

Ways to Beat the Heat: Effective Approaches to Heat Island Reduction

August 8, 2012

Jointly hosted by

U.S. EPA Heat Island Reduction Program

and

U.S. EPA Local Climate and Energy Program



Agenda



- Welcome and Introduction to Urban Heat Islands
Neelam R. Patel, U.S. EPA Local Climate and Energy Program
- Urban Heat Island and Climate Change: Planning for Extreme Heat in Cities
Brian Stone, Georgia Tech University
- Linking Urban Heat Islands to Climate Adaptation Planning
Brendan Reed, Chula Vista, CA
- Tree Strategies for Heat Island Reduction
Matt Grubisich, Texas Tree Foundation, Dallas, TX
- Austin Heat Island Mitigation
Norman Muraya, Austin Energy, Austin, TX
- Q and A Session, Optional Feedback

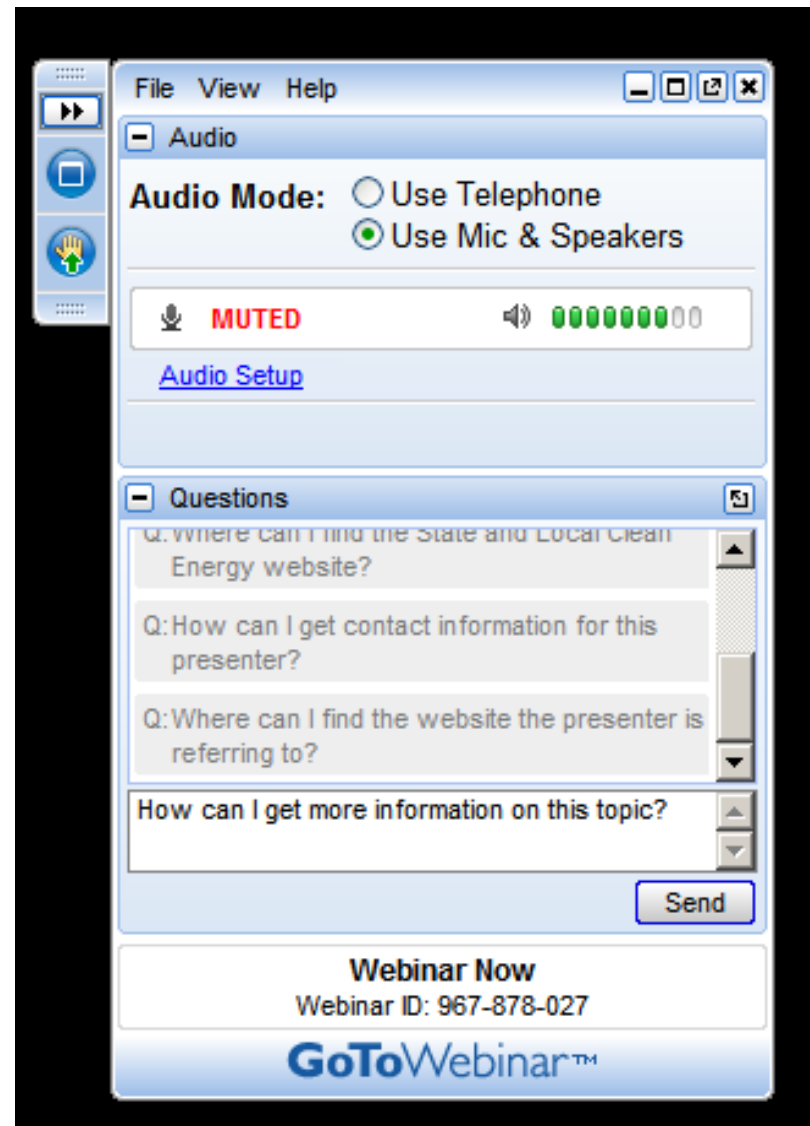
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- You will be muted throughout this webcast to minimize background noise. You'll be able to submit questions and comments in writing.
- PDF and audio files of today's session will be made available for download in a few weeks at:
 - <http://www.epa.gov/statelocalclimate/web-podcasts/index.html>
 - <http://www.epa.gov/heatisland/resources/webcasts.htm>
- Throughout the webcast, if you have technical difficulties, please contact Lauren Pederson from ICF at: LPederson@icfi.com

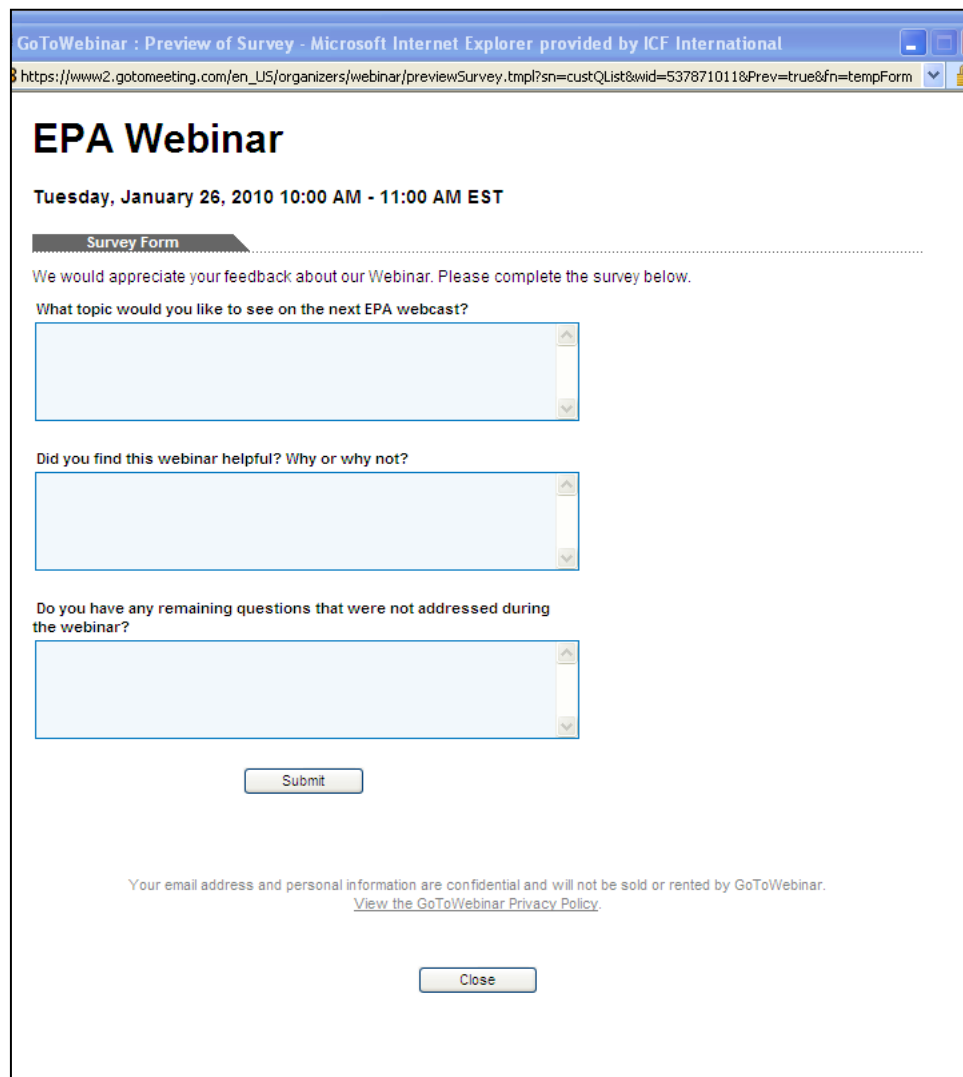
Questions (GoTo Meeting)

- If you have a question, submit through the question pane.
- We will compile these questions and ask them during the Q&A session.
- Please include the name of the presenter you would like to answer your question.



Optional Feedback (GoTo Meeting)

- A pop-up window will appear once you exit GoTo Meeting.
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EPA Webinar

Tuesday, January 26, 2010 10:00 AM - 11:00 AM EST

Survey Form

We would appreciate your feedback about our Webinar. Please complete the survey below.

What topic would you like to see on the next EPA webcast?

Did you find this webinar helpful? Why or why not?

Do you have any remaining questions that were not addressed during the webinar?

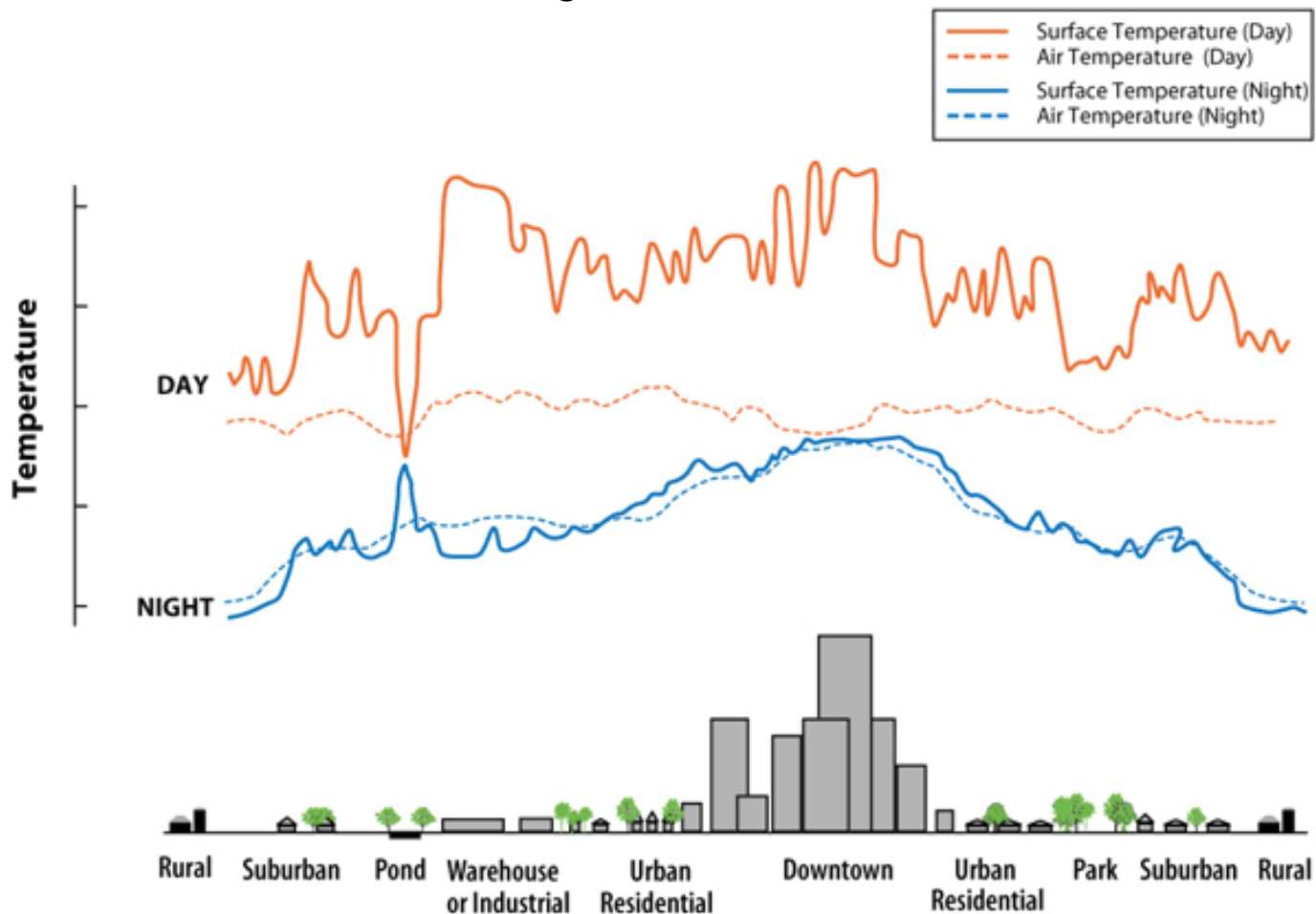
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Close

What is the Heat Island Effect?

- Micro-scale temperature differences between urban and rural areas
- Urban areas can be 9 – 27 ° F higher than rural areas



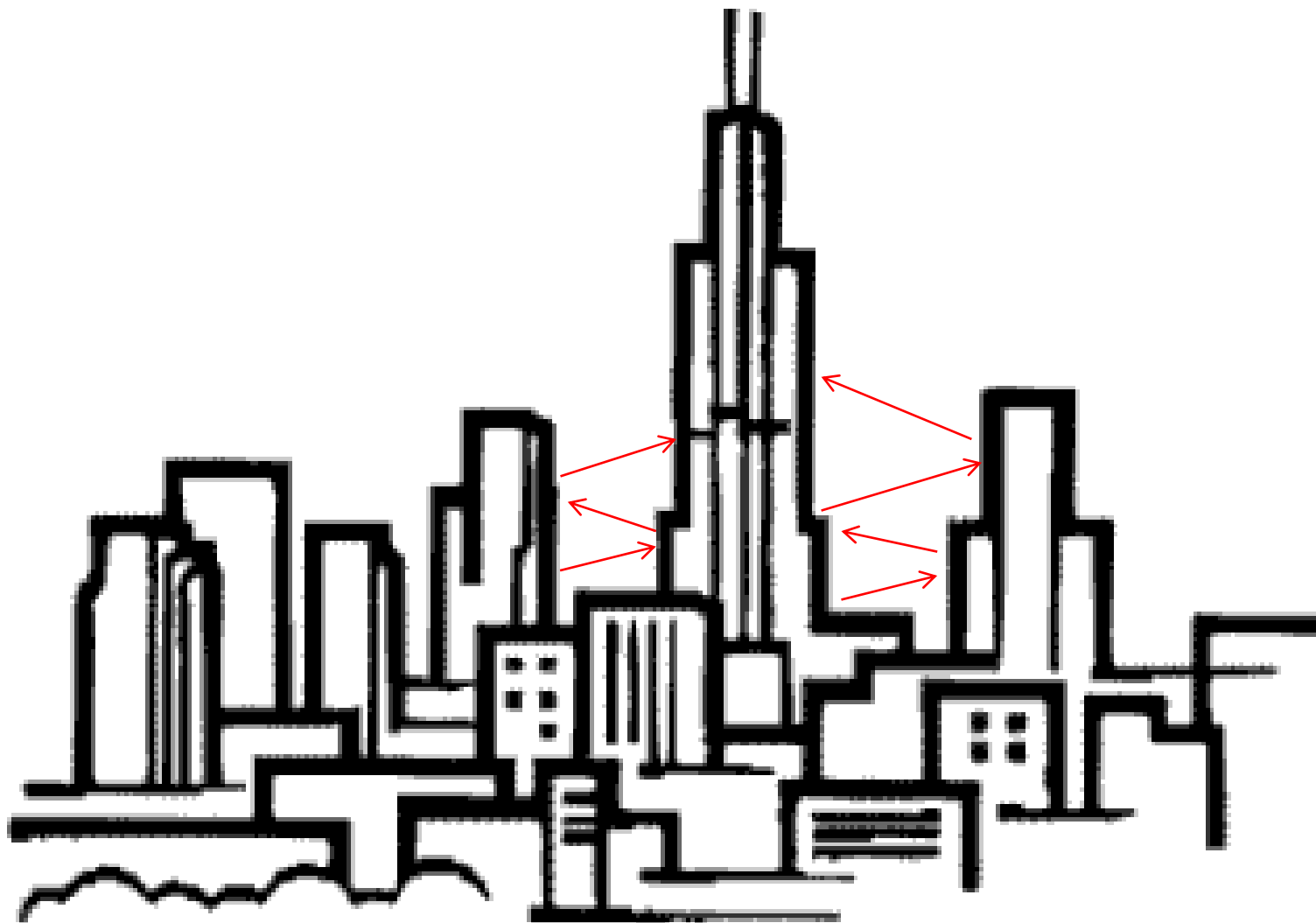
What Causes the Heat Island to Form?



- Reduced vegetation
- Increased heat generation
- Materials used to build urban infrastructure
- Urban geometry



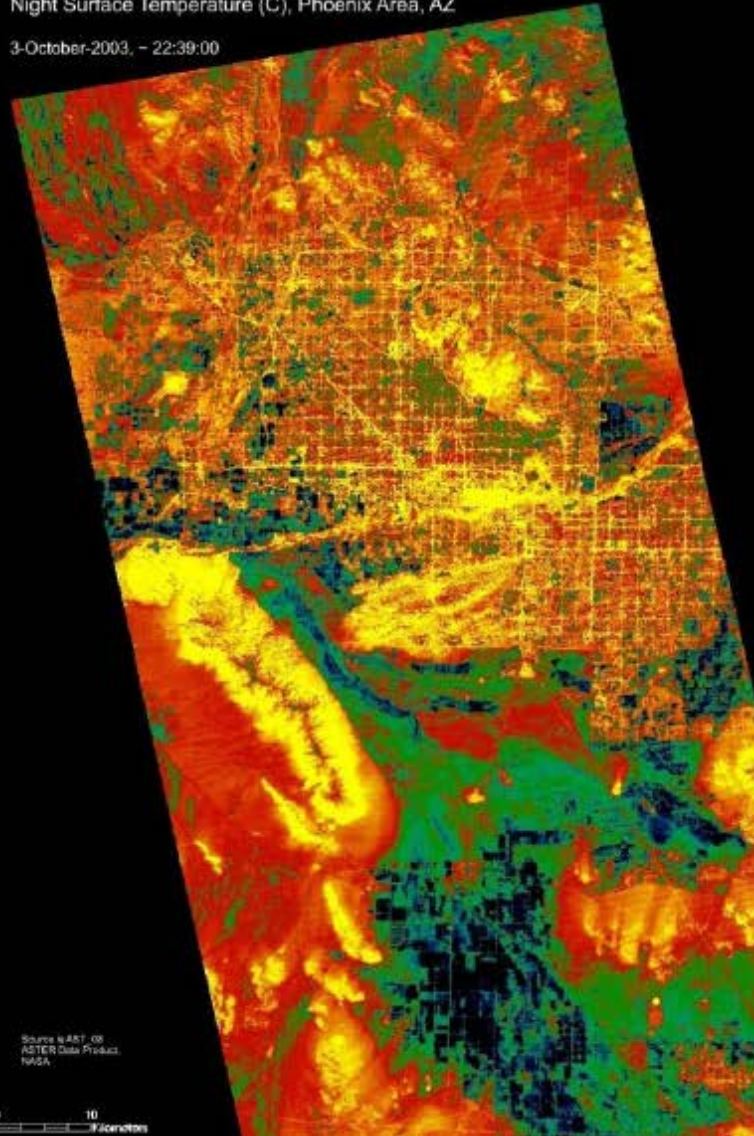
Air Temperature Heat Islands



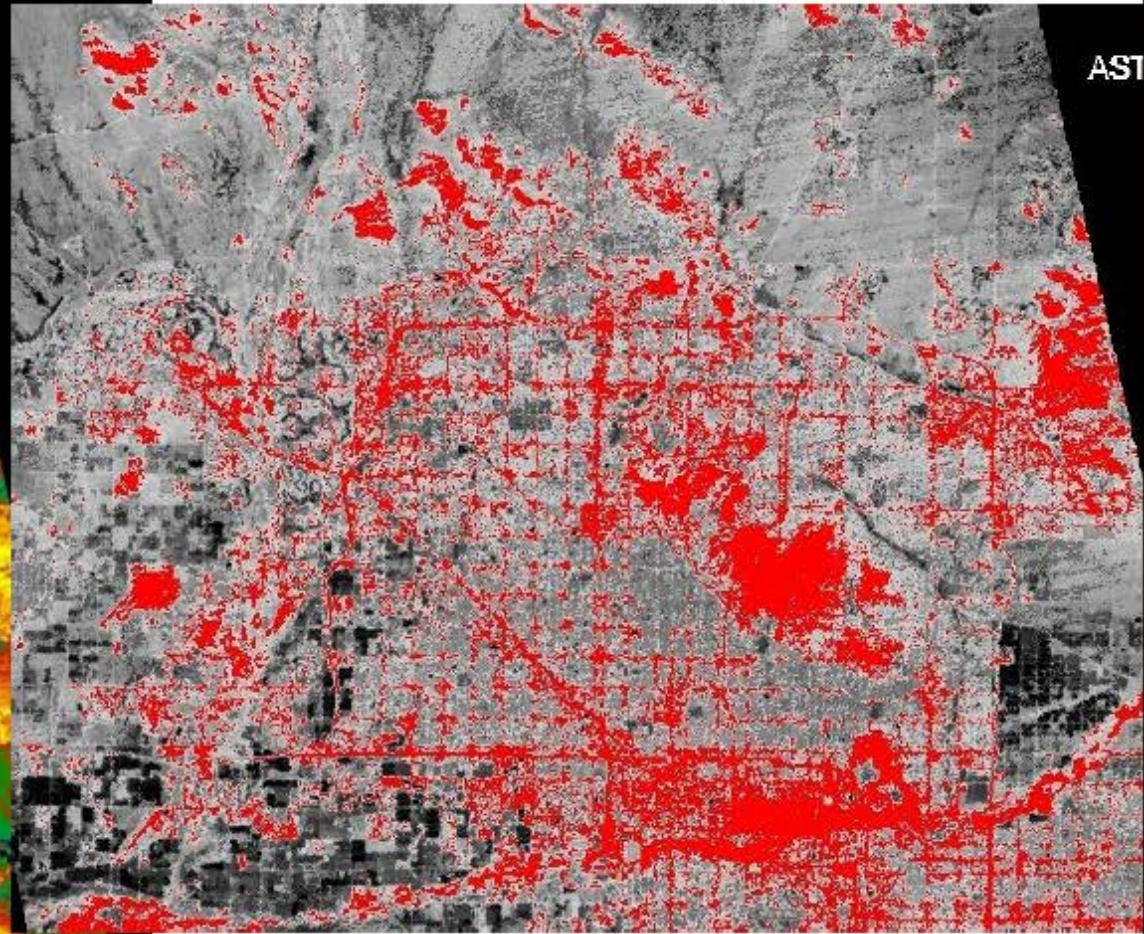
Surface Temperature Heat Islands

Night Surface Temperature (C), Phoenix Area, AZ

3-October-2003, - 22:39:00

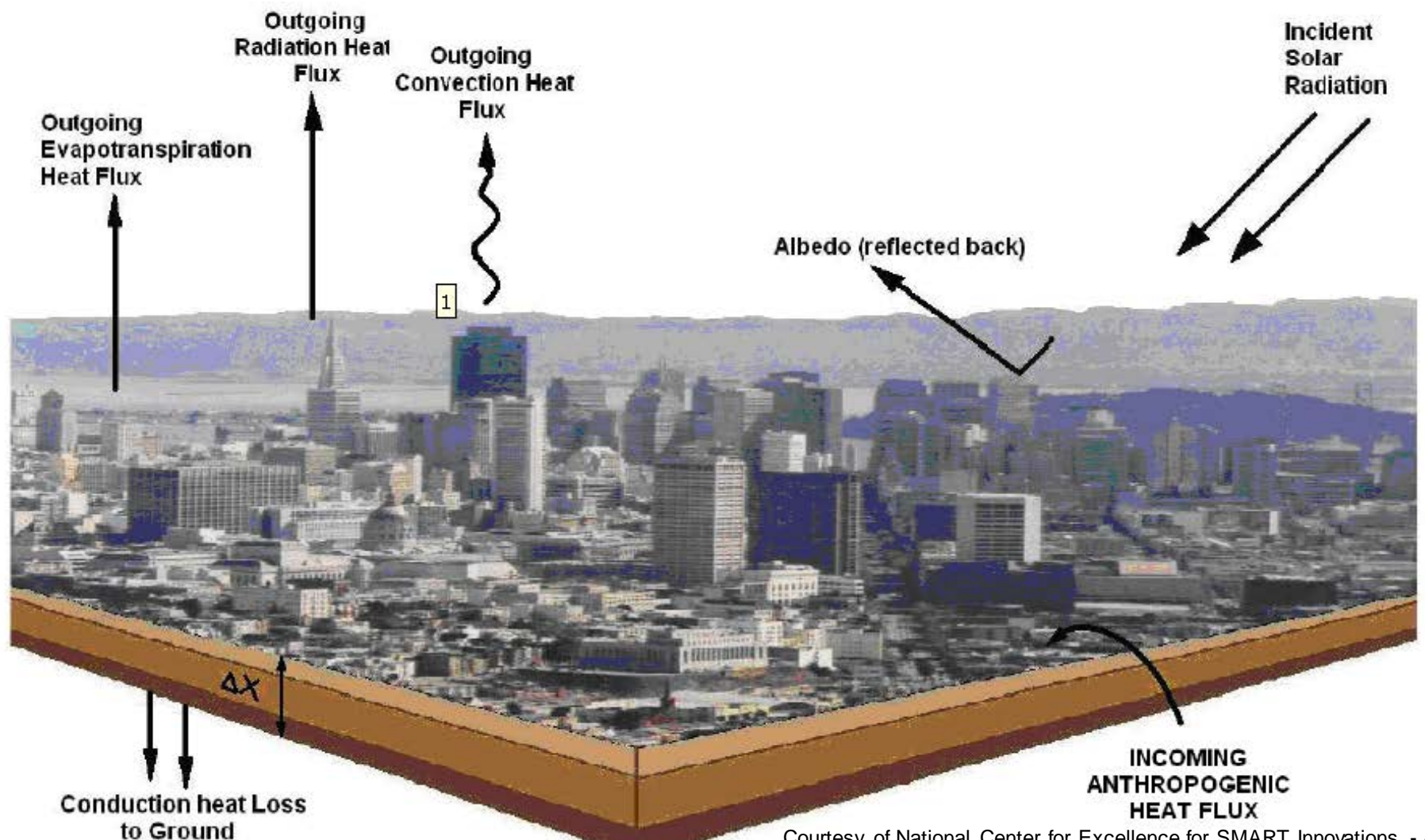


Paved surfaces are 40% of the urbanized land cover in Phoenix and contribute to UHI



Heat Island Dynamics

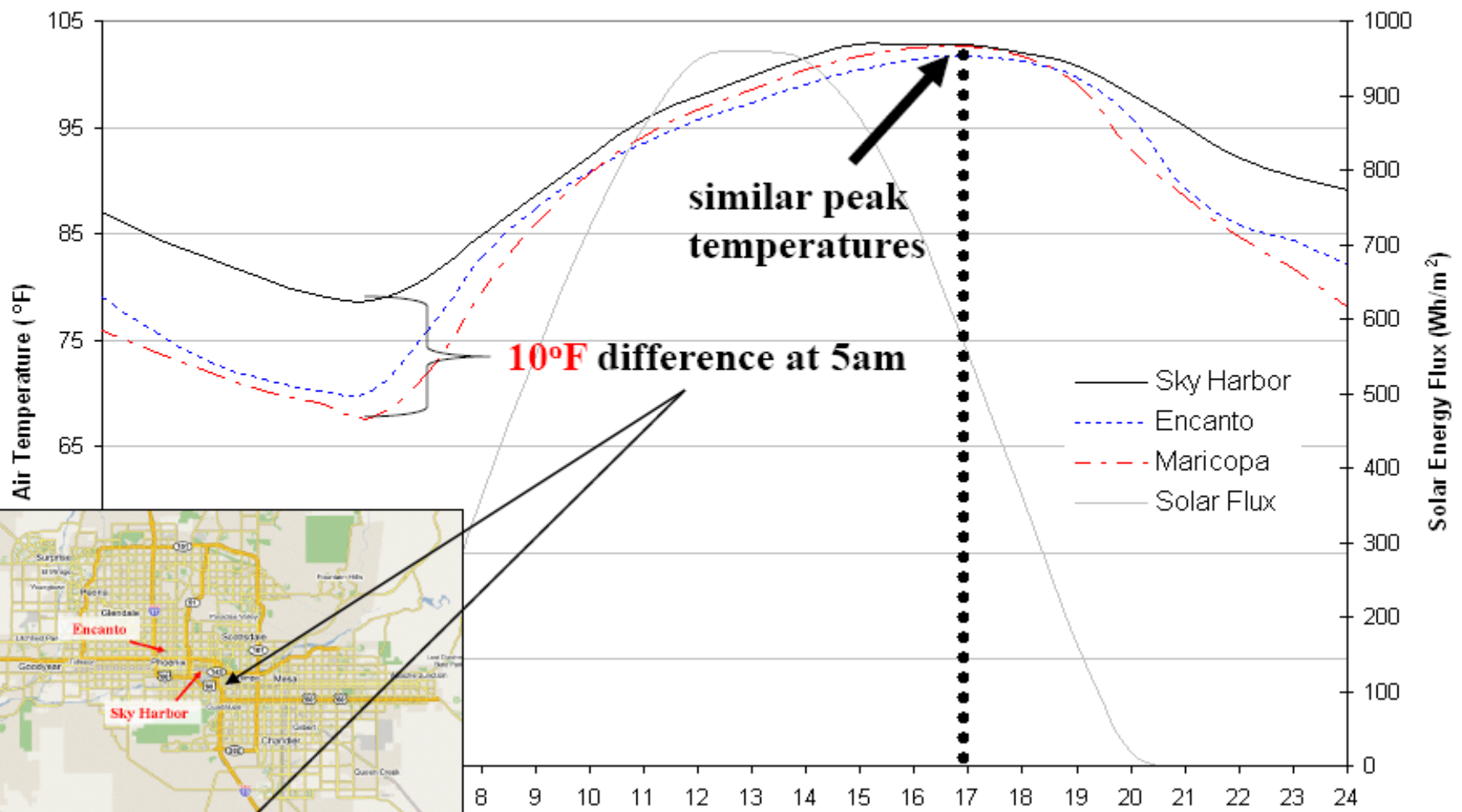
Urban Energy Balance



Nighttime Heat Island Temperatures

Average Hourly Air Temperatures (July 2005)

for Sky Harbor Airport (Urbanized), Encanto Park (Green Space), and the City of Maricopa (Rural)



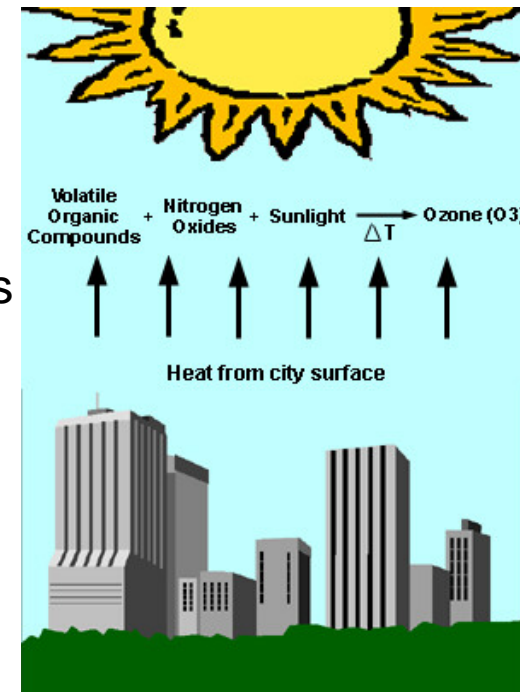
Heat Island Impacts

- **Increased energy use**
 - 5 – 10 % of summertime electricity demand cools heat islands
 - 1.5 – 2.0% E demand \uparrow for every 1 °F \uparrow in the summer
 - Longer peak periods; pressure on E grid; brownouts, blackouts

- **Air quality and greenhouse gas (GHG) emissions**
 - Increased GHG emissions
 - Increased air pollution
 - Increased ground-level ozone formation

- **Water quality**
 - Warmer water runoff = ecological shock in waterways
 - Increased water runoff = more pollutants in waterways

- **Human health**
 - Respiratory difficulties
 - Heat cramps, heat exhaustion
 - Non-fatal heat stroke/sun stroke
 - Heat related mortality



Mitigation Strategies

Communities can reduce ambient air and surface temperatures while achieving many other environmental benefits by taking these common sense actions:

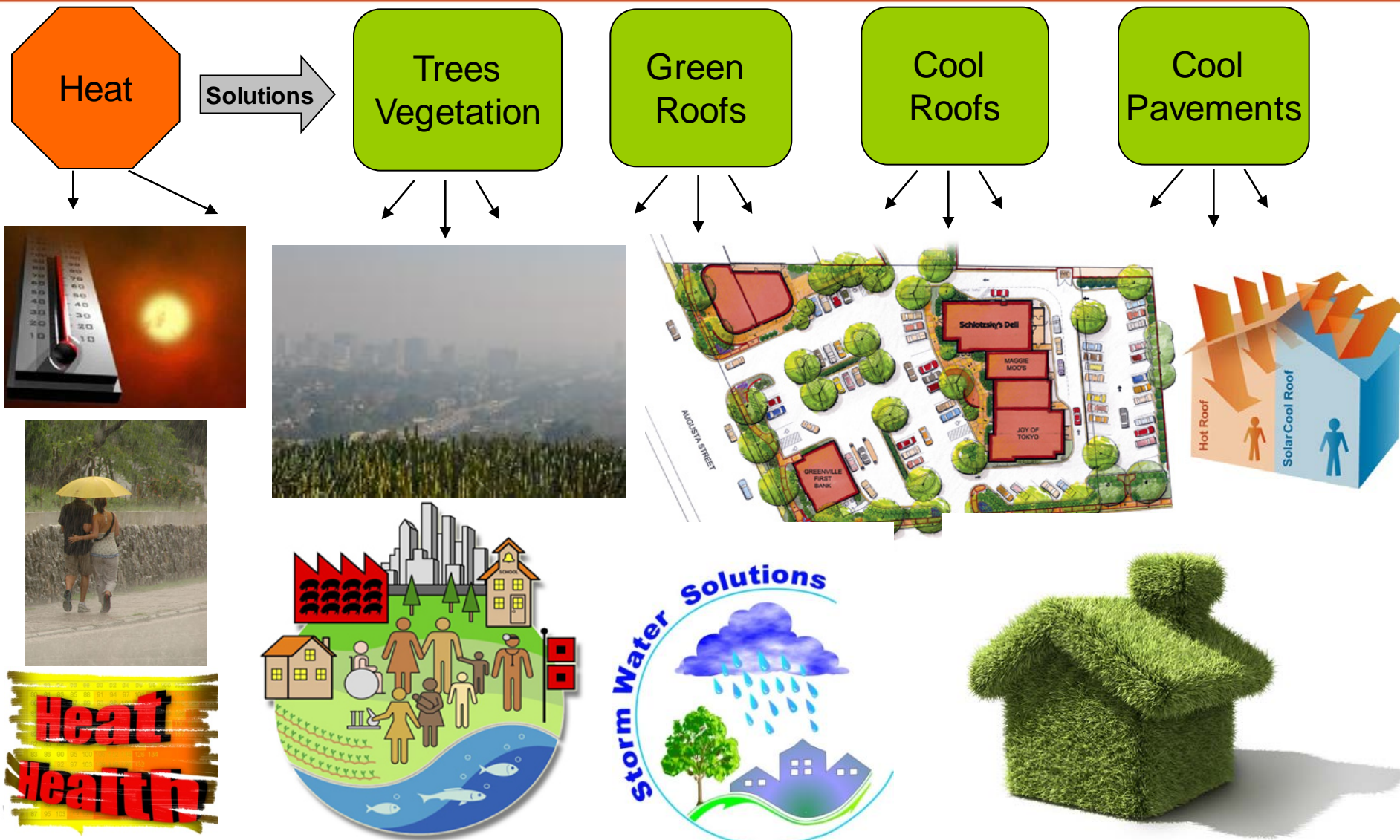
- Trees and Vegetation
- Green Roofs
- Cool Roofs
- Cool Pavements



**HEAT ISLAND
REDUCTION
PROGRAM**



Linkages = Opportunities



Heat



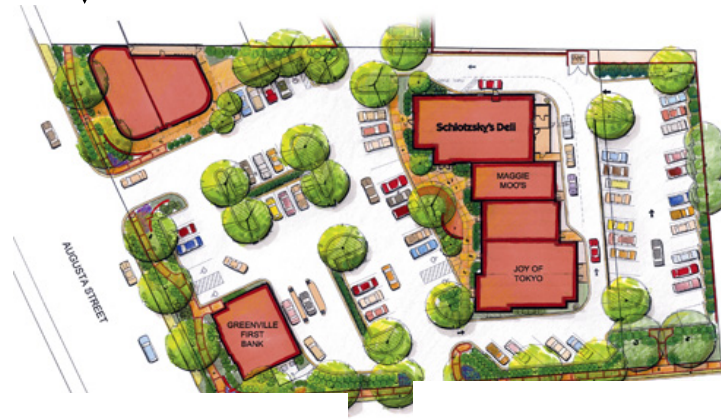
**Heat
Health**

Solutions

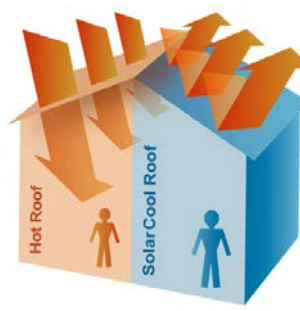
Trees
Vegetation



Green
Roofs



Cool
Roofs



Cool
Pavements



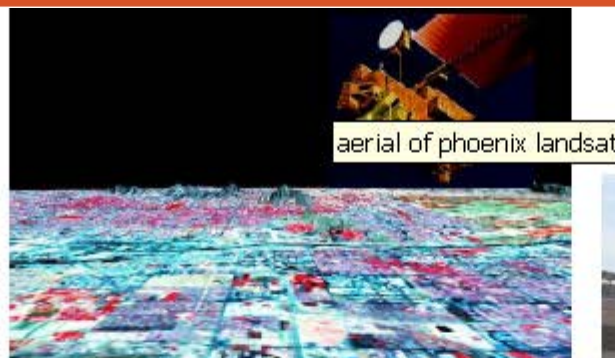
Scales for Implementation Strategies (helpful for measuring co-benefits)



- Individual building
 - Roofs (green and reflective)
 - Vegetation (shade trees and more)
- Community/Neighborhood
 - Street design (e.g., tree lined, vegetation, pavements)
 - Open vegetated land use (e.g., parks, green spaces)
- City/Regional
 - All mitigation strategies (e.g., pavements, trees, vegetation, roofing)
 - Integrate into land use plans, selection of materials

Methods/Technologies for Measuring Temperatures (and co-benefits)

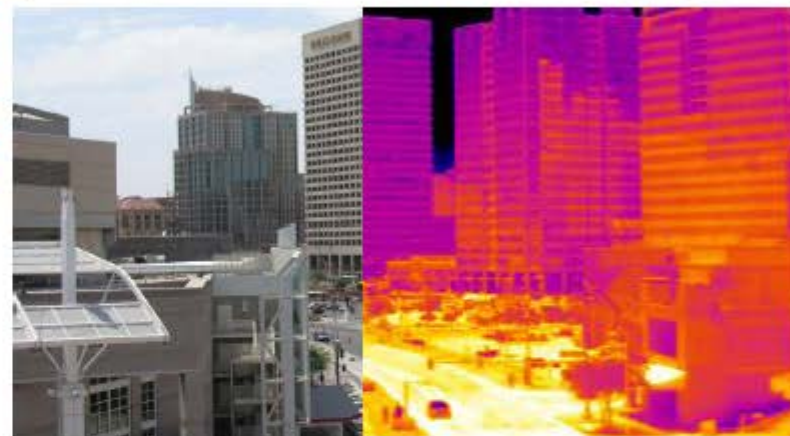
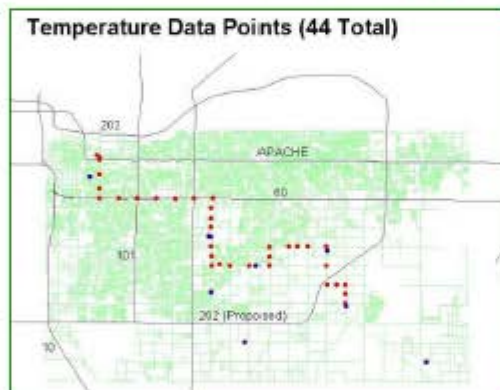
ASTER Thermal
Imaging Satellite



IR Thermal Imagery



Mobile Transects



Embedded Thermocouples

Laboratory Testing



About EPA's Heat Island Program



EPA Heat Island Program Overview



Mission

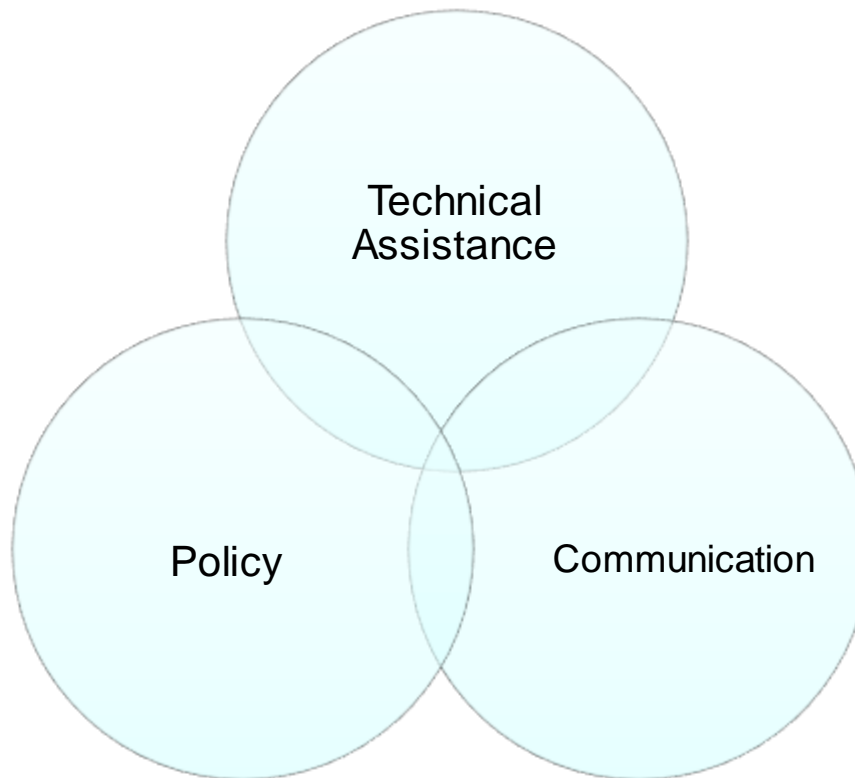
The EPA Heat Island Reduction Program increases the number of programs and policies that include heat island mitigation measures to create comfortable and sustainable communities.

Heat Island Community

- Policymakers, program designers
- Academia/researchers
- Industry
- General public
- Media
- Other Federal Agencies

EPA Programmatic Areas

- Provide resources, tools, and webinar discussions to fill technical and analytical gaps
- Making linkages with key implementation opportunities across multiple issue areas



- Increase the number of policy options available to implement of heat island measures

- Participate in public forums to educate interested audiences
- Sustain communication vehicles (i.e., website, listserv, seasonal outreach campaigns)
- Partner with peer organizations and academics to enhance outreach



Heat Island Program Resources

- **Website**, features include basic information on heat island topics, *calendar of events*, *heat island newsroom*, science corner and a variety of resources, <http://www.epa.gov/heatislands/>
- **Examples**, database provides info on more than 75 local and statewide initiatives to reduce heat islands and achieve related benefits, http://yosemite.epa.gov/gw/statepolicyactions.nsf/webpages/HIRI_Initiatives.htm
- **Compendium of Strategies: Reducing Urban Heat Islands**, provides scientific background, mitigation strategies, case studies, and recommendations for additional resources, www.epa.gov/heatisland/resources/compendium.htm
 - Heat Island Basics
 - Trees and Vegetation
 - Green Roofs
 - Cool Roofs
 - Cool Pavements
 - Heat Island Reduction Activities
- **Webcasts**, online meetings based on request that cover topics such as local/regional urban heat island programs, new scientific findings, and upcoming meetings www.epa.gov/heatislands/resources/webcasts.htm
- **Newsletter**, to sign up, visit <http://www.epa.gov/heatisland/admin/listserv.htm>

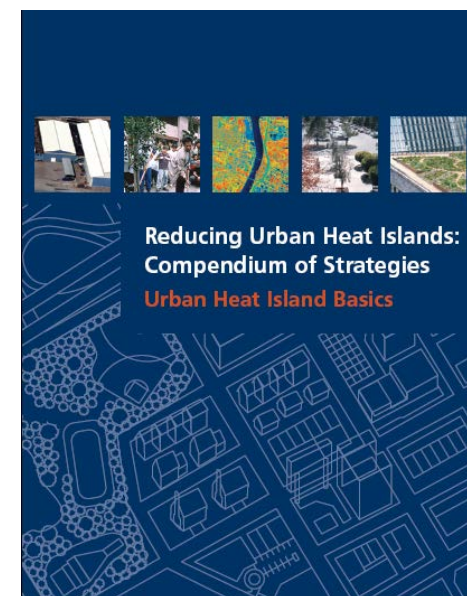
Compendium



Reducing Urban Heat Islands: Compendium of Strategies

- Provides scientific overview, mitigation strategies, case studies, and recommendations for additional resources
- Chapters
 - Heat Island Basics
 - Trees and Vegetation
 - Green Roofs
 - Cool Roofs
 - Cool Pavements
 - Heat Island Reduction Activities

www.epa.gov/heatislands/resources/compendium.htm



Database: Recent updates



- Database updated December 2011
- Actions listed in the database are some efforts underway to cool communities while saving energy, reducing greenhouse gas emissions and improving air quality
- Each entry in the database includes a description of the activity, its current status, and a link to a website (if available) for more information.
- The database can be searched by:
 - Clicking on U.S. map (diagram on right)
 - State and locality
 - Initiative Type
 - Strategy
- If you are aware of heat island initiatives, please submit through our website.



About EPA's Local Climate and Energy Program



Local Climate and Energy Program

EPA's Local Climate and Energy Program - Goals



Help communities (e.g., tribal governments, regional governments, cities, counties, etc.):

- Reduce greenhouse gas emissions while achieving sustainability goals
- Identify and work with expert partners and programs
- Understand, integrate, and maximize multiple benefits in planning and designing programs
 - Air quality improvements
 - Cost savings
 - Energy security and reliability
 - Economic development
 - Public health
 - Quality of life

EPA's Local Climate and Energy Program - Elements



1. Climate Showcase Communities (CSC)

- 50 pilot local government and tribal governments
- Create, support, and showcase replicable models of sustainable community action, www.epa.gov/statelocalclimate/local/showcase

2. Key Guidance and Tools

- Comprehensive Local Climate and Energy Website, www.epa.gov/statelocalclimate
- Local Government Climate and Energy Strategy Series, www.epa.gov/statelocalclimate/resources/strategy-guides.html
- Linkages to existing internal & external technical support programs

3. Peer Exchanges

- Annual CSC workshop
- Monthly local climate and energy webcast series collaboration/co-marketing webinars with other EPA programs; www.epa.gov/statelocalclimate/web-podcasts/local-webcasts-by-date.html
- Conference presentations
- Newsletters, www.epa.gov/statelocalclimate/listservs



EPA Contact Info

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www.epa.gov/heatislands

EPA Heat Island Newsletter sign-up:

www.epa.gov/hiri/admin/listserv.htm

Appendices

- Appendix A: Heat Island Mitigation Strategies
- Appendix B: Heat Island Implementation Activities to Help Cool Your Community
- Appendix C: Resources Offered by EPA's Local Government Climate and Energy Program
- Appendix D: Heat-related Resources and Tools (non-EPA)
- Appendix E: Additional Heat Island Programs



Appendix A: Heat Island Mitigation Strategies

Communities can take action to reduce urban heat islands using four main strategies.

- Trees and Vegetation
- Green Roofs
- Cool Roofs
- Cool Pavements

Mitigation Strategy: Trees and Vegetation

Most U.S. communities have opportunities to increase the use of trees and vegetation in their land cover to reap multiple benefits.

Strategically planting trees maximizes energy savings and reduce GHG emissions (among other things).

- Buildings
- Parking lots
- Streets



Mitigation Strategy: Green Vegetated Roofs

Decrease heat island impacts by shading roof surfaces and through evapotranspiration

Can save energy both in the summer and winter; energy savings depend on local conditions and building circumstances

Can be installed on a wide range of buildings, from industrial facilities to private residences

Green Roof Types

- **Extensive** - 2-inch covering of hardy groundcover
- **Intensive** - complex as a fully accessible park complete with trees



Mitigation Strategy: Cool Reflective Roofs

Cool roofing products are made of highly reflective and emissive materials that can remain approximately 50 to 60°F (28-33°C) cooler than traditional materials during peak summer weather.

Cool Roof Types

Low-sloped roofs

- Coatings
- Single ply membrane

Steep-sloped roofs

- Asphalt shingles
- Metal roofing
- Tiles
- Shakes



Green Roofs vs. Cool Roofs

Different options for different motivations – each has different costs and performance implications

Green Roofs

- Initial costs are higher
(costs depend on type of green roof)
- Selected by those interested in additional environmental benefits, i.e., stormwater management, natural habitat, green space

Cool Roofs

- Minimal incremental cost
(compared to conventional equivalents)
- Selected by those focused primarily on energy savings or reducing peak energy demand

Mitigation Strategy: Cool Pavements

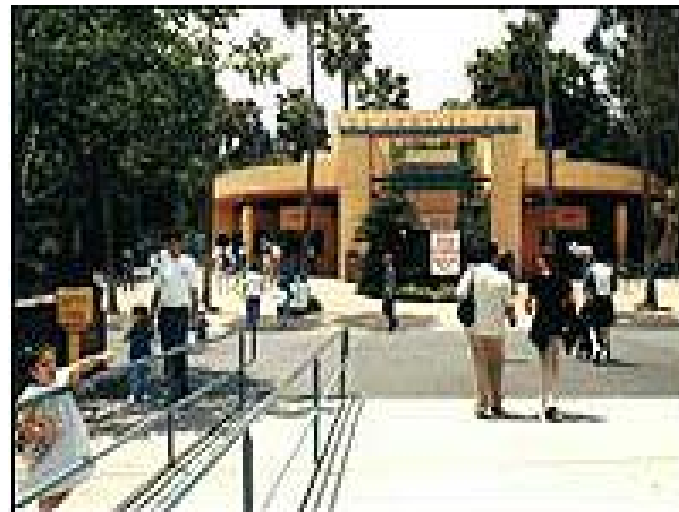
Materials range from established to emerging technologies

Tend to store less heat and have lower surface temperatures compared with conventional products

Do not have standards or an official definition like cool roofs

EPA Pavement Activities:

Created the Transportation Research Board Subcommittee Meeting: Pavements and the Urban Climate, encourages further pavement research



Appendix B: Implementation Activities to Help Cool Your Communities



Communities can integrate measures to reduce urban heat islands into climate mitigation, climate adaptation, energy efficiency, sustainability, air quality, stormwater, land use planning or green building programs by using:

- Voluntary Efforts
- Policy Efforts

For more information, read the activities chapter:

<http://www.epa.gov/heatisland/resources/pdf/ActivitiesCompendium.pdf>

Voluntary Mechanisms



- Demonstration Projects
- Incentive Programs
- Urban Forestry and Community Tree Planting Programs
- Weatherization
- Outreach and Education
- Awards

Policy Mechanisms



- Procurement
- Resolutions
- Tree and Landscape Ordinances
- Comprehensive Plans and Design Guidelines
- Zoning Codes
- Green Building Programs and Standards
- Building Codes
- Air Quality Requirements

Appendix D: Resources Offered by EPA's Climate and Energy Program



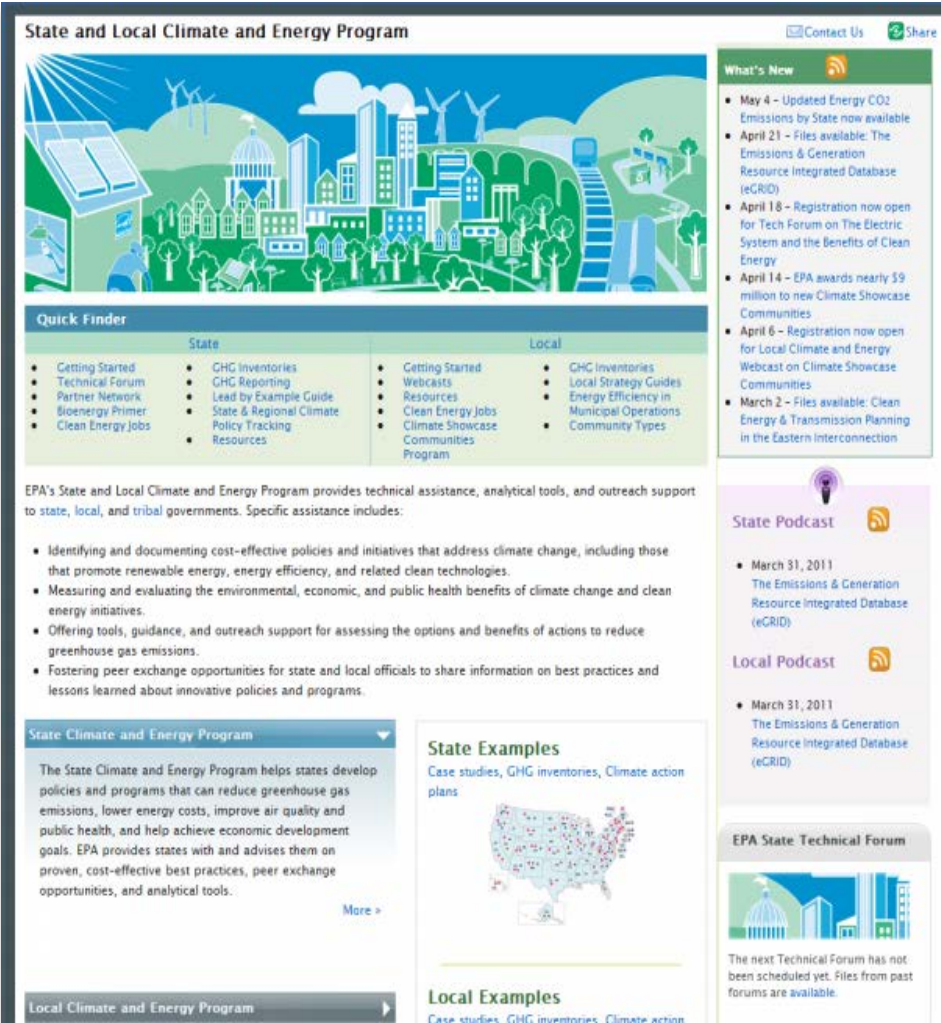
- Website, www.epa.gov/statelocalclimate
- Climate Showcase Communities Program, <http://www.epa.gov/statelocalclimate/local/showcase/index.html>
- Webcasts and Other Training Opportunities, <http://www.epa.gov/statelocalclimate/web-podcasts/local-webcasts-by-date.html>
- Local Climate and Energy Strategy Guides, <http://www.epa.gov/slclimat/resources/strategy-guides.html>

State and Local Climate and Energy Program Website

Provides state and local governments with:

- Background on climate change topics
- Information to develop and implement climate mitigation policies and programs
- Links to tools, guidance documents, webcasts, podcasts, and other technical assistance resources
- Examples and case studies

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



State and Local Climate and Energy Program

Contact Us Share

What's New

- May 4 - Updated Energy CO₂ Emissions by State now available
- April 21 - Files available: The Emissions & Generation Resource Integrated Database (eGRID)
- April 18 - Registration now open for Tech Forum on The Electric System and the Benefits of Clean Energy
- April 14 - EPA awards nearly \$9 million to new Climate Showcase Communities
- April 6 - Registration now open for Local Climate and Energy Webcast on Climate Showcase Communities
- March 2 - Files available: Clean Energy & Transmission Planning in the Eastern Interconnection

State Podcast

- March 31, 2011
The Emissions & Generation Resource Integrated Database (eGRID)

Local Podcast

- March 31, 2011
The Emissions & Generation Resource Integrated Database (eGRID)

EPA State Technical Forum

The next Technical Forum has not been scheduled yet. Files from past forums are available.

Quick Finder

State		Local	
<ul style="list-style-type: none"> • Getting Started • Technical Forum • Partner Network • Bioenergy Primer • Clean Energy Jobs 	<ul style="list-style-type: none"> • GHG Inventories • GHG Reporting • Lead by Example Guide • State & Regional Climate Policy Tracking • Resources 	<ul style="list-style-type: none"> • Getting Started • Webcasts • Resources • Clean Energy Jobs • Climate Showcase Communities Program 	<ul style="list-style-type: none"> • GHG Inventories • Local Strategy Guides • Energy Efficiency in Municipal Operations • Community Types

EPA's State and Local Climate and Energy Program provides technical assistance, analytical tools, and outreach support to state, local, and tribal governments. Specific assistance includes:

- Identifying and documenting cost-effective policies and initiatives that address climate change, including those that promote renewable energy, energy efficiency, and related clean technologies.
- Measuring and evaluating the environmental, economic, and public health benefits of climate change and clean energy initiatives.
- Offering tools, guidance, and outreach support for assessing the options and benefits of actions to reduce greenhouse gas emissions.
- Fostering peer exchange opportunities for state and local officials to share information on best practices and lessons learned about innovative policies and programs.

State Climate and Energy Program

The State Climate and Energy Program helps states develop policies and programs that can reduce greenhouse gas emissions, lower energy costs, improve air quality and public health, and help achieve economic development goals. EPA provides states with and advises them on proven, cost-effective best practices, peer exchange opportunities, and analytical tools.

State Examples

Case studies, GHG inventories, Climate action plans

Local Climate and Energy Program

Local Examples

Case studies, GHG inventories, Climate action

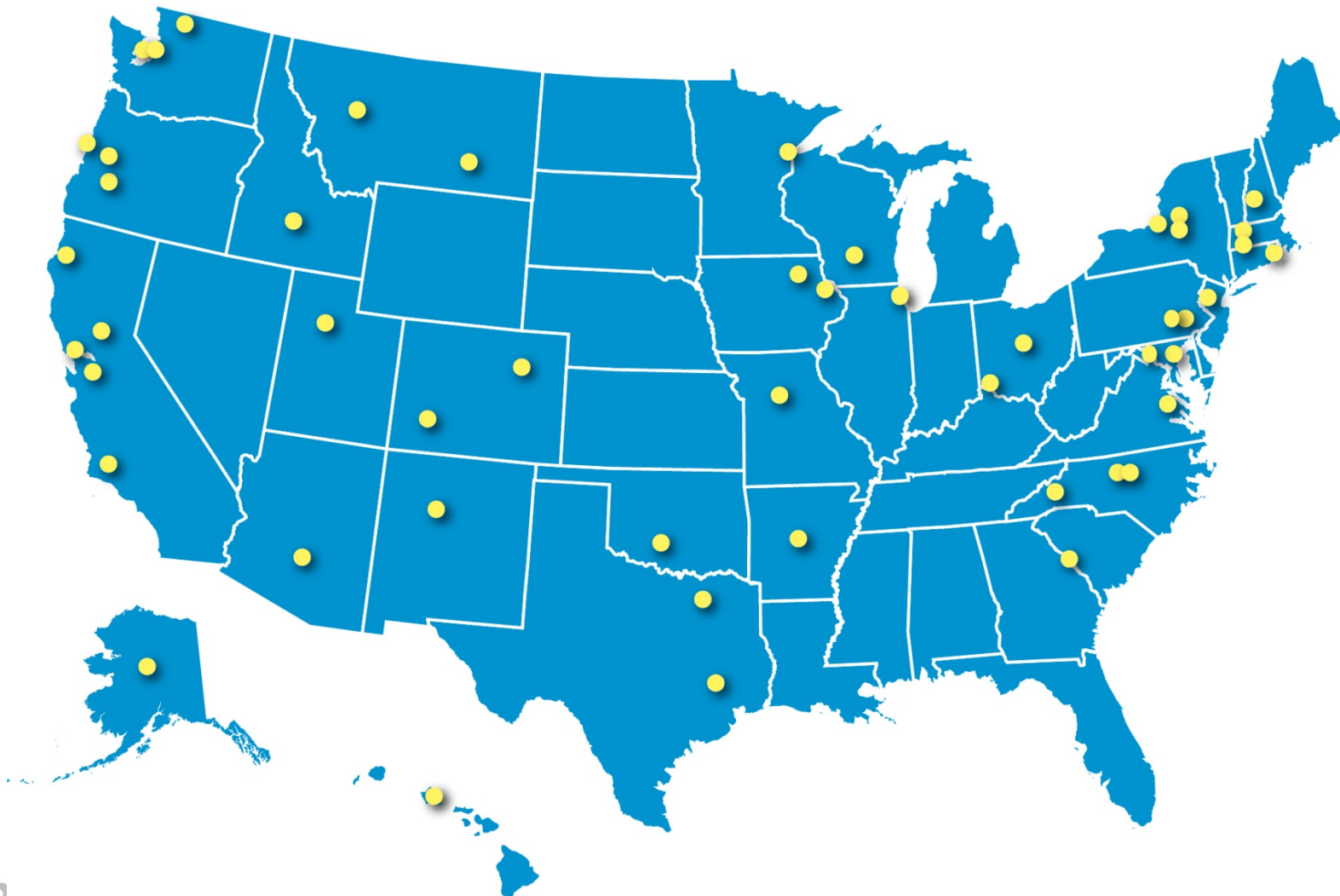
Climate Showcase Communities Program



- \$20 million in Competitive Grants Awarded to Local Governments and Tribal Nations in FY09 and FY10
- Mission
 - Create models of cost-effective and persistent GHG mitigation
 - Catalyze broader local and tribal government climate actions
 - Improve environmental, economic, health, and social conditions
- Scope
 - Energy Efficiency – Residential, Commercial, Public
 - Renewable Energy/Energy Production
 - Transportation & Smart Growth
 - Waste
 - Multijurisdictional Programs
 - Cross-Cutting Programs & Outreach



50 Climate Showcase Communities



<http://www.epa.gov/statelocalclimate/local/showcase/index.html>

Webcasts and Training

- **Local Climate and Energy Webcast Series**
 - Held regularly, announced via our newsletter and website
 - Each call features local government case studies and speakers
 - View past webcasts at:
 - All files: www.epa.gov/statelocalclimate/web-podcasts/local-webcasts-by-date
 - Podcasts: www.epa.gov/statelocalclimate/web-podcasts
- **Additional Webcast Opportunities**
 - ENERGY STAR Training Center <http://energystar.gov/training>
 - State Climate and Energy Technical Forum
<http://www.epa.gov/statelocalclimate/web-podcasts/forum-by-date.html>
 - Information on other EPA Clean Energy webcasts is available at:
 - <http://www.epa.gov/statelocalclimate/web-podcasts/index.html>
 - <http://www.epa.gov/statelocalclimate/events/index.html>

Widgets and iTunes for the Local Webcast Series

- **Webcast Widget**

- Can be added to your website
- Automatically updates with information on our next webcast
- Copy the code from our website and paste it into the source code for your webpage:
<http://www.epa.gov/statelocalclimate/widgets/downloadwidgets.html#local>

- **iTunes Channel**

- Automatically receive podcasts of our webcasts by subscribing to our iTunes channel:
<http://itunes.apple.com/podcast/us-epa-local-climate-energy/id311824706>
- You will need software for playing MP3 files in order to listen to our podcasts
- For more information, visit:
<http://www.epa.gov/statelocalclimate/web-podcasts/index.html>



Local Climate and Energy Strategy Guide Series

- Straightforward GHG emissions reduction strategies local governments can use to achieve economic, environmental, social, and human health benefits
- Each document provides an overview of:
 - Benefits
 - Planning and design
 - Key stakeholders
 - Policy mechanisms
 - Implementation considerations
 - Costs and funding opportunities
 - Programs and resources that offer technical assistance
 - Examples and case studies
- Available at:
www.epa.gov/statelocalclimate/resources/strategy-guides.html

Documents in this series include:

Energy Efficiency

- ✓ **K-12 Schools**
- ✓ **Affordable Housing**
- ✓ **Energy-Efficient Product Procurement**
- ✓ Local Government Operations
- ✓ Combined Heat and Power
- *Water and Wastewater Facilities*

Transportation

- ✓ **Transportation Control Measures**

Community Planning and Design

- ✓ **Smart Growth**
- *Urban Heat Island Reduction*

Solid Waste and Materials Management

- *Resource Conservation and Recovery*

Renewable Energy

- ✓ Green Power Procurement
- ✓ On-Site Renewable Energy Generation
- ✓ Landfill Gas to Energy

KEY:

- ✓ available, --- in development

Appendix D: Heat-related Resources and Tools (non-EPA)



- Documents and Reports
- Tools
- Green Roofs, Infrastructure and Buildings
- Cool Roofs and Pavements

Heat-related Documents and Reports

(1 of 2)



CCAP's The Value of Green Infrastructure for Urban Climate Adaptation

The Center for Clean Air Policy (CCAP) released a report which provides information on the costs and benefits of green infrastructure practices, such as green and cool roofs, urban forestry, and cool pavements. The report provides examples of different approaches that have been used as well as the benefits to urban communities, including increased resilience to climate impacts, improvements in land value, quality of life, public health, hazard mitigation, and regulatory compliance.

Available at http://www.ccap.org/docs/resources/989/Green_Infrastructure_FINAL.pdf

CCAP's Lessons Learned on Local Climate Adaptation from the Urban Leaders Adaptation Initiative

The Center for Clean Air Policy (CCAP) released a report which summarizes the main findings of CCAP's Urban Leaders Adaptation Initiative. This partnership with local government leaders served to empower local communities to develop and implement climate resilient strategies, including heat island mitigation measures. The report concludes that effective approaches include comprehensive planning, using "no-regrets" strategies, and "mainstreaming" adaptation efforts into existing policies.

Available at http://www.ccap.org/docs/resources/988/Urban_Leaders_Lessons_Learned_FINAL.pdf

Heat-related Documents and Reports (2 of 2)



NRDC's "Killer Summer Heat"

The Natural Resources Defense Council (NRDC) has released a report on heat-related death toll projections through the end of the 21st century in the most populated U.S. cities. According to the report, more than 150,000 additional Americans could die by the end of this century due to excessive heat caused by climate change. City dwellers are at particular risk because of elevated temperatures in cities brought about by the heat island effect.

Available at <http://www.nrdc.org/globalwarming/killer-heat/>

GCC's "Adapting to Urban Heat: A Tool Kit for Local Governments"

Georgetown Climate Center (GCC) offers a Tool Kit provides a decision-making framework for local governments to help overcome challenges to adapting to urban heat. The document provides criteria to help local governments analyze methods that can help reduce temperatures. Approaches included in the document are government buildings and land use operations, mandates, incentives and education programs.

Available at http://www.law.georgetown.edu/academics/academic-programs/clinical-programs/our-clinics/HIP/upload/Urban-Heat-Toolkit_RD2.pdf

Heat-related Tools



EPA Mitigation Impact Screening Tool (MIST)

The Mitigation Impact Screening Tool (MIST) is a software tool that estimates the impacts of urban heat island mitigation strategies on urban air temperatures, ozone, and energy consumption. Learn more about MIST at <http://www.heatislandmitigationtool.com/Introduction.aspx>

NRDC's Extreme Weather Mapping Tool

The Natural Resources Defense Council (NRDC) has developed an interactive extreme weather mapping tool to allow Americans to draw connections between climate change and extreme weather in their communities. The map and supplementary data tables provide information on extreme weather events in each state, including record-breaking temperatures. The Extreme Weather Map is available on <http://www.nrdc.org/health/extremeweather/>

Georgetown Climate Center Adaptation Clearinghouse

The Georgetown Climate Center, a nonprofit organization based at Georgetown Law in Washington, DC, has launched the Adaptation Clearinghouse, an online database and networking tool to assist state and local policymakers, resource managers, and others who are working to help communities adapt to climate change. The clearinghouse contains resources on urban heat island impacts and mitigation options. Visit <http://www.georgetownclimate.org/adaptation/clearinghouse>

Green Roofs, Infrastructure and Buildings

Get More Green: An American Rivers Initiative

American Rivers developed a tool to simulate energy, water, and economic savings from a green roof. Discover the savings from greening a roof in your community at <http://green.americanrivers.org/>

U.S. Department of Energy's New & Underutilized Technology: Green Roofs

The Federal Energy Management Program recently updated the “New & Underutilized Technology: Green Roofs” webpage to include information that outlines key deployment considerations for green roofs within the federal sector. http://www1.eere.energy.gov/femp/technologies/eut_green_roofs.html

EPA Heat Island Webcast Presentations: Green Roofs

Archived webcasts related to green roofs provide information on implementing projects at the local level; benefits to energy, the urban atmosphere, and stormwater management; city case studies; and green roof standards. <http://www.epa.gov/heatisd/resources/webcasts.htm#greenroof>

EPA Green Infrastructure Website

This website serves as a gateway to resources developed by government agencies, academia, nonprofits, and the private sector. <http://water.epa.gov/infrastructure/greeninfrastructure/index.cfm#tabs-1>

GSA's Sustainable Facilities Tool

This tool helps identify and prioritize cost-effective green building strategies that facilities managers or owners can implement to incorporate sustainable concepts into any remodel or small project. The tool allows users to compare materials and systems, access design guidance, ask questions, and share their knowledge to help others “green” their projects as well. The tool addresses the benefits of heat island strategies such as cool pavements and green roofs. <http://www.sftool.org/>

Cool Roofs and Pavements



GCCA's Cool Roofs and Pavements Toolkit

The Global Cool Cities Alliance launched a toolkit featuring cool surface and urban heat island information. The toolkit is comprised of *A Practical Guide to Cool Roofs and Cool Pavements*; a Knowledge Base which serves as a repository for research, program materials, sample documents, presentations, case studies, and codes and standards related to the topic; and a list of other sources of relevant information. <http://www.coolrooftoolkit.org/>

Appendix E: Additional Heat Island Programs

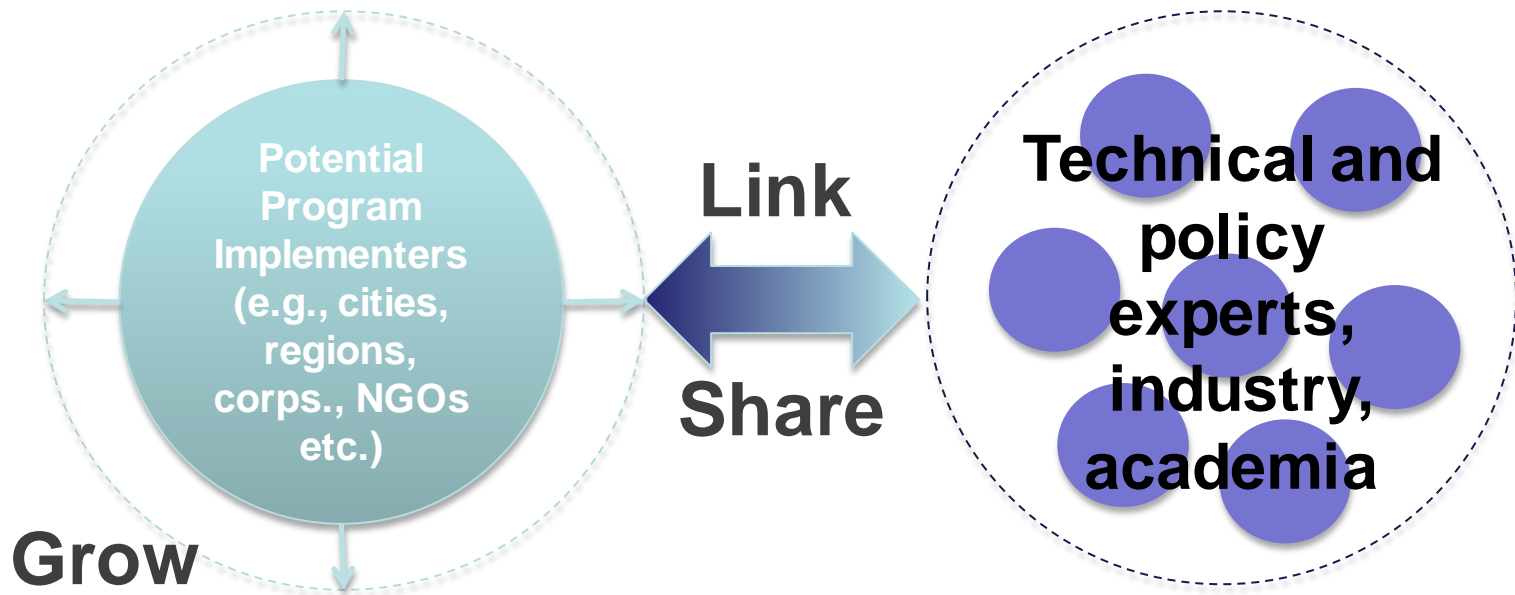


- Global Cool Cities Alliance, GCCA
- California Cool Communities Program
- Georgetown Climate Law Center

Global Cool Cities Alliance (GCCA)

<http://www.globalcoolcities.org/>

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.



California Cool Communities Program

Program Objective:

Provide technical assistance to California communities to save energy, reduce emission of greenhouse gases, and improve the urban environment.

Background:

- Funded by California Air Resources Board (CARB) & California Energy Commission (CEC)
- Implemented by Lawrence Berkeley National Lab (LBNL)
- Supports Global Warming Solutions Act of 2006 (AB 32)
 - Caps greenhouse gas emissions
 - CARB prepare plans to achieve objectives
- “Cool Communities” identified as a voluntary early action program
- Began Phase 2 in September 2011
- <http://coolcommunities.lbl.gov/>





Georgetown Climate Law Center

<http://www.georgetownclimate.org/adaptation/law-and-policy-work>

About Georgetown Climate Law Center's Adaptation Work

- Focused in the coastal and public health sectors and strives to address the legal barriers involved with adaptation to sea-level rise, the increased frequency, scope, and severity of heat events and the spread of hazardous waste by increased flooding

Urban Heat Island Project

- Works with state and local governments to develop “heat-smart” communities that are well prepared to cope with rising temperatures
- Analyzes policy tools from three perspectives:
 - 1) options for local governments to implement particular tools on the ground (e.g., amending building, zoning, or other local codes),
 - 2) ways that state and federal laws might obstruct or support implementation of local policies (e.g., federal regulations for public housing), and
 - 3) existing federal programs that could provide financial resources to help state and local governments adapt (e.g., weatherization assistance programs or transportation funding)
- Released Urban Heat Adaptation Toolkit on August 7, 2012. Available at:
<http://www.law.georgetown.edu/academics/academic-programs/clinical-programs/our-clinics/HIP/Climate-work.cfm>