


# ***Green Asphalt***



**Flexible Pavements of Ohio**

**46<sup>th</sup> Annual Meeting**

**March 18, 2008**

**Columbus, Ohio**

**Richard J. Schreck  
Executive Vice President  
Virginia Asphalt Association**

# The World of Asphalt is Changing



# The Henry Ford Concept of Asphalt is NOT a 21<sup>st</sup> Century Concept



*“People can have the  
Model T in any color-  
-so long as it's black.”*

*Henry Ford  
1863-1947*

# We Have Tried Big Rock Mixes...





# And Glass in Asphalt...



# And Pave the Planet...



**We live in a different  
world today...**





# Understanding where we are...

- Climate Change/Global Warming
- Green House Gases
- Urban Heat Island Effect
- Cool Pavements
- U.S. Green Building Council (USGBC)
- Leadership in Energy and Environmental Design (LEED)



# Climate Change/Global Warming

*Grinnell Glacier, Glacier National Park, Montana*



1911



2000

# Proof of Global Warming?





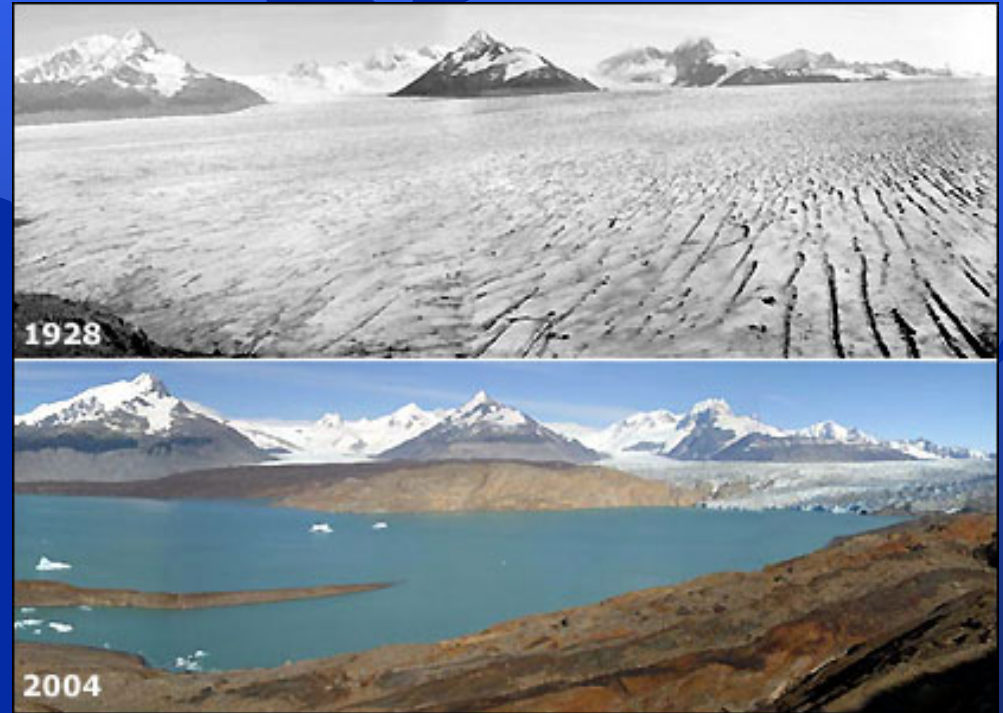
# ***You Call This Global Warming?***



# Fact: Climate Change is Real!



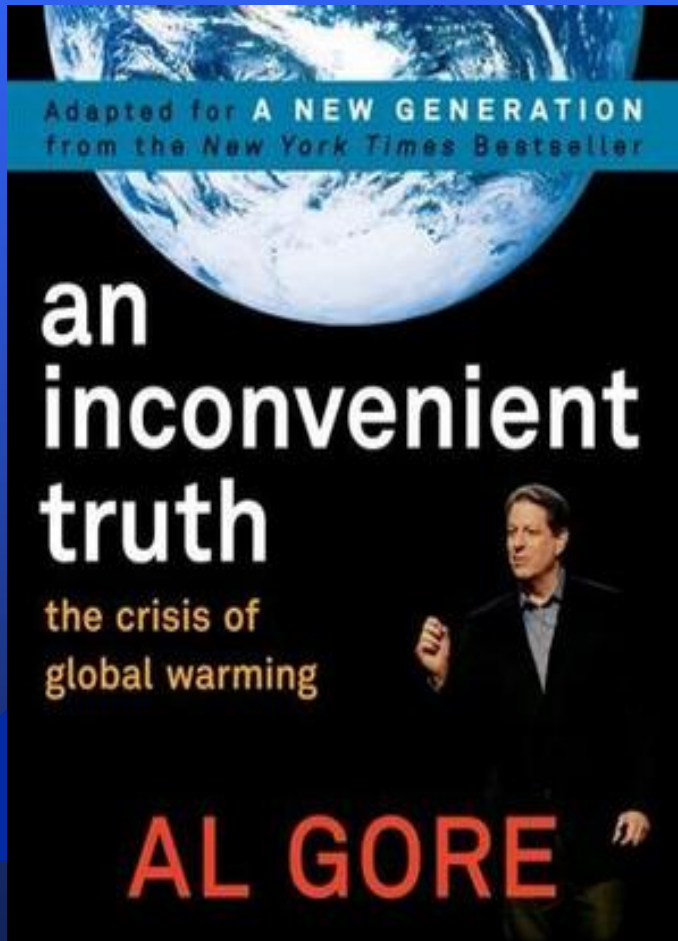
Since 1979 more than 20% of the polar ice cap has melted.





# Is Man Responsible?

*Yeas*



*Nays*



# Global Warming - Causes and Effects

Earth's temperature has risen about 1 degree Fahrenheit in the last century. The past 50 years of warming has been attributed to human activity.

Burning fuels such as coal, natural gas and oil produces greenhouse gases in excessive amounts.

Greenhouse gases are emissions that rise into the atmosphere and trap the sun's energy, keeping heat from escaping.

The United States was responsible for 20 percent of the global greenhouse gases emitted in 1997.

Most of the world's emissions are attributed to the United States' large-scale use of fuels in vehicles and factories.

During the past 100 years global sea levels have risen 4 to 8 inches.

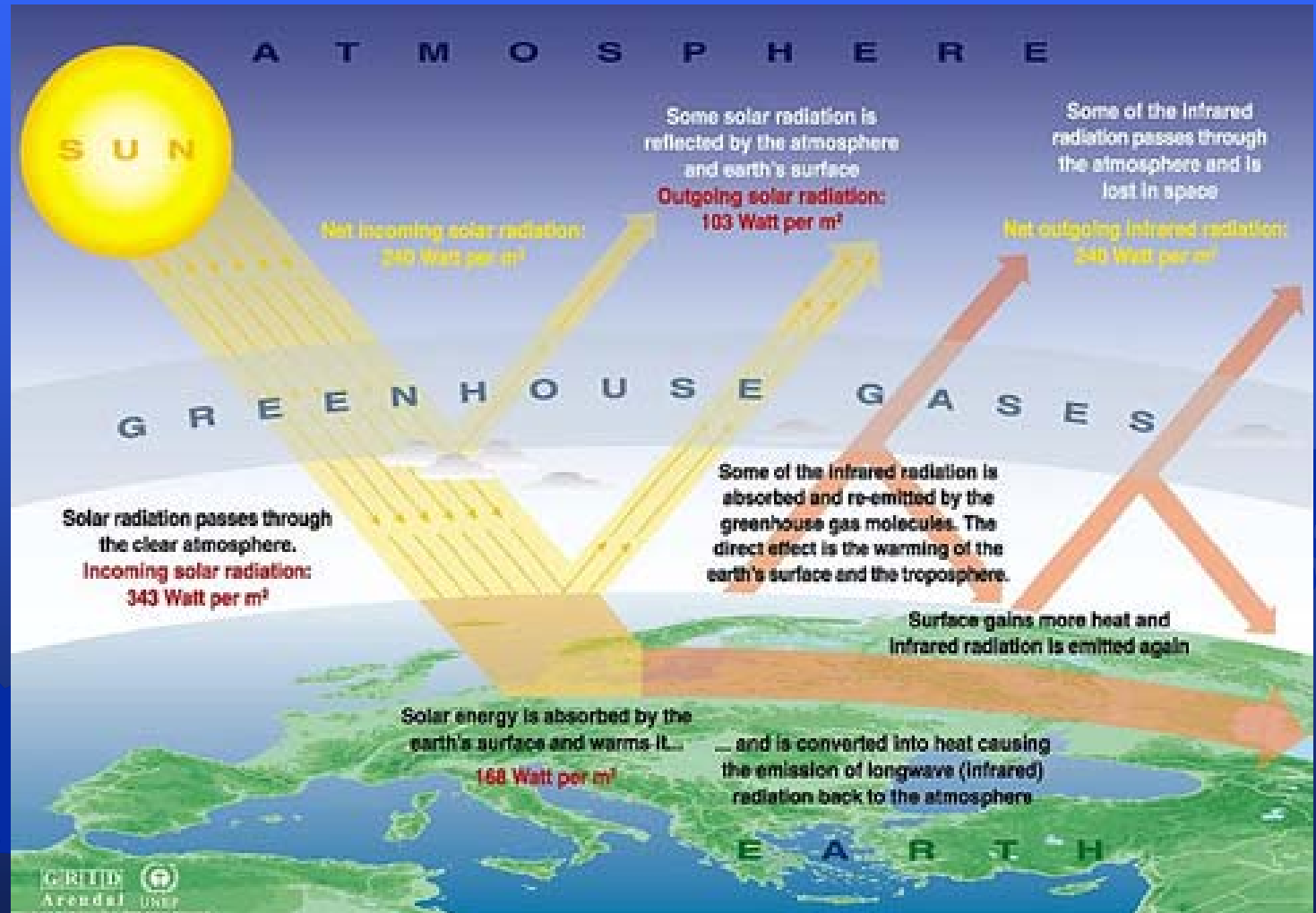
Some predictions for local changes include increasingly hot summers and intense thunderstorms.



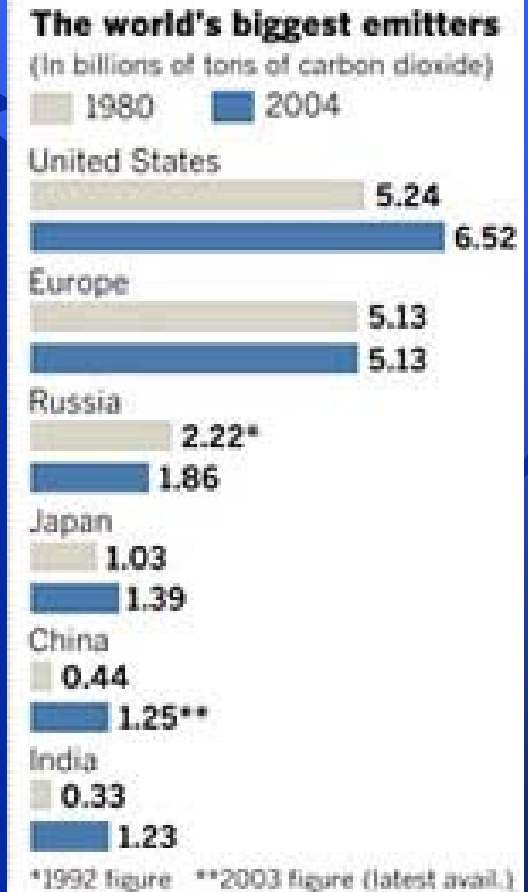
Damaging storms, droughts and related weather phenomena cause an increase in economic and health problems. Warmer weather provides breeding grounds for insects such as malaria-carrying mosquitoes.

**Perception = Fact?**

# Greenhouse Gases

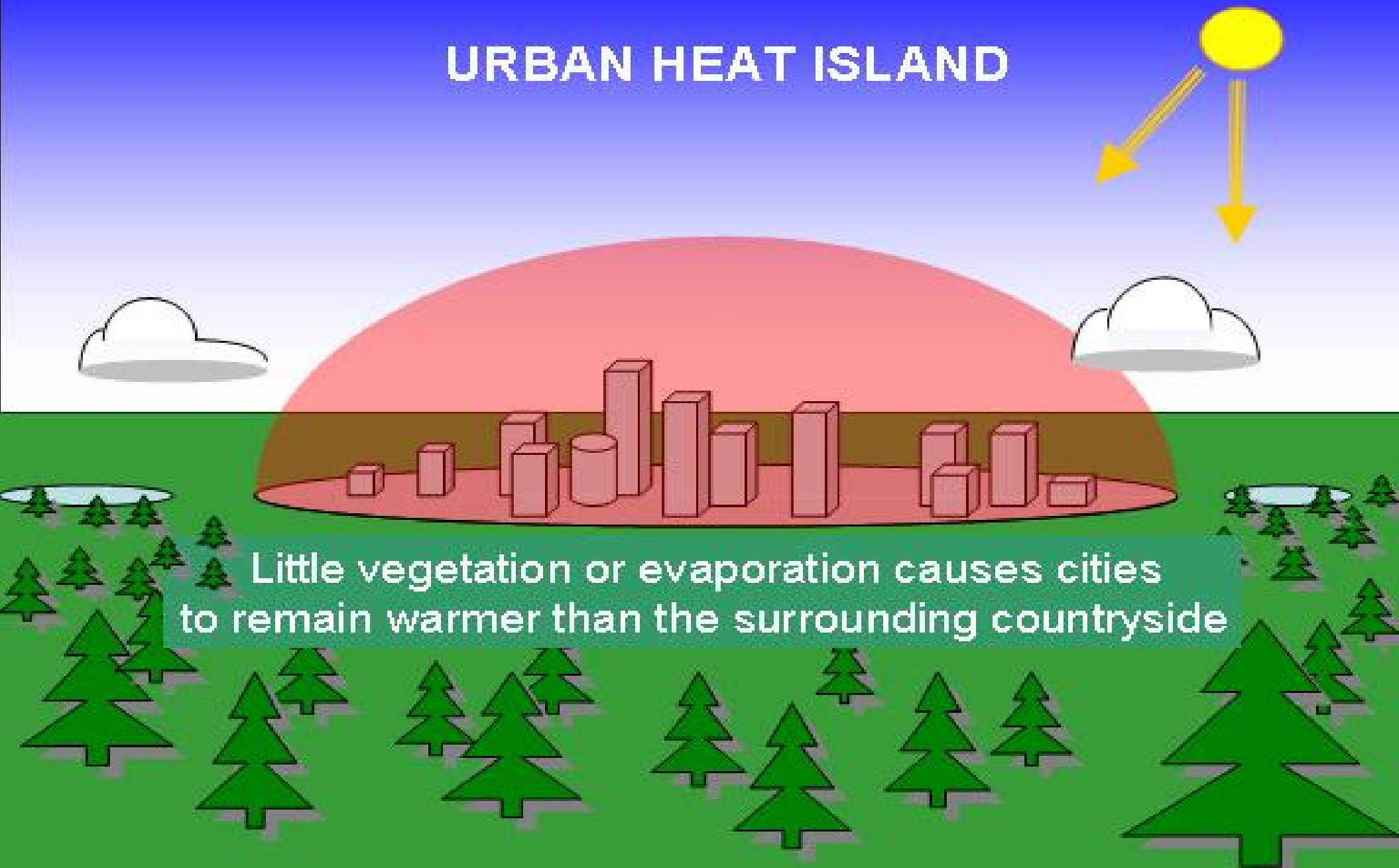


# Where do Greenhouse Gases Come From?





# URBAN HEAT ISLAND





# Urban Heat Island Effect

*“For millions of Americans living in and around cities, heat islands are of growing concern. **This phenomenon describes urban and suburban temperatures that are 2 to 10°F (1 to 6°C) hotter than nearby rural areas.** Elevated temperatures can impact communities by increasing peak energy demand, air conditioning costs, air pollution levels, and heat-related illness and mortality.”*

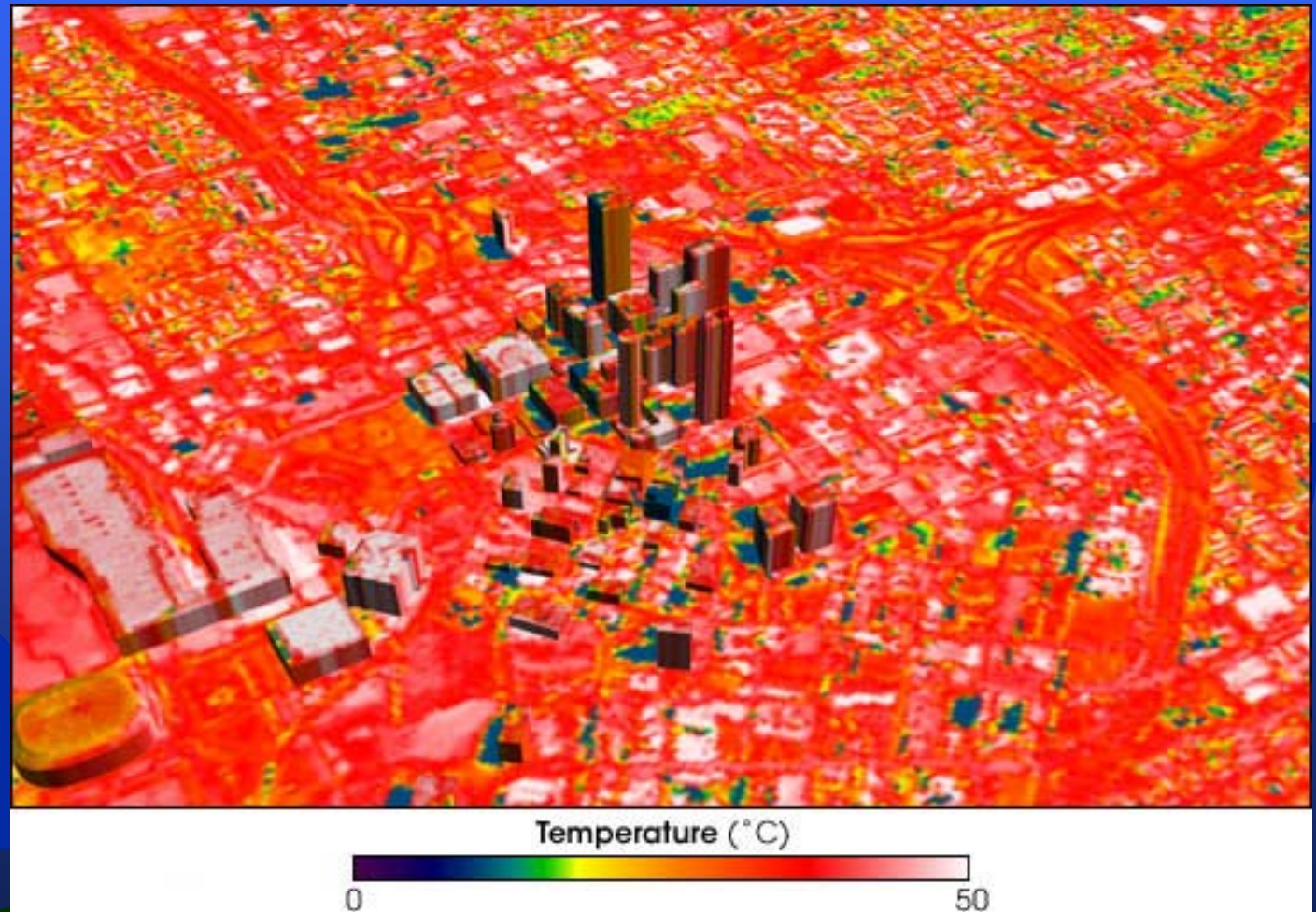
***“urban and suburban temperatures that are 2 to 10°F hotter than nearby rural areas.”***





## ***“Hot-Lanta”***

*May 11-12, 1997, NASA metropolitan Atlanta thermal data . Daytime temperatures of 80 degrees F but some surface temperatures reached 118 degrees F.*





# What Can Be Done?

- Community Action
- Cool Roofs
- Green Roofs
- Trees & Vegetation
- ***Cool Pavements***



# Cool Pavements

- *“There is no official standard or labeling program to designate cool paving materials, and research in this area is in an early stage.”*
- *There are situations, however, where communities interested in reducing heat island effects can **choose paving materials that lower surface temperature** and achieve related objectives. **Large parking areas, terminal facilities, airfields, or urban roadways with large expanses of paved surface are examples where cool pavements may be most practical.***



# EPA Cool Pavement Solutions:

- Use of *lighter-color aggregate*. HMA and PCC pavements built with *porous or permeable designs*.
- Other techniques to meet special pavement needs while promoting cool pavement objectives *include roller compacted concrete “where a strong, economical pavement is needed in locations where speed and smoothness are not critical”*.
- *Asphalt chip seals using light-colored aggregate*, on lower volume roads.
- *Permeable surfaces* can also be constructed using *lattices filled with soil, gravel, or grass*.



# Cool Pavement Report

## *EPA Cool Pavement Study - Task 5*

*prepared for*

U.S. Environmental Protection Agency's  
Heat Island Reduction Initiative

*By Cambridge Systematics, Inc.*

*June 2005*





# Executive Summary

*Possible mechanisms for creating a cool pavement that have been studied are:*

- ***Increased surface reflectance, which reduces solar radiation absorption.***
- ***Increased permeability, which cools the pavement.***
- ***Composite structure for reduced noise, which also has been found to emit lower levels of heat at night.***



*“Greater reflectance can be provided by conventional concrete, roller-compacted concrete, concrete-over-asphalt (“whitetopping” and “ultra-thin whitetopping”), asphalt concrete and asphalt chip seals with light-colored aggregate, and asphalt pavements with modified color.”*

*“The composite structure used for noise reduction plus nighttime temperature benefits comprises a rubber asphalt surfacing over conventional concrete slabs.”*

Exerts from the Executive Summary



## Cool Pavements

Black surfaces in the sun can become up to 70°F (40°C) hotter than the most reflective white surfaces. Roads and parking lots are frequently paved with black asphalt concrete (commonly called "asphalt") and other dark materials that absorb most of the sunlight that falls upon them. The energy of the sunlight is converted into thermal energy and pavements get hot, heating the air around them and contributing greatly to the heat island effect.

<http://eetd.lbl.gov/HeatIsland/Pavements>

# Albedo

- The word is derived from *albus*, a Latin word for "white".
- The **albedo** of an object is the extent to which it reflects light, defined as the ratio of reflected to incident electromagnetic radiation.
- It is a unitless measure indicative of a surface's or body's diffuse reflectivity.



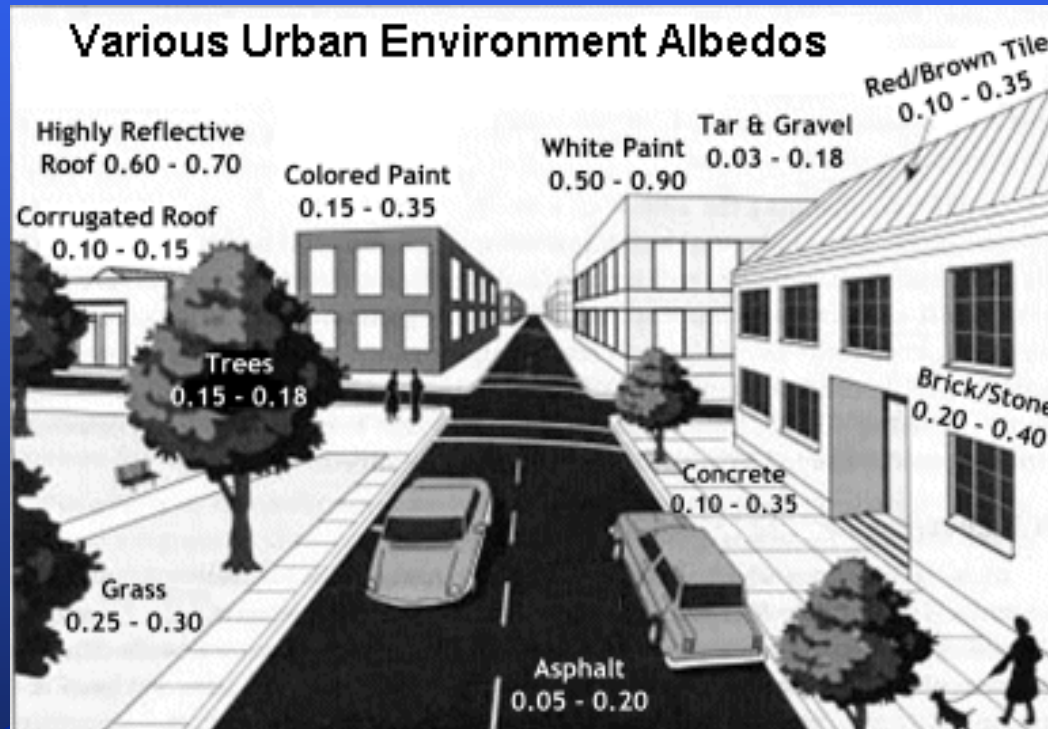
# Albedo Effect

The classic example of albedo effect is the snow-temperature feedback. If a snow covered area warms and the snow melts, the albedo decreases, more sunlight is absorbed, and the temperature tends to increase. The converse is true: if snow forms, a cooling cycle happens. The intensity of the albedo effect depends on the size of the change in albedo and the amount of insolation; for this reason it can be potentially very large in the tropics.



# Typical Albedo Values

Albedos of typical materials in visible light range from up to 90% for fresh snow, to about 4% for charcoal, one of the darkest substances.



Fresh asphalt	0.04
Worn asphalt	0.12
Bare soil	0.17
Green grass	0.25
Desert sand	0.40
New concrete	0.55
Fresh snow	0.80+



# United States Green Building Council and LEED

*Where is all this coming from?*



# U. S. Green Building Council (USGBC)

*“A non-profit composed of leaders from every sector of the building industry working to promote buildings that are environmentally responsible, profitable and healthy places to live and work. Our more than 11,000 member organizations and our network of 75 regional chapters are united to advance our mission of transforming the building industry to sustainability.”*

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





# Core Purpose

*“The U.S. Green Building Council's core purpose is to **transform the way buildings and communities are designed, built and operated**, enabling an environmentally and socially responsible, healthy, and prosperous environment that improves the quality of life.”*

# What is LEED?

The Leadership in Energy and Environmental Design (LEED) Green Building Rating System™ is the nationally accepted benchmark for the design, construction, and operation of high performance green buildings. LEED promotes a whole-building approach to sustainability by recognizing performance in five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality.



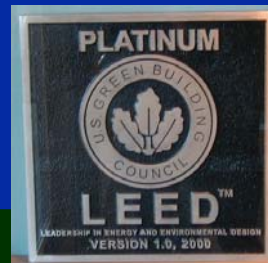
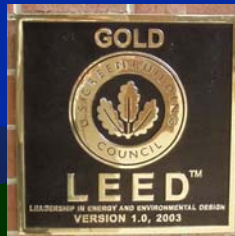
# LEED Certification



To earn certification, a building project must meet certain prerequisites and performance benchmarks ("credits") within each category. **Projects are awarded Certified, Silver, Gold, or Platinum certification depending on the number of credits they achieve.** This comprehensive approach is the reason LEED-certified buildings have reduced operating costs, healthier and more productive occupants, and conserve our natural resources.

# LEED is Everywhere!

- Individual, Governmental & Corporate Memberships
- Chapters
- Accreditation (Individual, Governmental & Corporate)
- Project Certification (Silver, Gold, Platinum)
- International



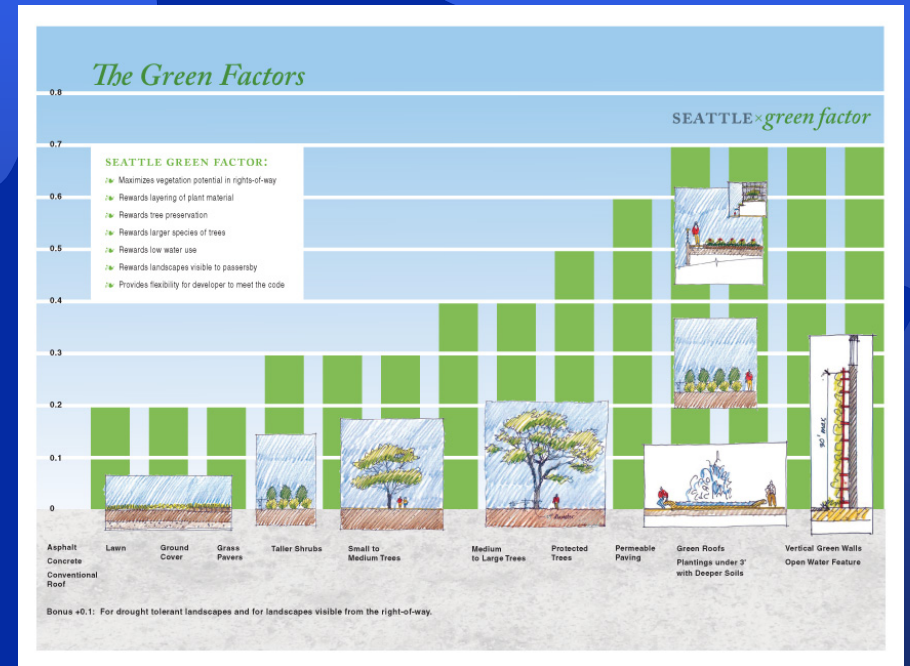


# Greenbuild 2007

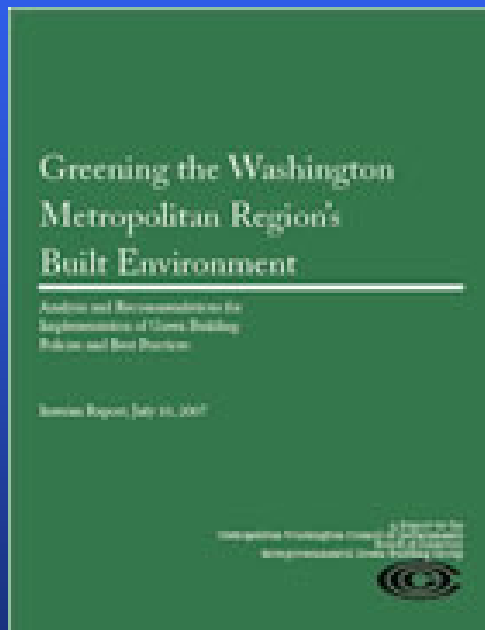
Former President Bill Clinton delivered the keynote speech of the opening plenary of Greenbuild, the world's largest conference and exposition dedicated to green building, held Nov. 7-9, 2007, in Chicago.



# Seattle Adopts New Green Landscaping Initiative



# Greening the Washington Metropolitan Region's Built Environment



This report by the Intergovernmental Green Building Group (IGBG) of COG explores issues related to building practices and the region's environment, reviews best practices and green building standards, and offers recommendations that local governments and COG can implement to improve the performance of buildings region wide.

**Publication Number: 20077304**

**Publication Date: 7/10/2007**

In the words of Kermit the frog...



***“It ain’t easy  
being green!”***

*What’s the Asphalt Paving Industry to do?*



**a smaller piece of cheese  
(paving market)...**



**or ...**

# Understand where we headed...

- Warm Mix Asphalt
- Colored Asphalt
- Porous Pavements
- Colored Pavements
- Quiet Pavements
- Recycling
- LEEDS Credits
- And more...



**So....**



**What's in *Your* Silo?**





Questions?