Cool Roofs
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Global Cool Cities ALLIANCE

Global Cool Cities Alliance (GCCA)

The Global Cool Cities Alliance is dedicated to advancing policies and actions that increase the solar reflectance of our buildings and pavements as a cost-effective way to promote cool buildings, cool cities, and to mitigate the effects of climate change through global cooling.

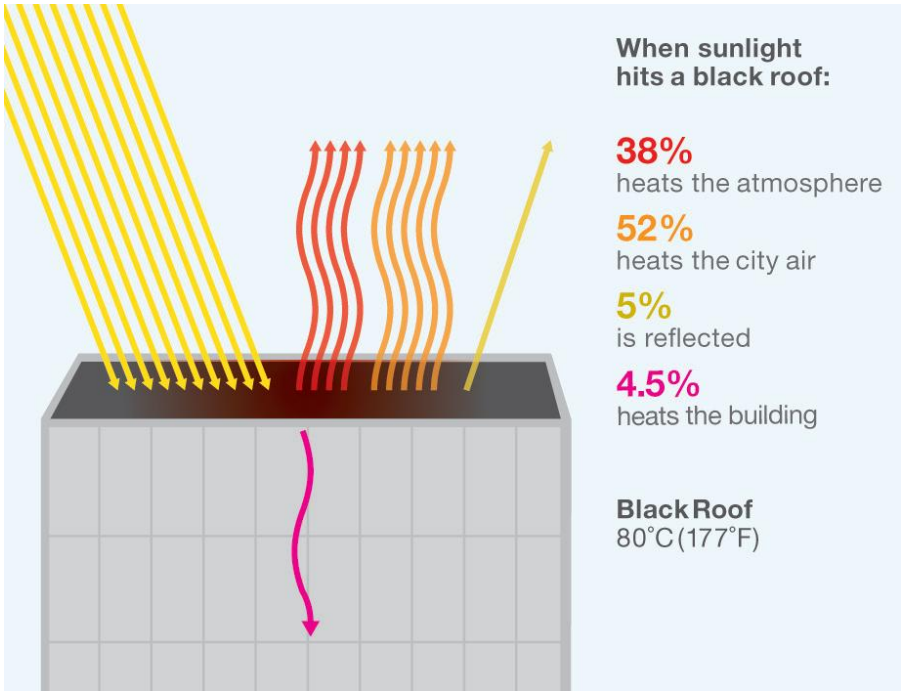
Cool surfaces are a high-impact, short-payback investment that:

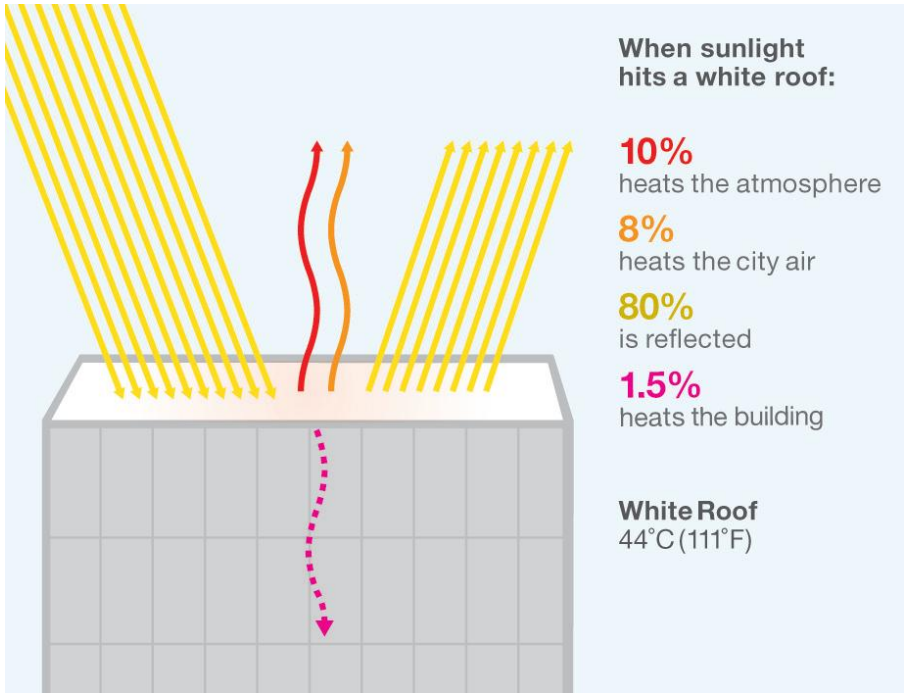
- Improves buildings by cutting net energy use, help roofs and the equipment on them last longer, and improve the comfort of unconditioned buildings.

- Generates significant economic and societal benefits by reducing heat and pollution related illness and death in urban areas.

- Helps us both mitigate and adapt to climate change risks.

How Cool Roofs Work





Air Temperature 37°C (99°F)

Cool surfaces are measured by how much light they reflect (Solar Reflectance) and how efficiently they shed heat (Thermal Emittance).

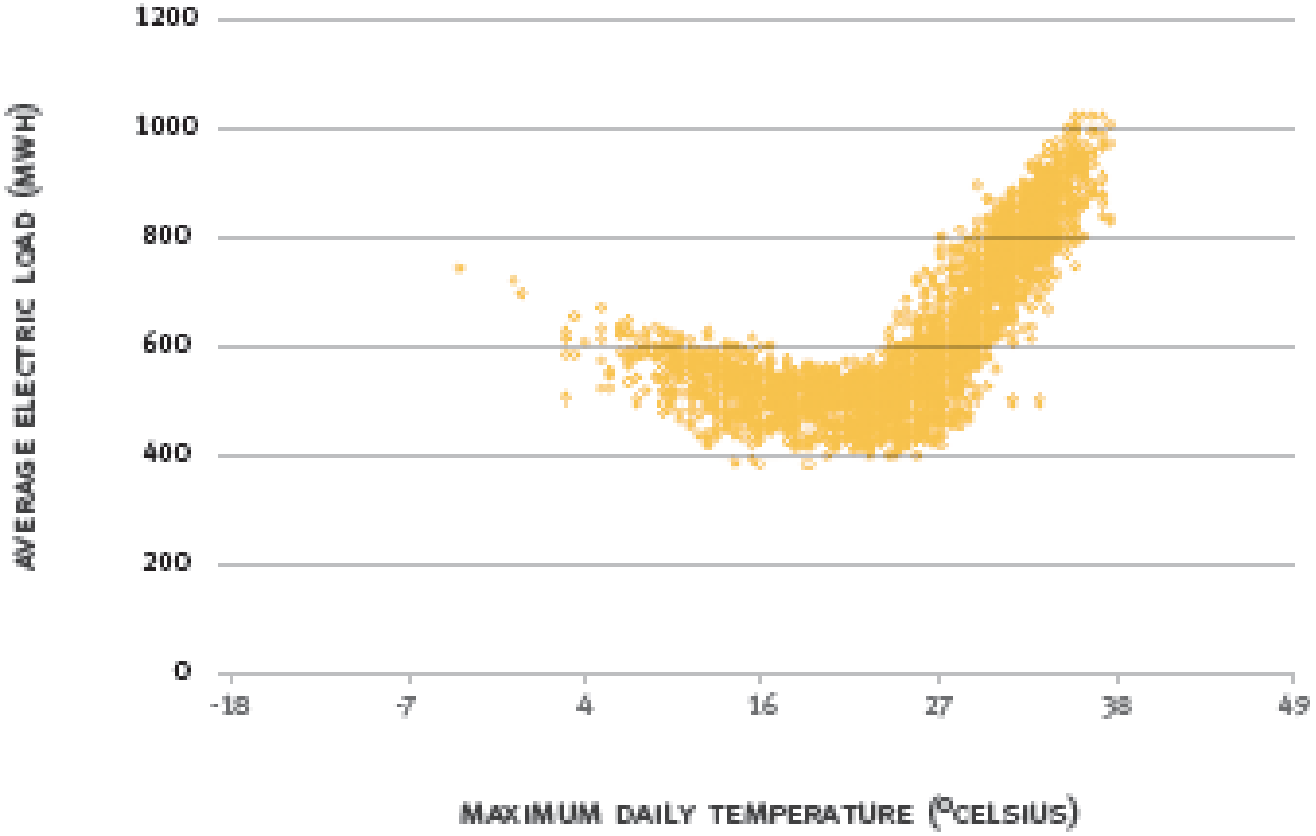
The Benefits: Cooler Buildings

- Cool roofs can cut energy use by 10 to 20 percent on the top floor of conditioned buildings – often avoiding cooling load at the most expensive times of the day.
  - *UHI accounts for 5 – 10% of U.S. peak electricity demand for A/C.*
  - *2-4% more demand per 1° C temperature increase above 20°C*
  - $735 million in energy costs savings in the U.S. commercial buildings.

- Cooler surface temperatures may help the roof and the equipment on it last longer.

- Cool roofs improve the comfort and "live-ability" of unconditioned buildings.

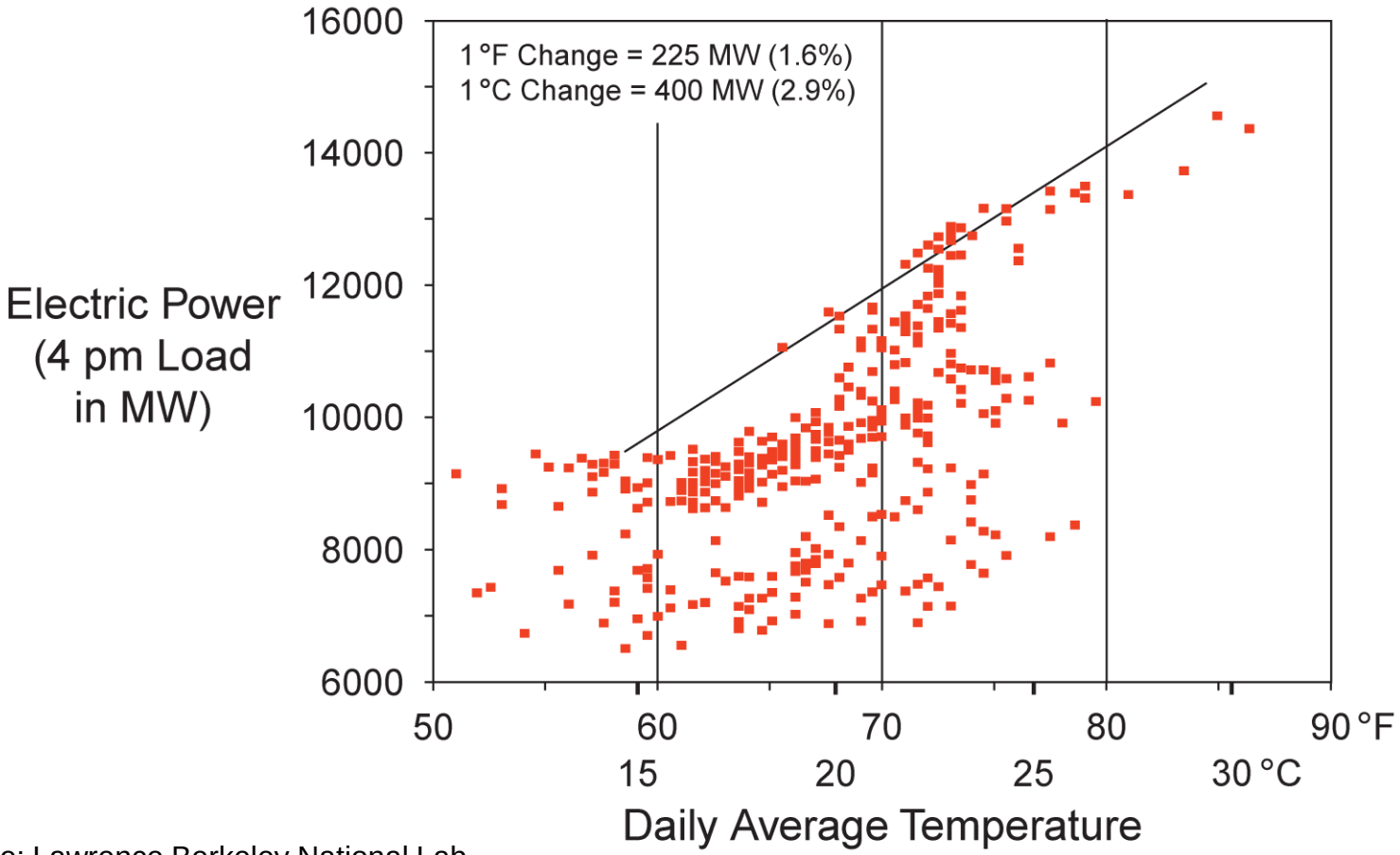
Electricity Load and Temperature



Data from New Orleans, LA

Adapted from Sailor, D. J. 2002. Urban Heat Islands, Opportunities and Challenges for Mitigation and Adaptation. Sample Electric Load Data for New Orleans, LA (NOPSI, 1995). North American Urban Heat Island Summit. Toronto, Canada. 1–4 May 2002. Data courtesy Entergy Corporation.

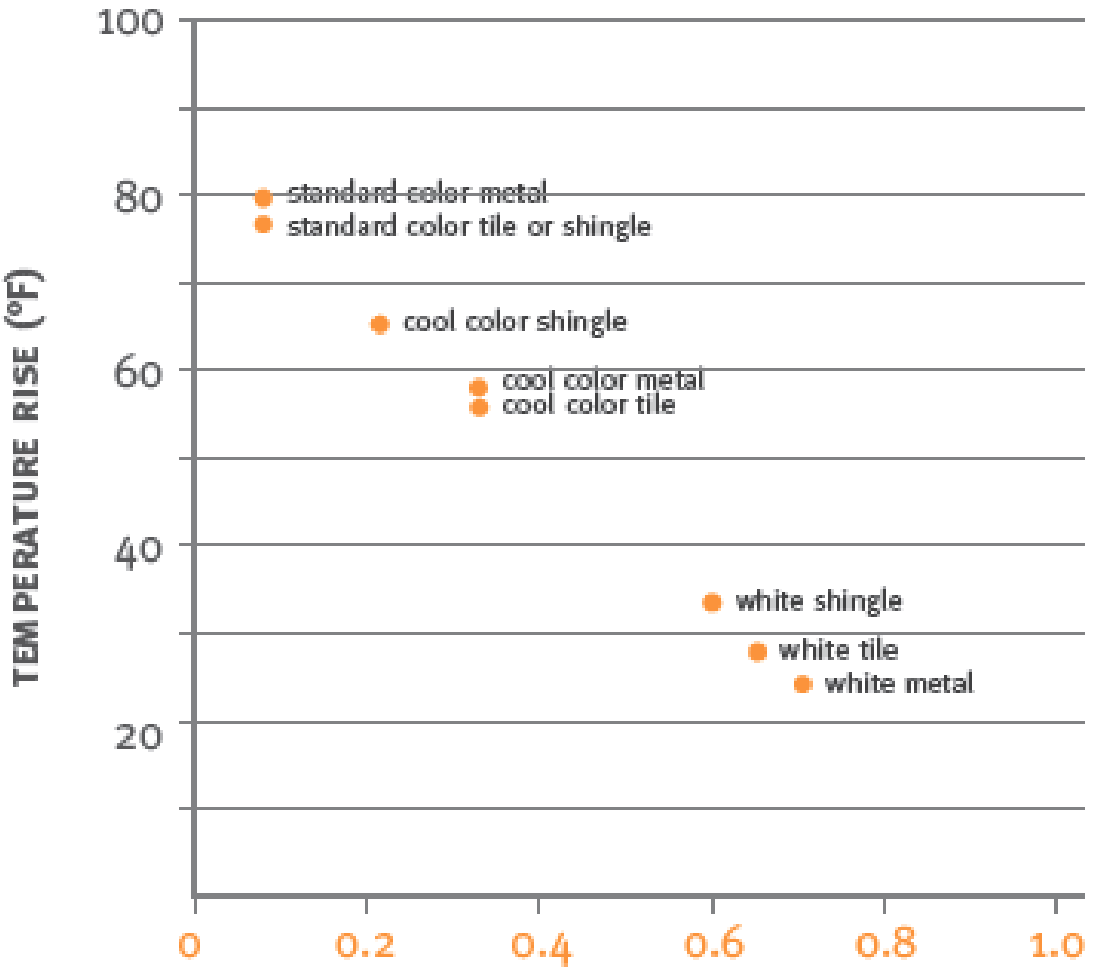
Electricity Load and Temperature



Source: Lawrence Berkeley National Lab

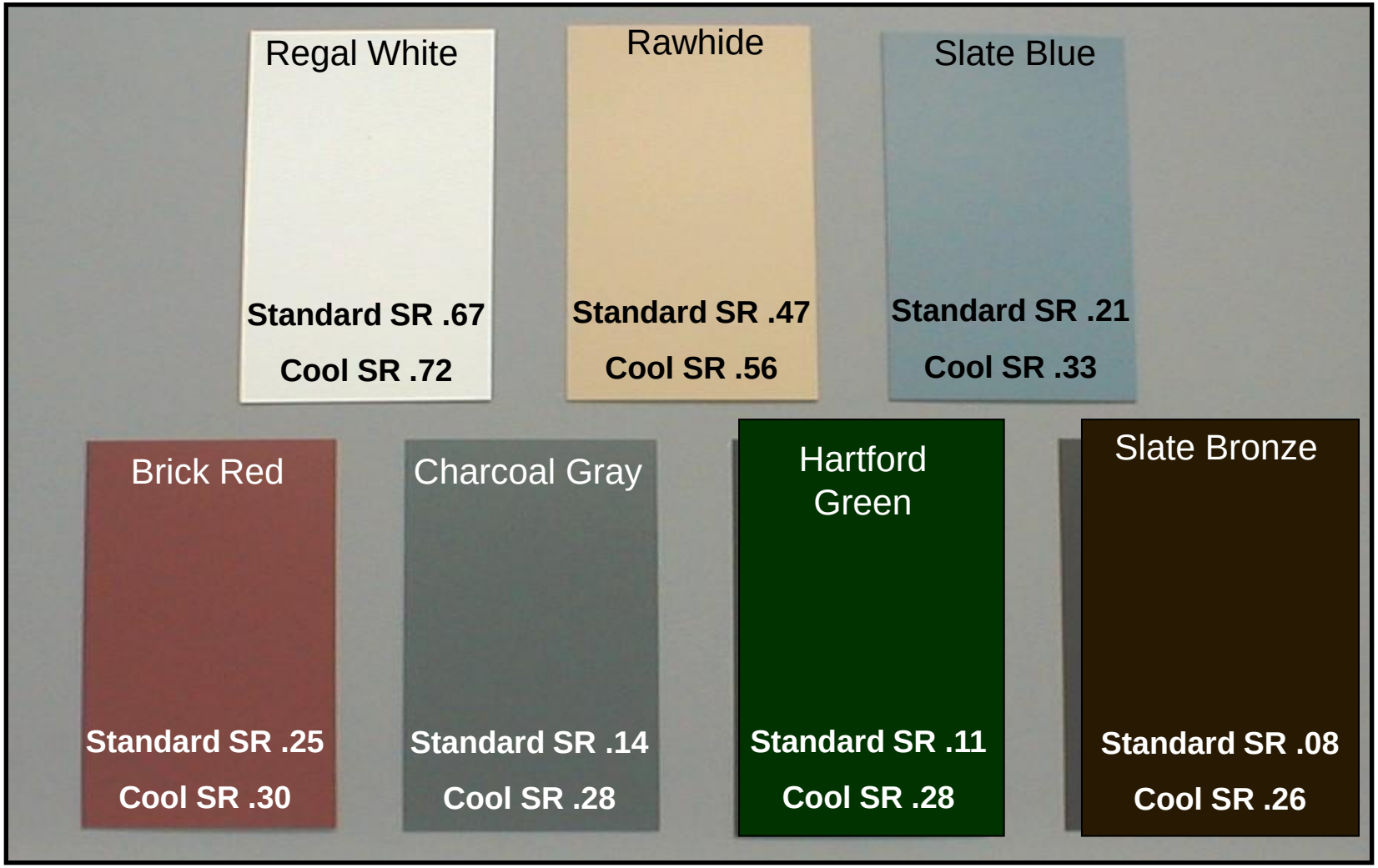
Cool Materials

Reflectance of common roofing materials and the temperature increase above ambient.

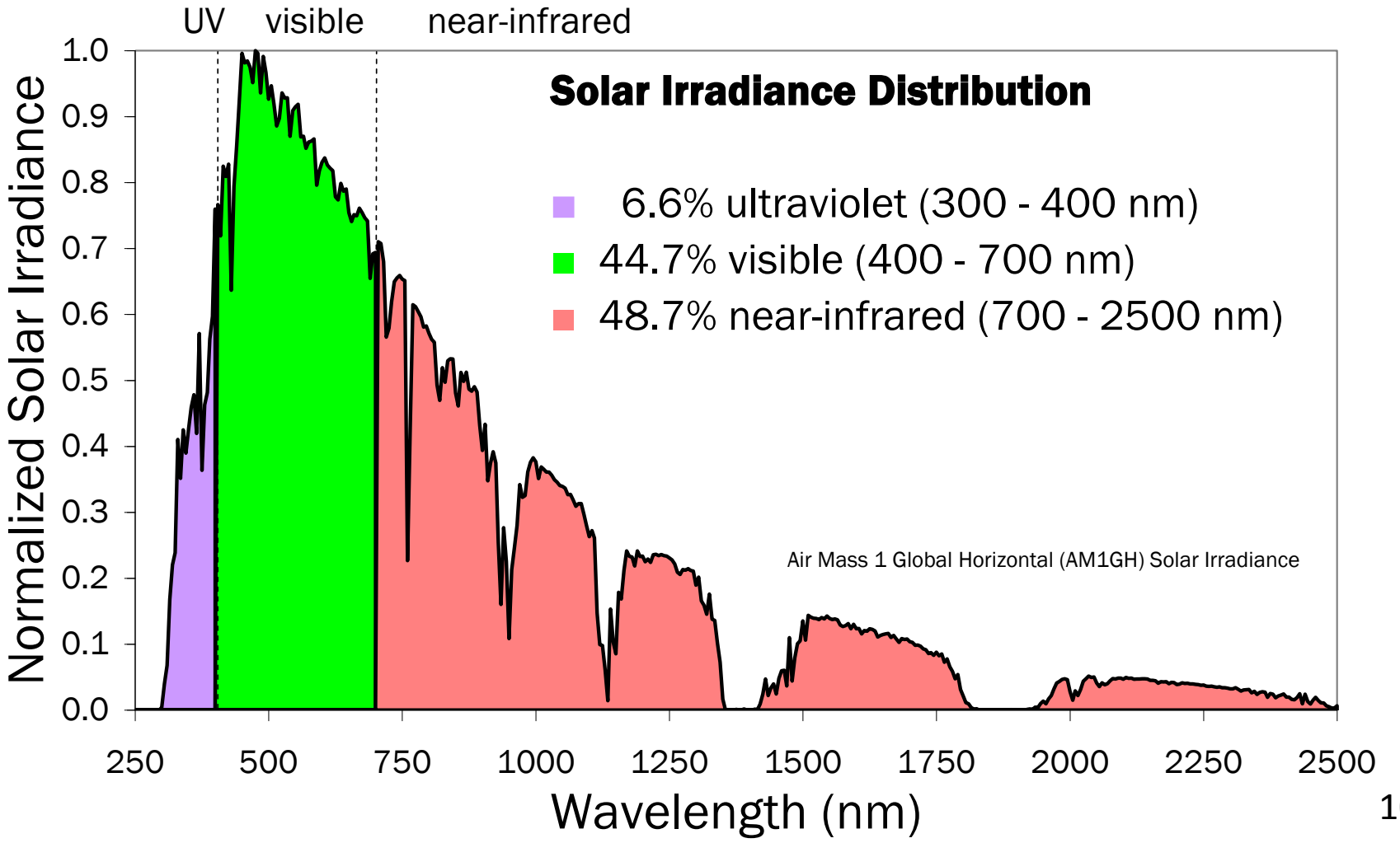


Source: Lawrence Berkeley National Laboratory Heat Island Group

Not just white



Cool Colors


UV
visible
near-infrared
Solar Irradiance Distribution
6.6% ultraviolet (300 - 400 nm)
44.7% visible (400 - 700 nm)
48.7% near-infrared (700 - 2500 nm)
Air Mass 1 Global Horizontal (AM1GH) Solar Irradiance
Normalized Solar Irradiance
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
250
500
750
1000
1250
1500
1750
2000
2250
2500
Wavelength (nm)

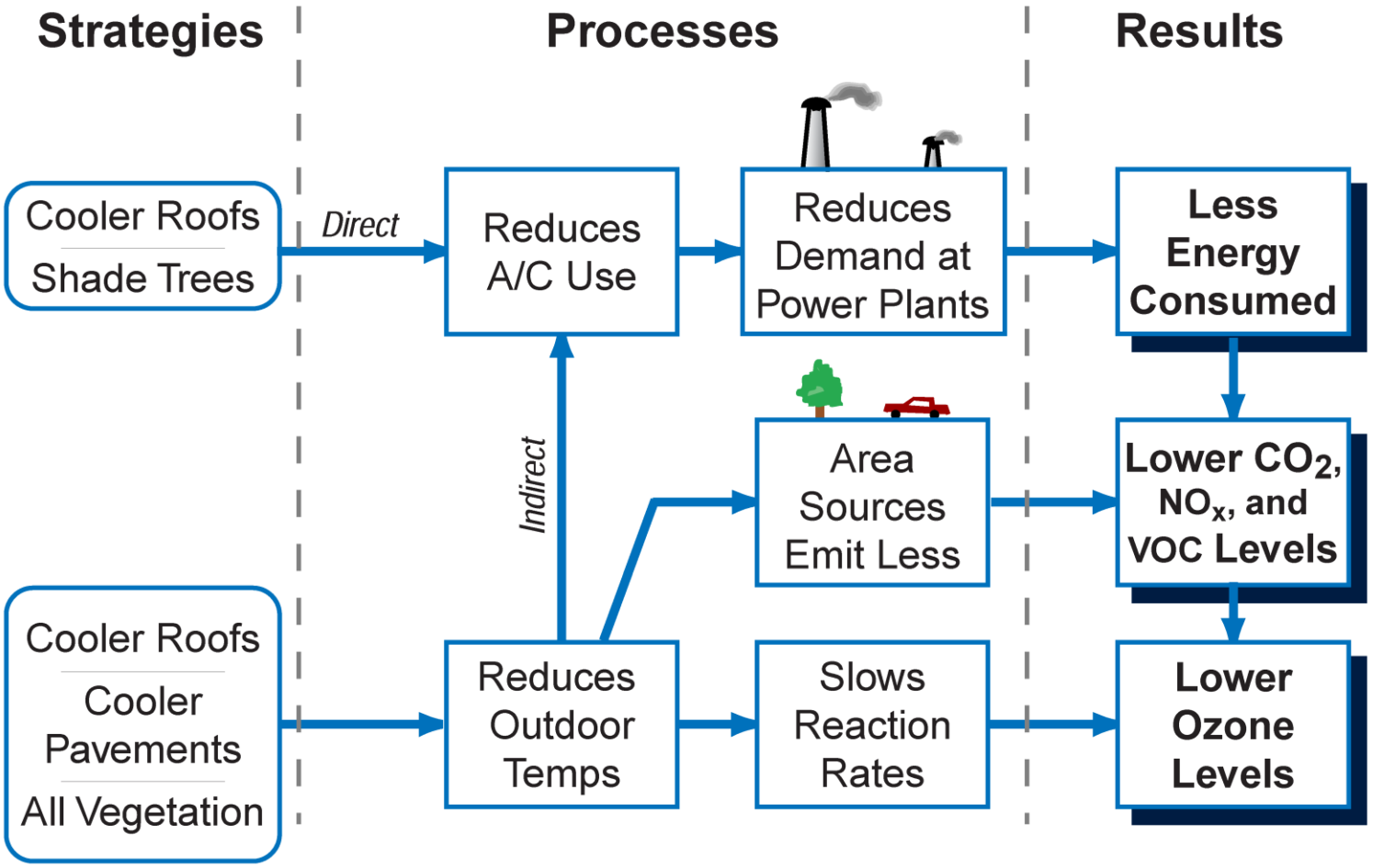
Trends in Cool Materials

- **Staying cleaner, longer** – improved aged material values
- **More "cool" colors** - expanding the broad set of available reflective color options
- **Directional reflectivity** - good for sloped roofs
- **Clear reflective coatings** – an option that balances reflectivity and aesthetics

Trends in Cool Materials – continued

- **Color-shifting materials** – thermo- and electro-chromic (more focused on windows currently)
- **Advances in testing** – accelerated aging processes
- **Pavements** – longevity by material and application.
- **Research** – broaden geographic diversity of data, field testing, additional modeling and testing of large-scale climate benefits.

Strategies for Cool Communities



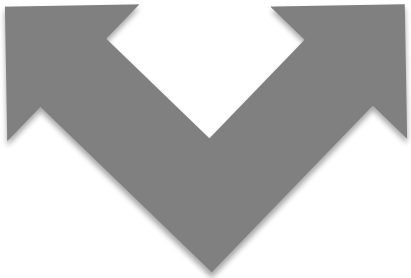
Source: Lawrence Berkeley National Laboratory Heat Island Group

Roadmap for implementation

A preview of a guide being developed for R20 – Regions of Climate Action

Policies
(e.g., codes, ordinances, incentives)

Programs
(e.g., demonstrations, volunteer efforts, workforce training)



Foundation Activities
(e.g., information gathering, building support and capacity)

GCCA envisions a future in which our urban environments are cooler, more resilient and more efficient. Join us!

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