

# Cool Roofs & Pavements:

## A cost-effective strategy to save energy, improve cities, and cool the planet.

Produced by: Global Superior Energy Performance Partnership's Cool Roof and Pavement Working Group



**Our planet is rapidly warming.** According to the Intergovernmental Panel on Climate Change, the Earth's average temperature is on track to increase by between 2 and 7 degrees Celsius (4 to 13 degrees Fahrenheit) this century, producing a climate never before experienced by human civilization. This rapid change in temperature is not only stressing ecosystems, but is also increasing the frequency and duration of heat waves, creating serious health risks to people around the world.

**The trends are worse in urban areas due to the urban heat island effect.** Urban heat islands are formed because roofs and pavements, which cover 60 percent of urban surfaces, absorb more than 80 percent of the sunlight that contacts them and then converts that energy into heat. Hotter cities result in high energy costs, greater incidences of illness from air pollution, greater vulnerability to extreme heat events and lower quality of life for residents.

**Leaders can address these issues by cooling their buildings and cities by increasing the reflectivity of roofs and pavements.** White roofs reflect more sunlight than dark roofs, turning less of the sun's energy into heat. Increasing the reflectance of our buildings and paved surfaces—whether through white surfaces or reflective colored surfaces—is a low cost investment that improves energy efficiency, building comfort and the health and resiliency of urban populations.

Research suggests that cool roofs and pavements create the following benefits:

- **Cooler Buildings:** Highly reflective roofs can reduce the indoor temperatures of buildings by 1 to 2 degrees Celsius (2 to 3 degrees Fahrenheit), which lowers their cooling needs and thus results in net energy savings of approximately 10 to 20 percent on the top floor. Cooler indoor temperatures can make unconditioned buildings more comfortable, forestall the need for conditioning equipment, and even save lives during heat waves.
- **Cooler Cities:** Studies show that widespread installations of cool roofs and pavements can reduce summer air temperatures in cities by 2 to 3 degrees Celsius (4 to 5 degrees Fahrenheit). In addition to leading to a more comfortable environment, such a transition would result in health benefits from improved air quality as smog (ozone) forms more quickly at higher temperatures.
- **Cooler Planet:** It is estimated that if cool roofs and pavements were adopted on a large scale globally, they would have a cooling effect equivalent to reducing greenhouse gas emissions by 44 billion metric tons of carbon dioxide over the 20 year life of the roof (2.2 billion metric tons annually).

Roofs and pavements cover 60% of urban surfaces, and absorb more than 80% of the sunlight that contacts them. This energy is converted to heat, which results in hotter cities and higher energy costs.



**Urban Heat Island.** Source: Adapted from LBNL data that shows an average summer day in an average North American city.

## The Global Superior Energy Performance Partnership (GSEP) Cool Roof and Pavement Working Group

With the goals of reducing energy use in buildings and mitigating the warming effects of climate change, the Cool Roofs and Pavements Working Group formed as a subgroup within GSEP at the second Clean Energy Ministerial in April 2011. The GSEP Cool Roofs and Pavements Working Group will collaborate at the local, regional, national and multinational level to accelerate development and deployment of cool roofs and pavements. Where feasible, the Working Group will seek to incorporate cool roofs and pavements into existing programs, protocols and organizations.

The Working Group has identified four initial objectives:

- **Collect** information and tools of existing working group partners in an accessible repository. Draft case studies and identify best practices of cool roof and pavement development efforts including partnership models, code development, incentives and financing.
- **Promote** cool roofs and pavements and identify or develop champions to drive development and implementation – with a focus on city leaders and market makers.
- **Develop** projects with partners to demonstrate the efficacy of cool roofs and pavements to the public, policymakers and the private sector.
- **Provide** technical assistance to develop infrastructure for testing, rating and ongoing research at the local/regional level by nationally-recognized labs using international standards.

The Working Group recommends the following actions be taken by each partner country:

- **Agree** to draft a country-specific cool roofs and pavements work plan.
- **Assign** a point of contact in each country responsible for supporting the aggregation of data and case studies for the online repository.
- **Identify** at least one site per country for a demonstration project. Prioritize sites in high-profile locations (e.g. cities) or close to high-profile events (e.g. Olympics, World Cup).
- **Communicate** to stakeholders about cool roofs and pavements.



White roofs stay much cooler in the summer sun than black roofs. Shown above is an example of that difference on a day when the air temperature is 98°/36°C. Source: Data adapted from LBNL.



Global Cool Cities Alliance is the Operating Agent for the Cool Roofs and Pavements Working Group. Learn more online at:

[www.GlobalCoolCities.org](http://www.GlobalCoolCities.org)