

Rebuild America



Sarnafil is proud to have been selected

2002 Rebuild America Energy Champion
Business Partner of the Year

Energy Star® Roofing Systems

Using White Reflective Roofs to Conserve Energy
Improve the Environment and Save Money

By Peter D'Antonio

Sarnafil Roofing and Waterproofing Systems

Selecting a Roof System



Important performance criteria:

- 25 year level history in New England
- ability to withstand ponding water/snow/ice
- local contractor base
- ability to be repaired easily over lifetime
- low maintenance costs

Roof System Design



Design features of a properly designed roof assembly

- Membrane thickness

- minimum 60 mil
- optimum 72 mil

- Insulation thickness

- minimum R-30
- optimum R-38

- Slope

- minimum 1/4"/foot

Building Dynamics - The Roof



The Roof functions as one of the most important features in a building:

Basic Function: → Provide Weatherproofing

New Impact: → Energy Conservation
→ Improve Air Quality

Building Dynamics - The Roof



Roof System Performance has a direct effect

- Indoor Air Quality
 - Development of mold

Urban Heat Islands



Development replaces natural vegetation with pavement, buildings, and other structures

These surfaces absorb the sun's heat causing surface temperatures and overall ambient temperatures to rise

Heat islands reduce livability by increasing temperatures, air pollution, and the incidence of heat related illness and death

The Smog Connection



Urban heat islands are not only hotter but are also smoggier.

Smog is created by photochemical reactions of pollutants in the air and intensify at higher temperatures.

In Los Angeles, for every degree increase above 70F smog increases by 3%.

1997 EPA Heat Island Reduction Initiative



1997 Heat Island Reduction Initiative

- Urban Heat Island Pilot Project (UHIPP)
- Energy Star® Roof Products Program
with US DOE

Urban Heat Island Pilot Project



EPA Objective:

Investigate the use of HIR strategies for the reduction of cooling-energy use and for the reduction of the ambient air temperature and improving air quality

The Energy Star® Roofing Program



Energy Star Roofing Program Key Terms

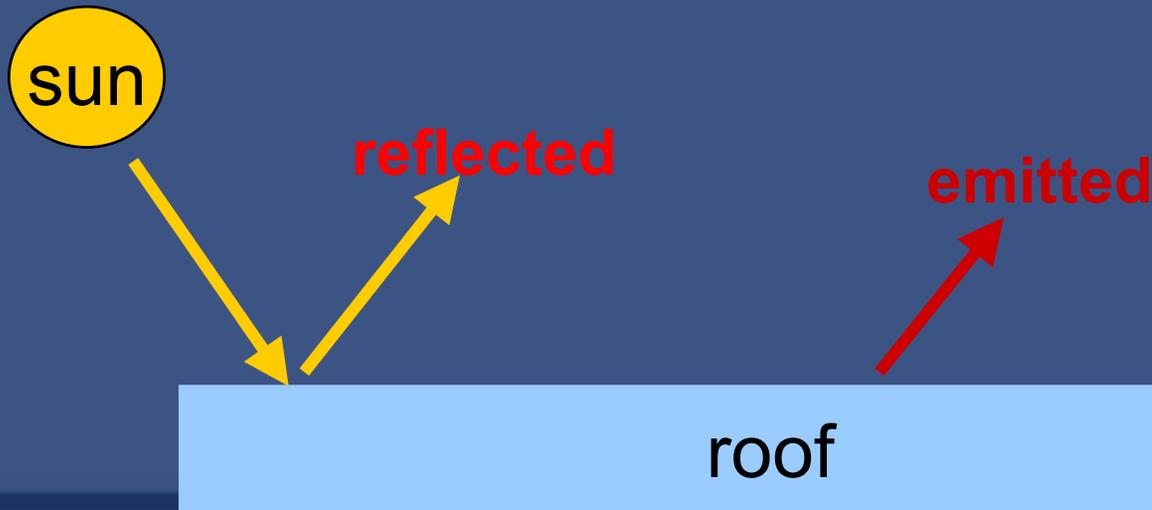


Solar Reflectivity

Amount of incoming solar energy a material reflects, also called “albedo” (usually in %)

Emissivity

Amount of energy a material emits due to its own heat and temperature (usually in %)



EnergyStar® Roof Products Program Product Specifications

LOW-SLOPE ROOFS: Surfaces with a slope of 2:15 inches or less*

Characteristic	Performance
Energy efficiency	
Initial solar reflectance	Greater than or equal to 0.65
Maintenance of solar reflectance	Greater than or equal to 0.50 three years after installation under normal conditions
Reliability	
Manufacturers warranty for defects in materials and manufacturing.	Each company's warranty for reflective roof products must be equal in all material respects to the warranty offered by the same company for comparable non-reflective roof products. A company that sells only reflective roof products must offer a warranty for comparable non-reflective roof products.

STEEP-SLOPE ROOFS: Surfaces with a slope greater than 2:12 inches*

Energy efficiency	
Initial solar reflectance	Greater than or equal to 0.25
Maintenance of solar reflectance	Greater than or equal to 0.15 three years after installation under normal conditions
Reliability	
Manufacturers warranty for defects in materials and manufacturing.	Each company's warranty for reflective roof products must be equal in all material respects to the warranty offered by the same company for comparable non-reflective roof products. A company that sells only reflective roof products must offer a warranty for comparable non-reflective roof products.

* For roof products that can be applied to either low-slope or steep-slope roofs, manufacturers should refer to the low-slope roof tables for Energy Star® specifications.

Roofing Material Comparison

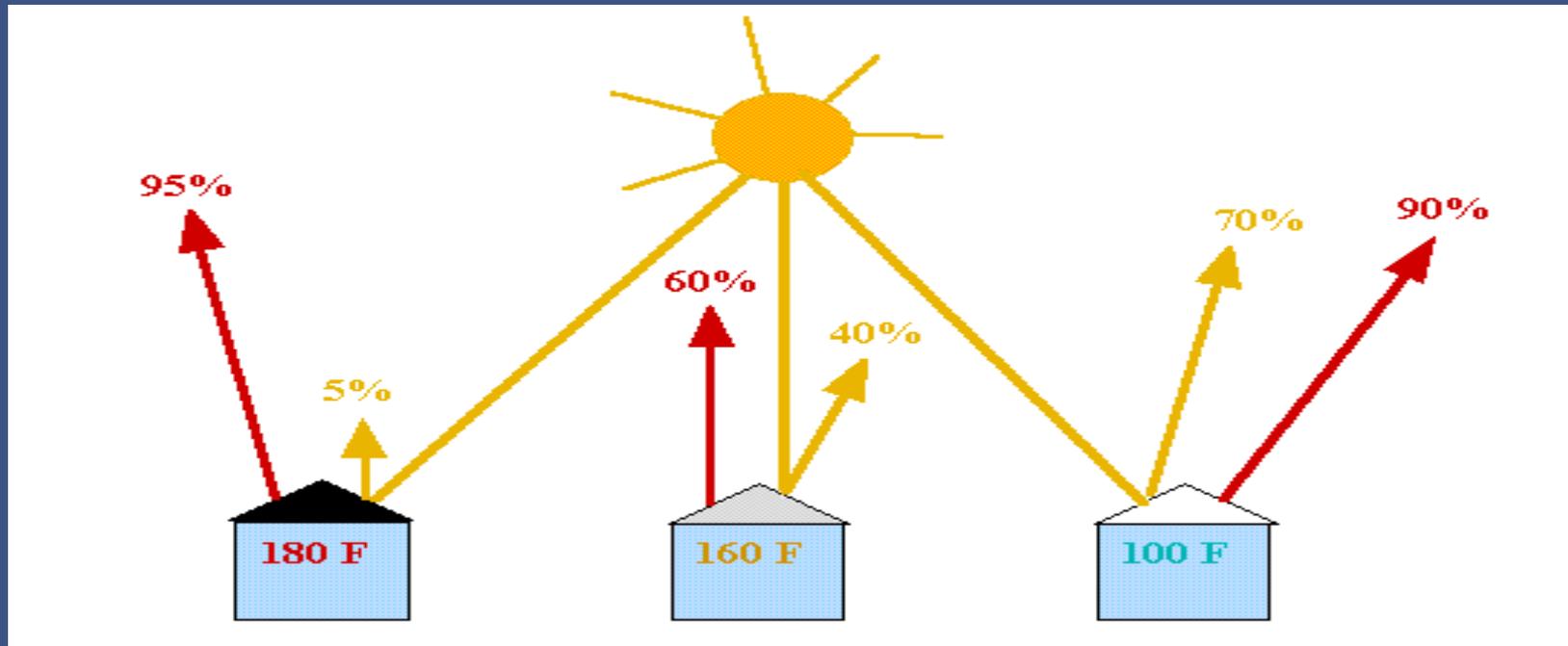


White reflective membrane	83%
White granular surface	26%
Smooth surface BUR	6%
EPDM black	6%

Source: Cool Roofing Material Database/LBNL

<http://eetd.lbl.gov/CoolRoof/membrane.htm>

Effect of Reflectivity & Emissivity on Temperature

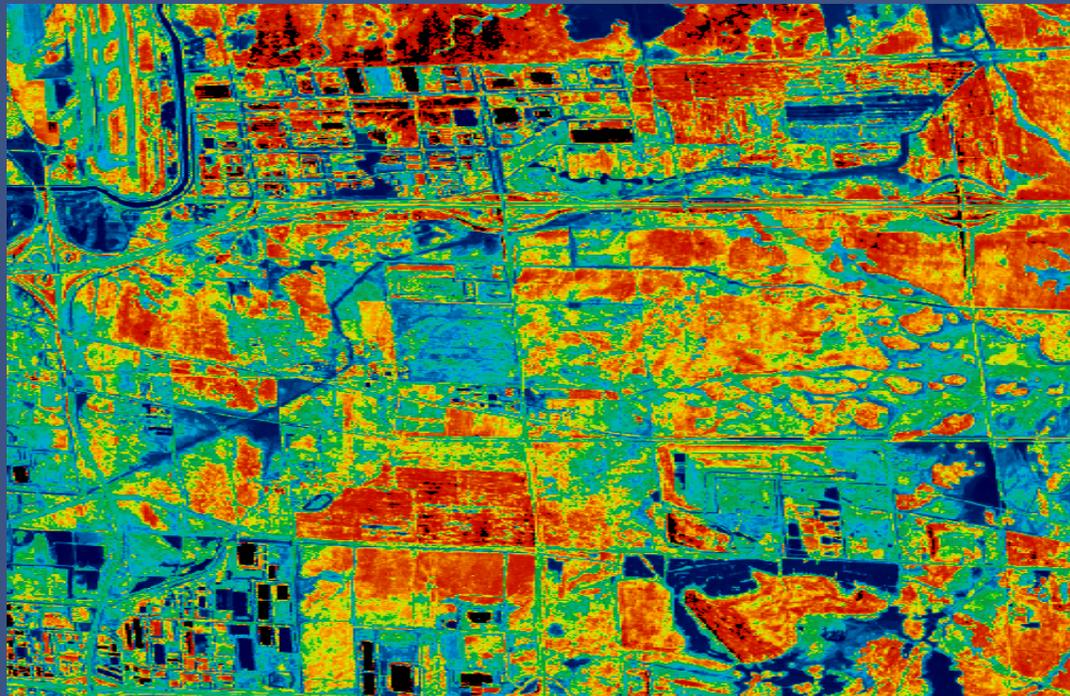


black asphalt
low reflectivity
high emissivity

aluminum coating
high reflectivity
low emissivity

white membrane
very high reflectivity
high emissivity

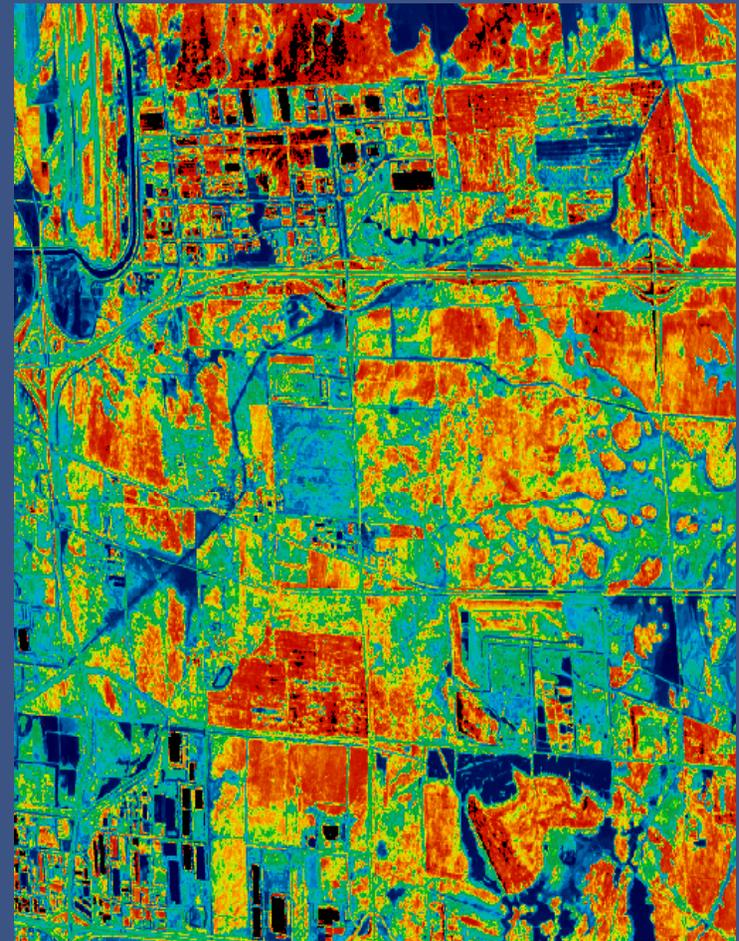
Salt Lake City 1999



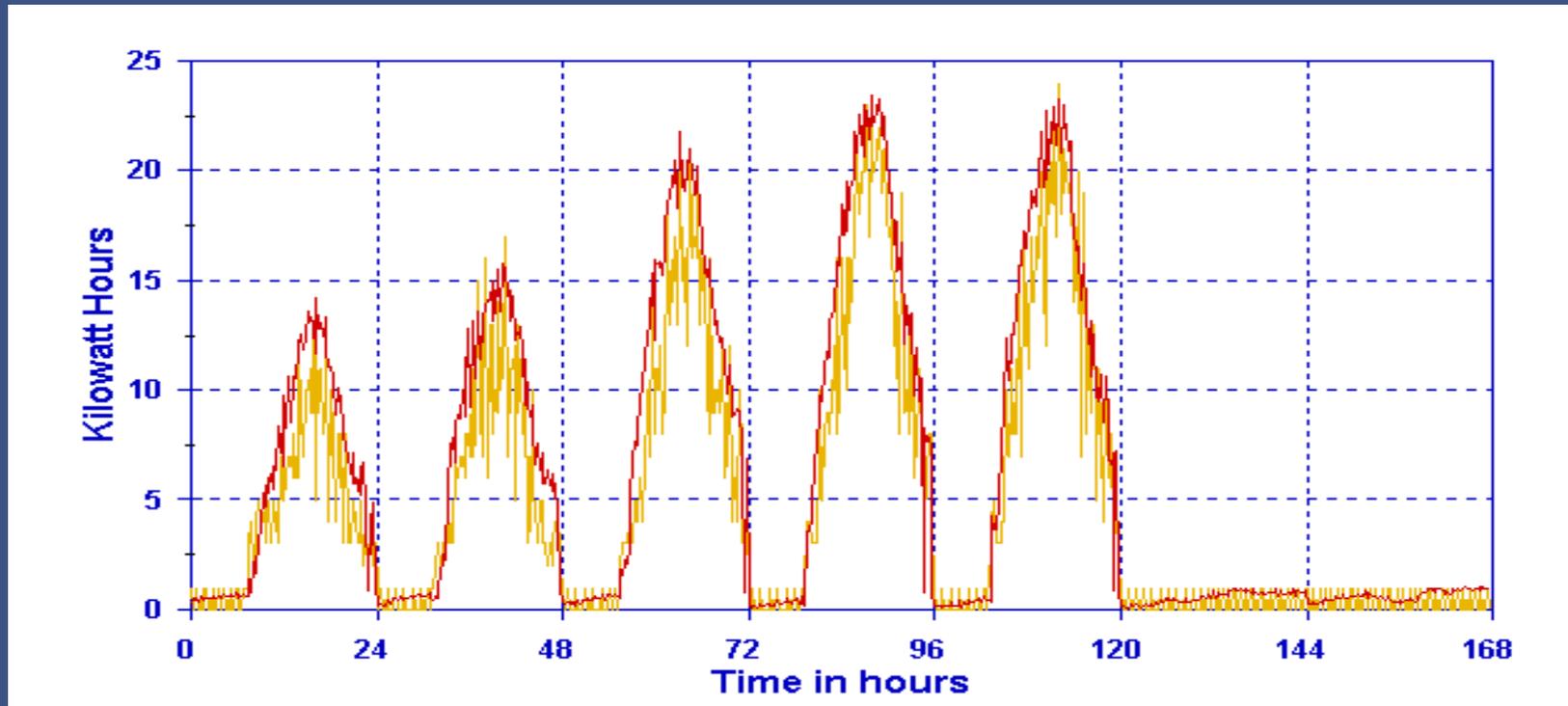
RC Willey Warehouse



Reflective Roofing Impact



One Week of Cooling Energy Use



Totals: **3242 kWh white membrane** **4102 kWh black BUR**
Savings: **860 kWh or 21%**

Figure courtesy of LBNL.

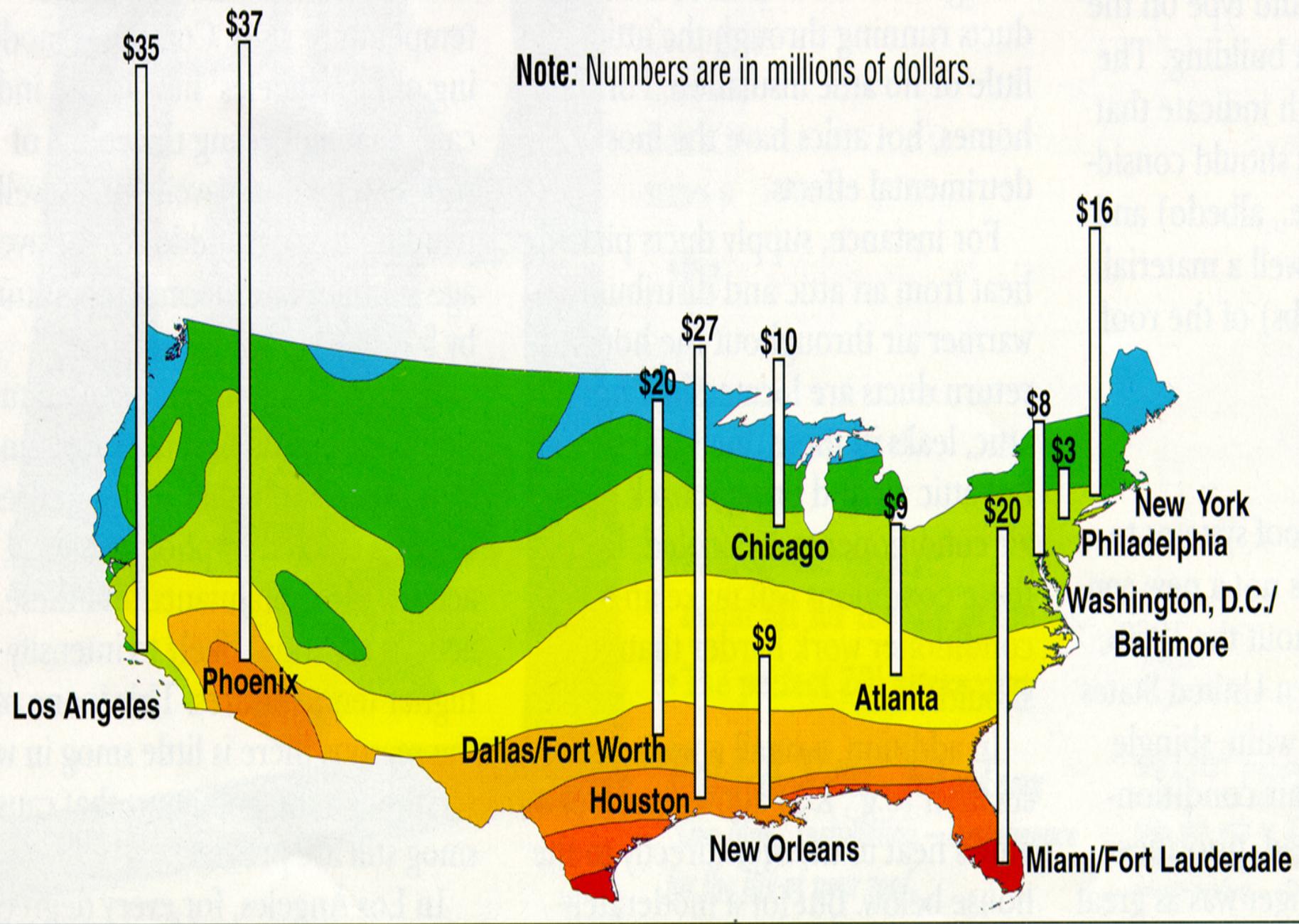


Figure 1: Annual net cooling energy savings for 11 metropolitan areas.

Smith Middle School

Energy Efficient Design Features



Energy Star Rated Roof System

Roof Monitors for Natural Daylighting with light detection system

Roof Storm Water Retention System

Roof Mounted Solar Water Panels

Photo Voltaic Panels for lighting

Smith Middle School Chapel Hill, N.C.



Storm Water Retention System



Daylight Roof Monitor



Solar Water Heating Panel



USGBC LEED™ Rating System



LEED - *Leadership in Energy and Environmental Design* is a standard that improves environmental and economic performance of commercial buildings using established or advanced industry principles, practices, materials, and standards.

Version 2.1 dated June, 2002

Energy Star Roofing Program



Who will benefit with the highest savings?

Buildings with the following characteristics

1. high air conditioning costs
2. a large roof surface
3. lower levels of insulation
4. location in a hot, sunny climate

Energy Star Roofing Program



Energy Star Roofing Systems Benefits

- Longer life cycle
- Lower maintenance costs
- Lower life cycle costs
- Lower cooling costs

Energy Star Roofing Program



Will it cost my facility more money?

The good news: an Energy Star Roof product could significantly reduce annual cooling costs by as much as 40% according to the EPA. Savings will depend on location and climate, insulation levels, the products Solar Reflectance Value, and maintenance.

Energy Star Roofing Products



*White reflective roof systems with added insulation
provide significant, cooling cost reductions*

Energy savings are passive - not occupant driven

Energy Star Roofing Products



Benefits of High Performance Roof Systems

- Longer life cycle
- Lower maintenance costs
- Lower life cycle costs
- Reduce cooling costs
- Extend real time roof life
- Increased environmental benefits
- Maintain better learning environment



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SALT LAKE 2002



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More information



ICLEI - Cities for Climate Protection

www.iclei.org/us

EPA's Heat Island Website

www.epa.gov/heatisland

EPA Climate Change Impact Fact Sheets

[www.epa.gov/globalwarming/impacts/
stateimp/](http://www.epa.gov/globalwarming/impacts/stateimp/)

Acknowledgements



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www.pstvnrg.com

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<http://eetd.lbl.gov/heatisland>