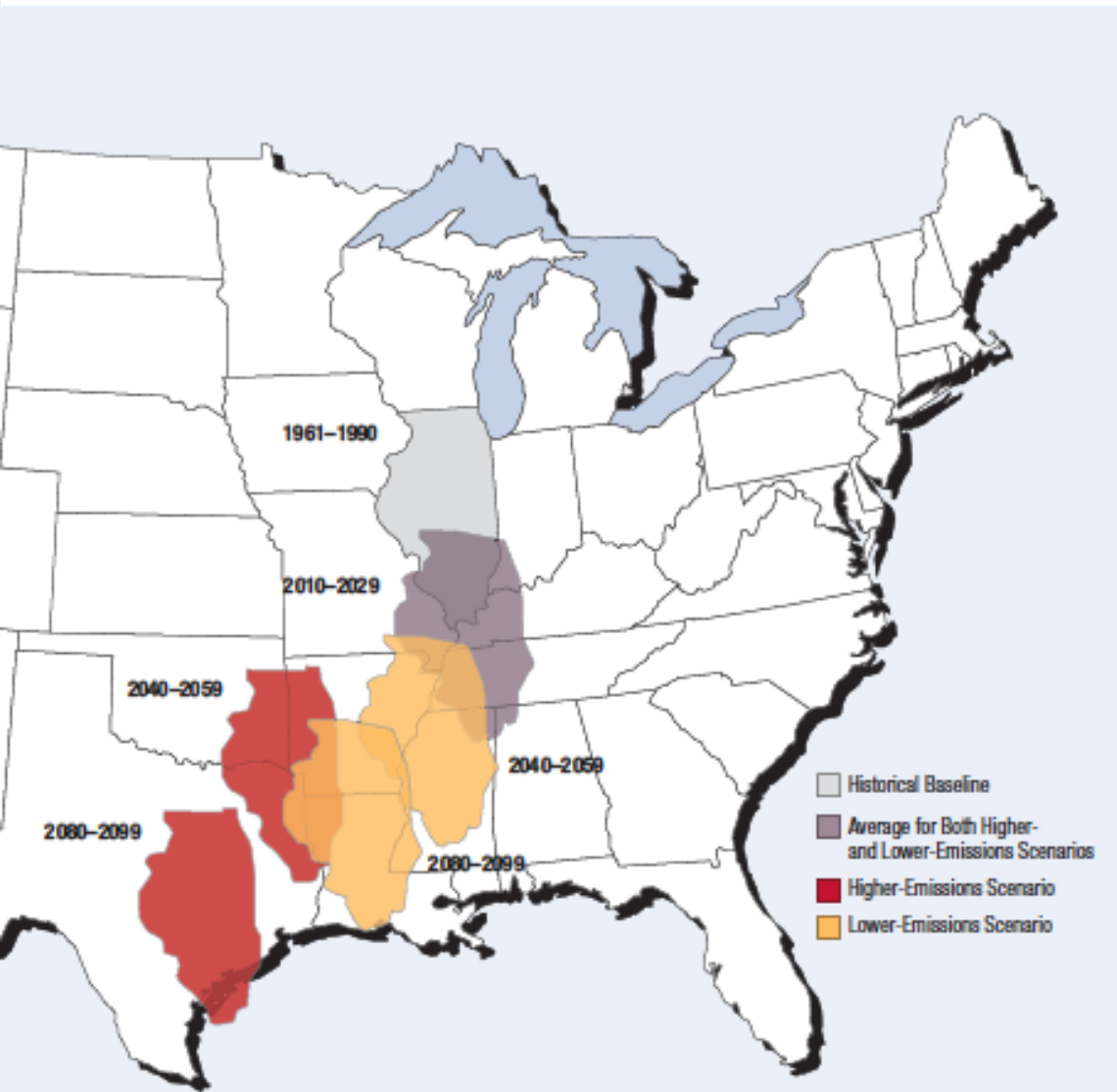
What causes urban heat islands?



Top 10 most intense UHIs in the U.S.

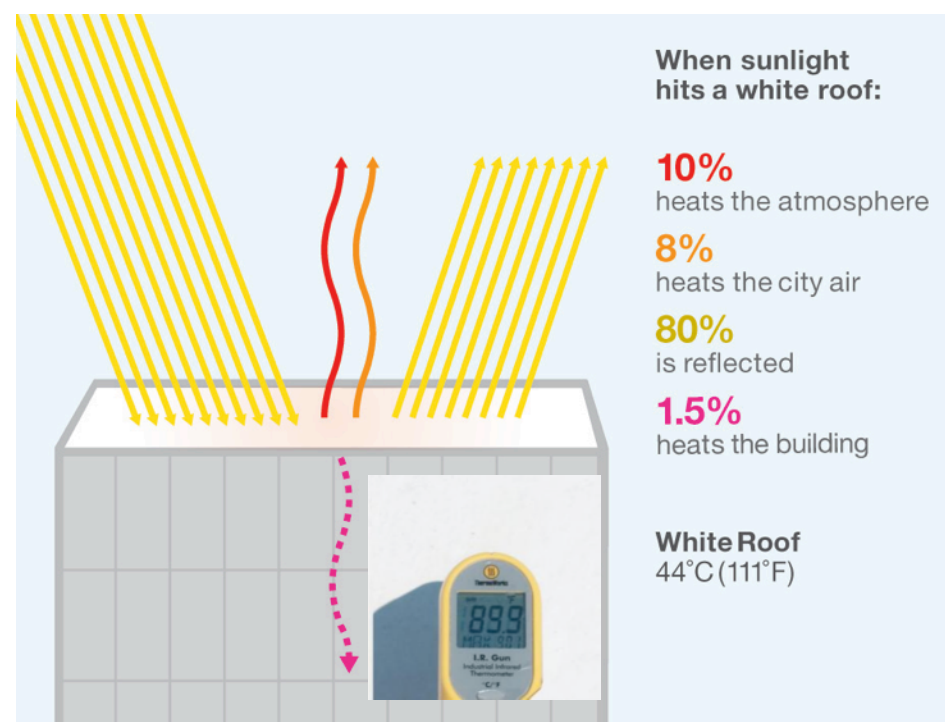
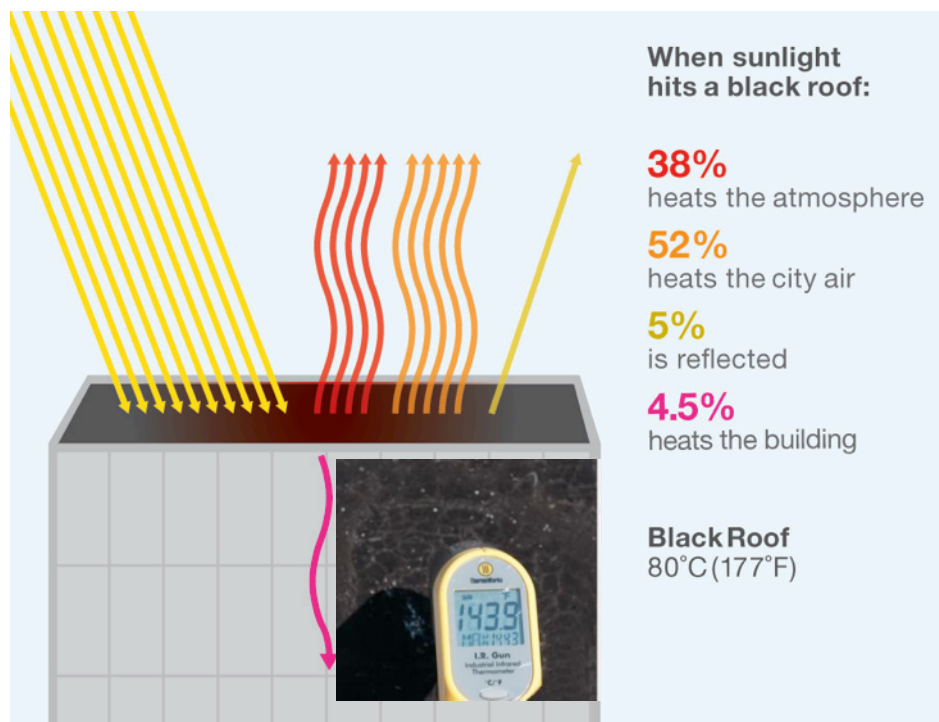


Urban heat is worsened by global climate change...



...and growing at 2x the global average

How reflective “cool” surfaces work



Air Temperature 37°C (99°F)

All sorts of roof types and colors are cool

Standard Concrete
Tiles (SR)

0.04

0.18

0.24

0.33

0.17

0.12

With Cool Coating
Applied (SR)

0.41

0.44

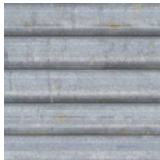
0.44

0.48

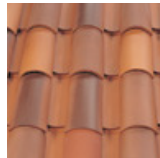
0.46

0.41

Source: Adapted from data from American Rooftile Coatings.



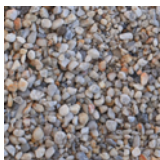
Metal Roofs



Clay & Concrete Tiles



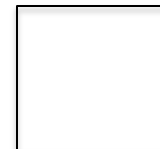
Coatings



Built-Up Roofs



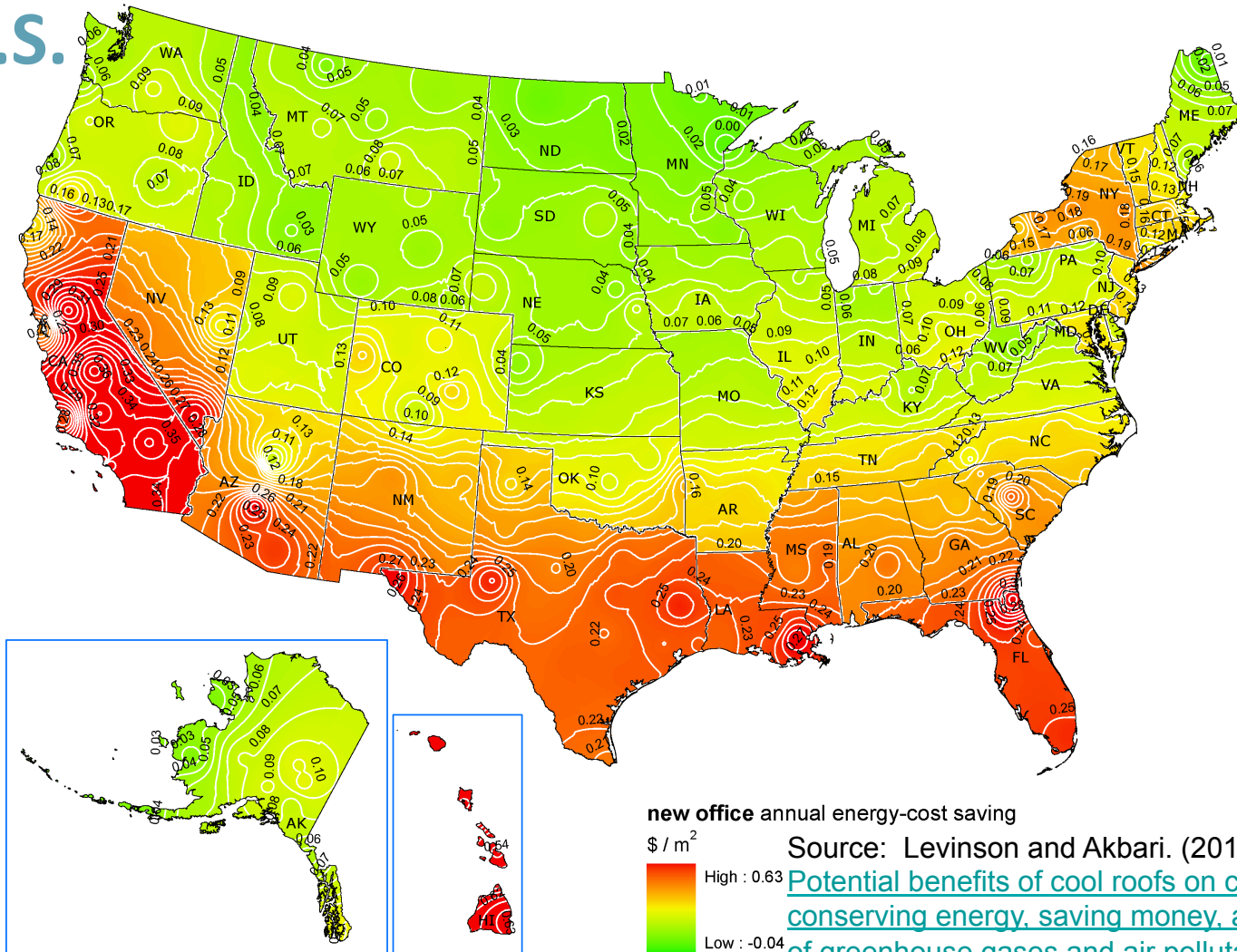
Asphalt Shingles



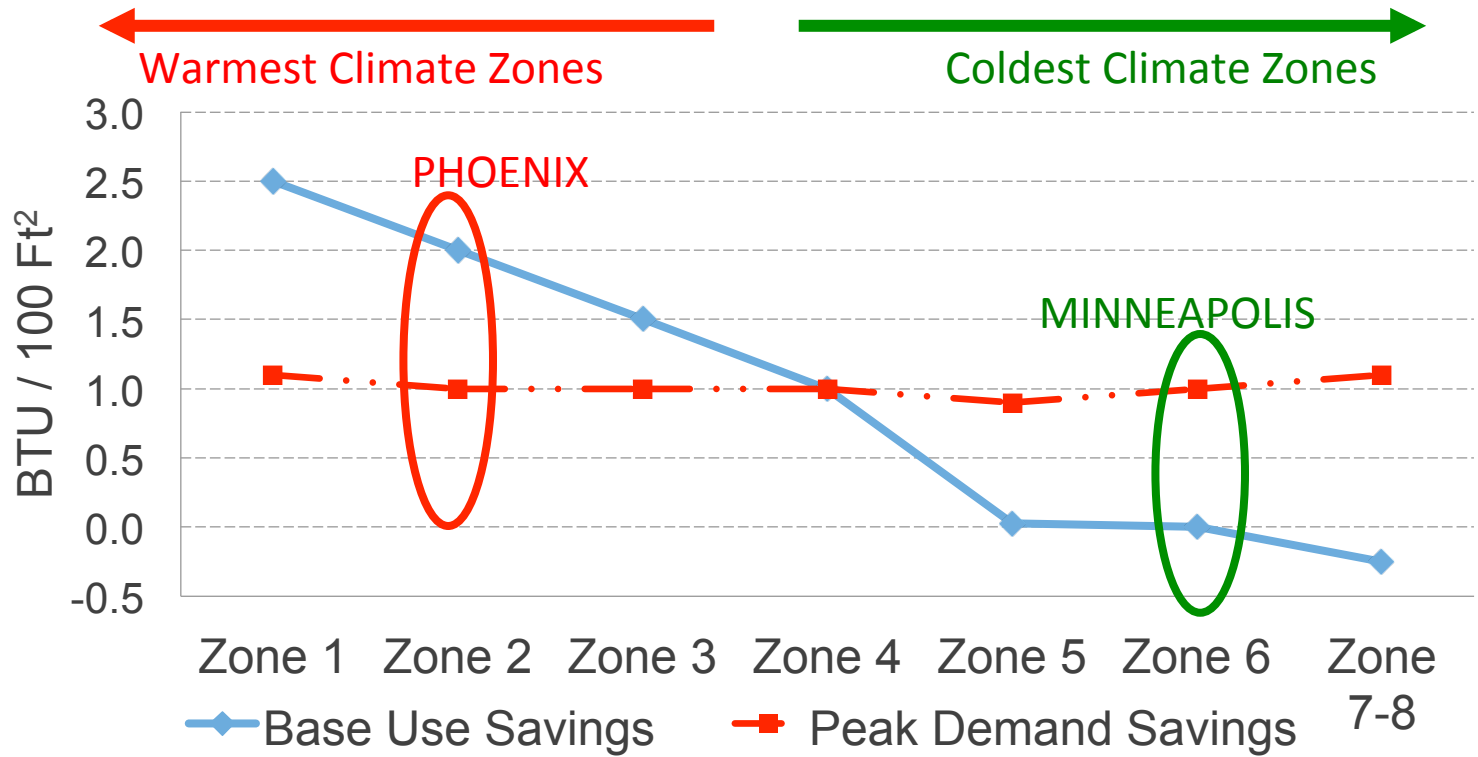
Membranes

Cool roofs generate net energy cost savings across the U.S.

R-19 roof
R-13 walls
EER10 A/C



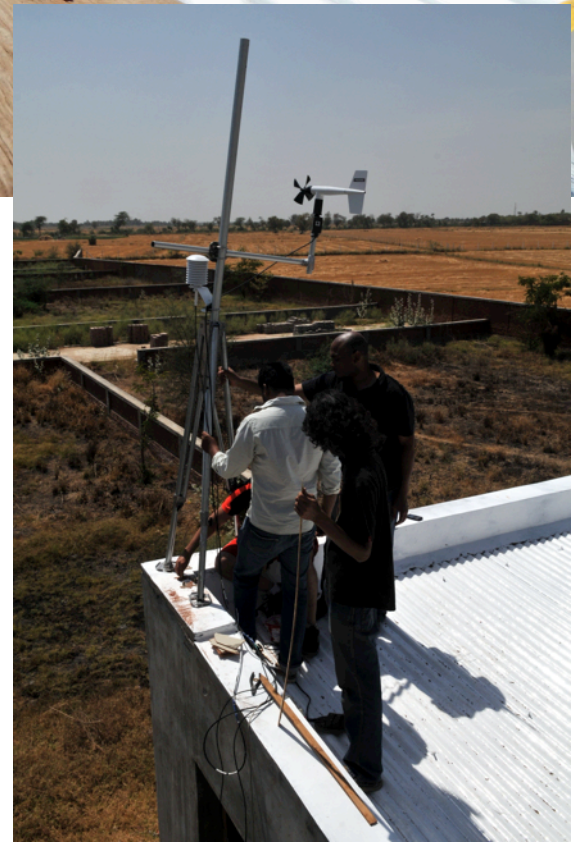
Peak Demand Savings: Uniform Across Climates



Potential Roof-Related Base Use and Peak Demand Savings (by North America Climate Zone)



Not just for energy efficiency



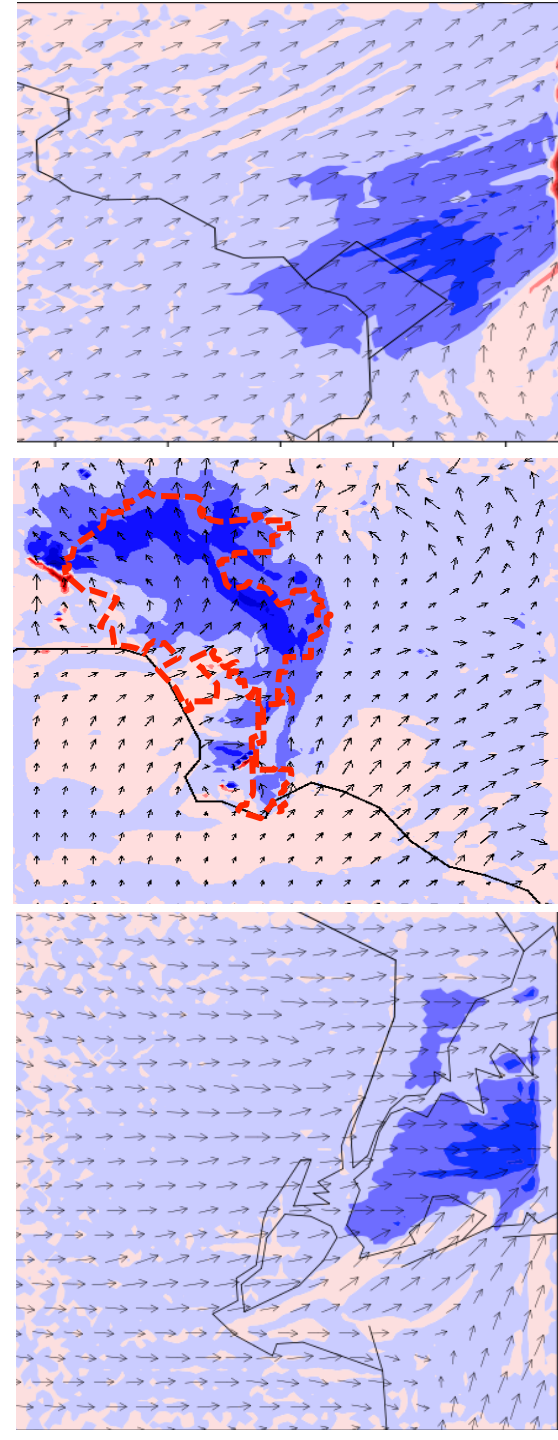
*A 10% \uparrow in surface reflectivity and vegetation cut **outside** temperatures by:*

DC: **0.5°F**, leading to a **7%** mortality reduction

LA: **0.5°F**, leading to a **1%** mortality reduction

NYC: **0.3°F**, leading to a **9%** mortality reduction

Baltimore: : **0.5°F**, leading to a **2%** mortality reduction



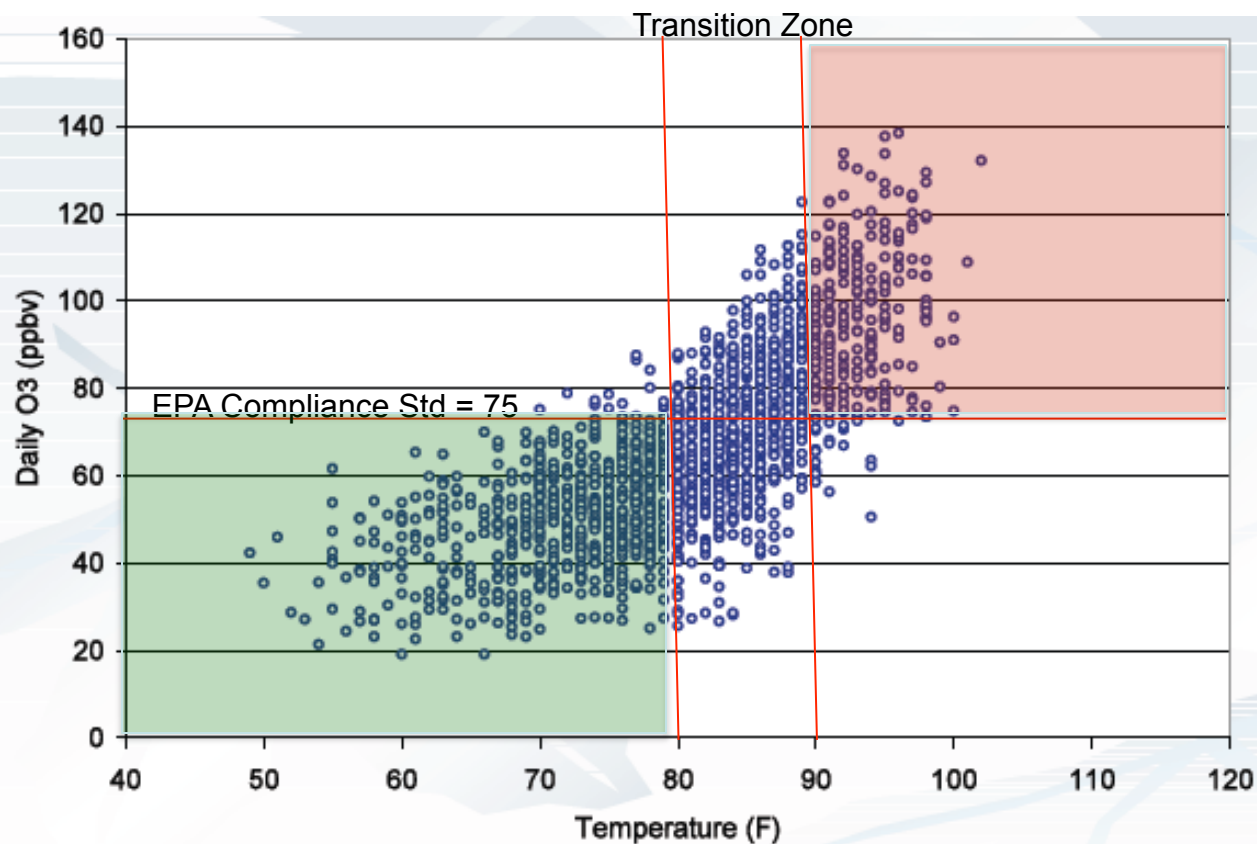
Cooling with reflectivity: A real-world case



The whitewashed greenhouses of Almeria, Spain have cooled the region by 0.8 degrees Celsius each decade compared to surrounding regions, according to 20 years of weather station data.

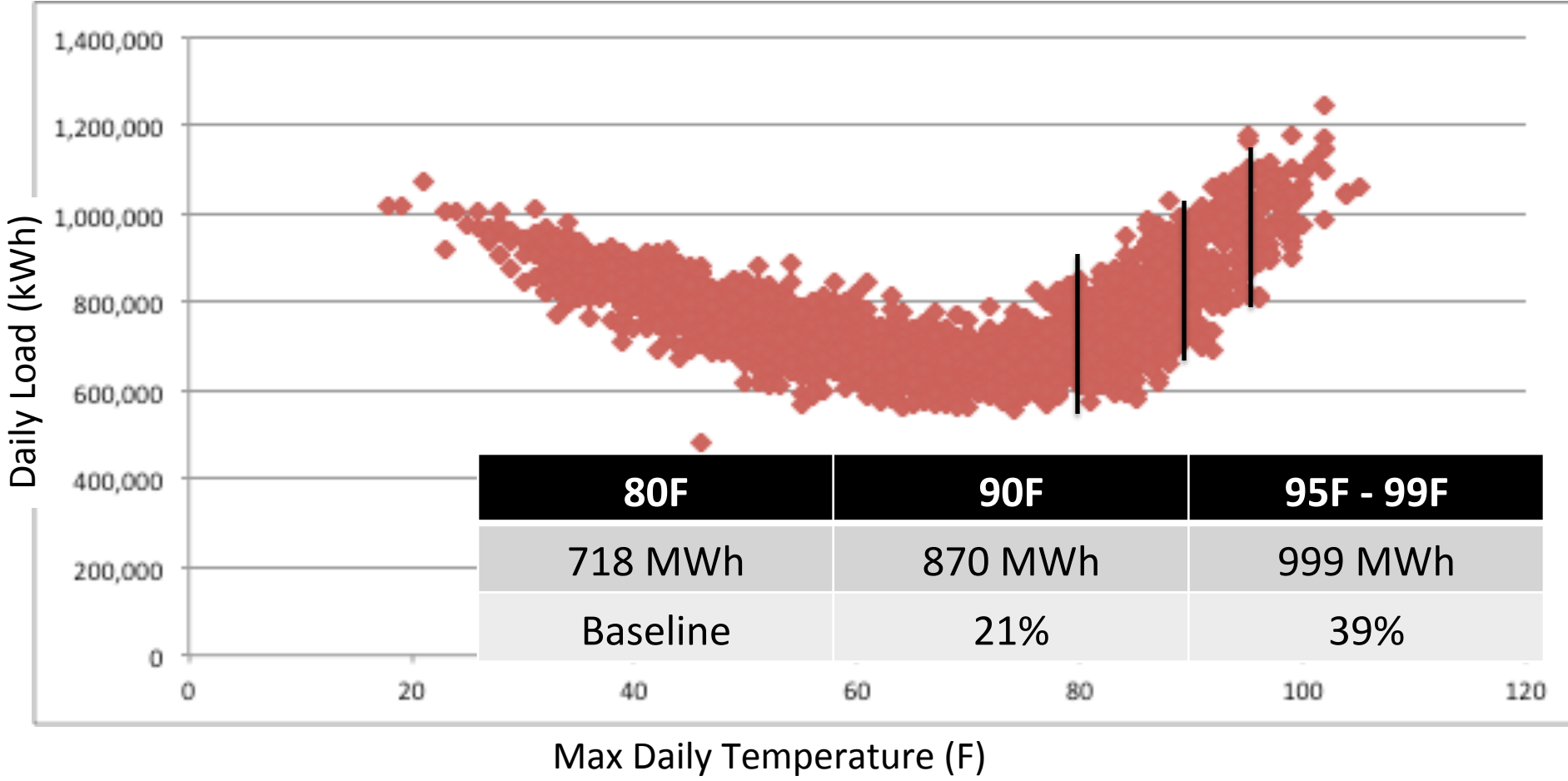
Source: Google Earth

A little cooling goes a long way...



Maximum surface temperature at BWI versus peak 8-hr ozone concentrations in the Baltimore non-attainment area for the period May-September, 1994-2004 (Piety, 2007).

A little cooling goes a long way (cont)...



Global Cooling

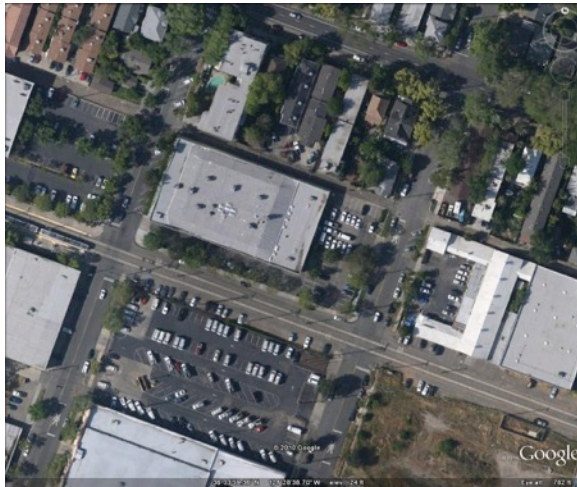
- Whitening 1000 ft² of grey roof offsets the warming effect of 10 tons of GHGs.
- Total potential is 24 Gt of offsets, or 500 coal power plants worth of emissions, or removing half the world's cars for 20 years.



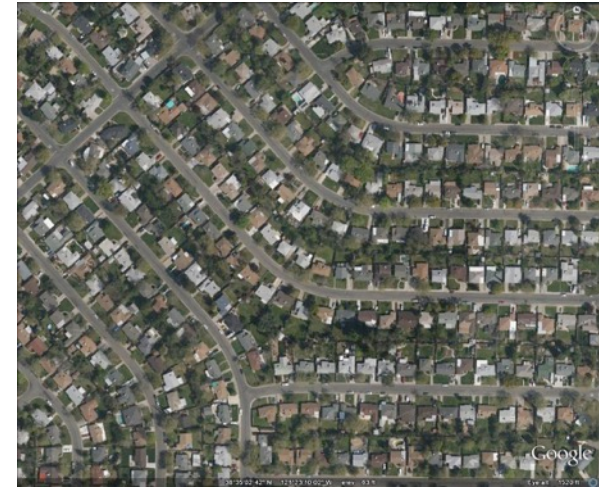
About 1/3rd of our cities is paved



45% are roads and streets



40% are exposed parking



15% are sidewalks



58.8°C (138°F)



46.2°C (115°F)



41.4°C (107°F)



Thank You!

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GlobalCoolCities.org

CoolRoofToolKit.org

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