

# WHITE ROOFS

## Cooler Roofs and a Cooler Planet

Presented by Will Maddux – IB Roof Systems

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*Credit, in part, for this presentation goes to the following:*

**Oak Ridge National Laboratory**  
**U.S. Department of Energy**  
**EPA – Energy Star**  
**Cool Roof Rating Council**



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## Talking Points

- Is energy efficiency in roof systems important?
- Making a roof “Cool”
- Case study

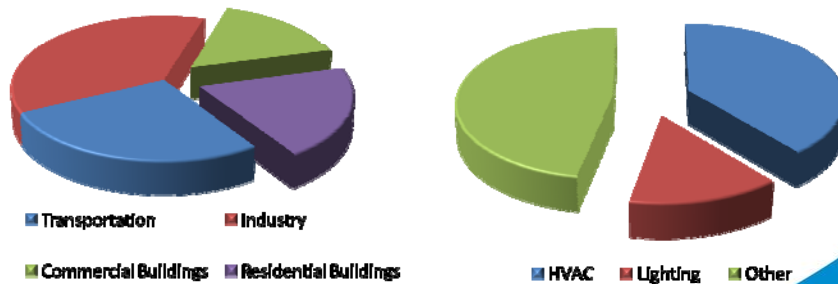


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## Energy Consumption in Buildings

### Energy Use



#### Total Building Envelope Energy Loss:

- 13.4 quads (quadrillion BTU's)
- 14% of energy in US economy & about 3.5% of the world

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## Choices



VS



If you wanted to stay cool on a hot summer day,  
which shirt would you wear?

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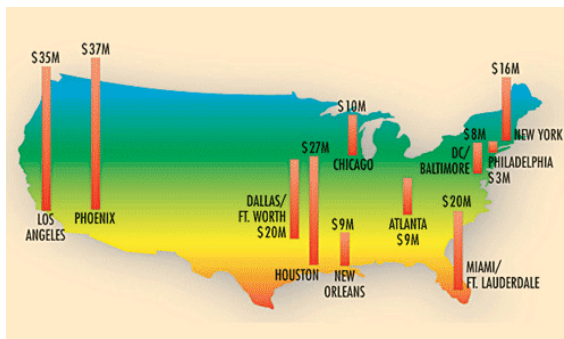
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## CALCULATING ENERGY SAVINGS\$

Lawrence Berkeley National Laboratory study

Nationwide  
implementation of  
cool roofs could mean

● \$1 Billion in annual cooling  
costs savings



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“Whitening the world's roofs and roads would have the same effect on global warming as removing all the world's cars for 11 years.”



By Dr Steve Chu US Energy Secretary

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## *Why a Cool Roof?*

- **Reduced cooling loads**
- **Reduced peak energy demand**
- **Extended roof life**
- **Energy reduction savings**
- **Cool roofs are included into energy codes**
  - **Title 24**

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## What is a Cool Roof?

Roof that has a high solar reflectance (SR) and a high thermal emittance (TE)

Reflective rating 5% (not a cool roof)  
At 85° roof temperatures may reach 170°



Reflective rating of 87% (much cooler)  
At 85° - Roof temperatures may reach 91°



### Energy Code Requirements

- California code: 70% SR and 75% TE
- EPA EnergyStar Program: 65% SR (new) and 50% SR (after 3 years)

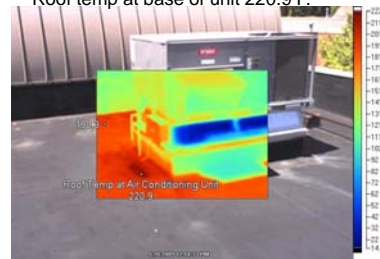
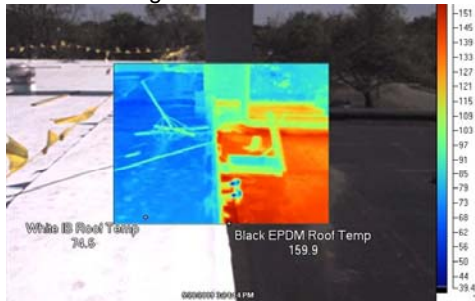


## What is a Cool Roof?

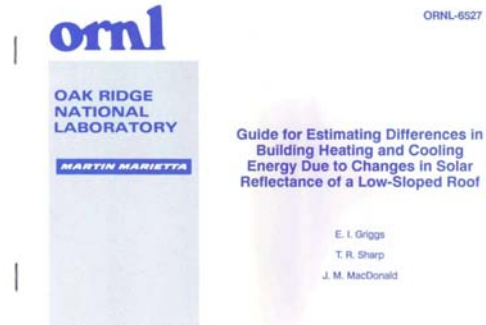
This infrared photo shows a direct side by side comparison on roof temperatures

Thermal image taken 5/20/09 12:18PM  
Roof temp at base of unit 220.9 F.

Thermal image taken 5/20/09 3:24PM



# The Origins of Solar Reflectiveness



Published in 1989

# Cool Roof Rating Council

The screenshot shows the CRRC website. On the left is a navigation menu with links: About the CRRC, Product Rating Program, Rated Products Directory, Membership, Events, News, FAQs, Contact Us, Resources, and Home. The main content area has the CRRC logo and the text: 'COOL ROOF RATING COUNCIL. The Cool Roof Rating Council (CRRC) is an independent, non-profit organization that maintains a third-party rating system for radiative properties of roof surfacing materials.' Below this, there are sections for 'Where do I find CRRC rated roof products: Rated Products Directory', 'What is a Cool Roof?' (explaining solar reflectance and thermal emittance), 'Benefits of cool roofs include:' (listing energy savings, urban heat island mitigation, occupant comfort, and code compliance), and 'AIA Cool Roof Course' and 'ANSI CRRC-1 Standard News'.

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

## *The Proof: A Case Study*

Nationwide Insurance building, Scottsdale Arizona -  
before and after (SRI value 84)

The conditions of this study were near perfect for multiple reasons.

- Virtually identical buildings side-by-side.
- One building had the old roof system and the other had the new – they could do a before-and-after analysis at the same time and under the same conditions.

<http://www.starkweatherroof.com/coolroof>

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## *The Proof: A Case Study*

Nationwide Insurance building, Scottsdale Arizona -  
before and after (SRI value 84)

### *Independent Analysis of the Data*

“...Richard J. Bird, professor of statistics at DeVry University in Phoenix, Arizona concluded... the temperatures of the reflective roof and black roof were statistically and significantly different...”

“Our utility bill shows a consistent monthly drop in kilowatt-hour use since the roof project completion. A conservative estimate of power drop is around 50,000 Kwh a month mid-summer. The building A/C demand has dropped tremendously. Rarely do I have all four towers online. With the old roof, we used all four towers from June to October to satisfy the building demand.”

-Chris Peterson, Lead Facilities Technician for the Nationwide  
Scottsdale Insurance Company building

<http://www.starkweatherroof.com/coolroof>

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## The Proof: A Case Study

Nationwide Insurance building, Scottsdale Arizona -  
before and after (SRI value 84)



Month/Year	Kilowatt consumption	Difference
August 2008	719,000	56,000 kilowatts or \$5,450
August 2009	663,000	



7.79% decrease in energy consumption  
(\$5,450 savings for the month of August alone)

<http://www.starkweatherroof.com/coolroof>

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## Heat Island Effect



The term "heat island"

- Describes built up areas that are hotter than nearby rural areas.
- The annual mean air temperature of a city with 1 million people or more can be 1.8–5.4°F (1–3°C) warmer than its surroundings.
- In the evening, the difference can be as high as 22°F (12°C).

<http://www.epa.gov/heatisland/>

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## Heat Island Effect



Heat islands can affect communities:

- By increasing summertime peak energy demand.
- Air pollution and greenhouse gas emissions.
- Heat-related illness and mortality, and water quality.

<http://www.epa.gov/heatisland/>

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## Summary

- Energy savings are well documented
- Keeping energy costs low attracts tenants
- Energy codes require reflective roof systems.
- Impact of cool roofs is growing

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*Thank You!*



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