Urban Heat Island Policies

State Clean Energy-Environment Technical Forum

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David Hitchcock, AICP
dhitchcock@harc.edu

Director, Sustainable Transportation Programs
Houston Advanced Research Center

Moving knowledge to action to improve human well-being and the environment
Introduction

- David Hitchcock, AICP
  - urban planner: regional development, sustainable transportation, and energy/air quality
  - directing new transportation/air quality research program (Joint Center) focused on placed-based strategies for the Houston and Dallas/Ft. Worth regions: http://www.harc.edu/jointcenter
  - urban heat island involvement since 1998 through NASA, EPA, Texas Forest Service, and various community studies
  - baseline heat island information on Houston leading to Cool Houston Program and Plan as a regional initiative: http://www.harc.edu/coolhouston

- HARC
  - non-profit research organization with a mission of sustainable development: http://www.harc.edu
  - founded in 1982 with four founding Texas universities; located in The Woodlands, Texas: http://www.thewoodlands.com
  - lead research management entity for Texas air quality research and technology development: http://www.tercairquality.org or http://www.harc.edu/OurWork/AirClimate

- HARC Programs
  - sustainable energy/clean energy/nanotechnologies/hydrogen/fuel cells/biofuels
  - human health/DNA/toxicogenomics/nanotoxins
  - air and climate research/sustainable transportation/new technology R&D/biofuels
  - green buildings and materials/energy efficiency
State and Local Policies for Urban Heat Island Mitigation

• State/local policies on UHI include:
  1. Formal resolutions
  2. Urban and regional plans
  3. Air quality policies or regulations
  4. Other regulatory instruments including:
     1. procurement
     2. development controls
     3. various codes or ordinances

• Examples of each are identified.
Cool Houston Plan

• Example of a more comprehensive approach for local or regional use
• Provides basic information on UHI and mitigation
  – accurate background information
  – mitigation technologies
  – relevant conditions/data for the region
  – potential actions to address UHI
• Comprehensive in scope so that multiple audiences can participate
• Serves as a spring board for participation
• Downside:
  – needs substantial input if no studies have been done
  – needs to apply to local circumstances
  – lacks official adoption
  – needs someone to provide continuity
Cool Houston Origins

• 1995 - 2000: EPA Concept of comparative risk analysis led by HARC: Houston Foresight
• 1999: Houston Cool and Green! Workshop: NASA, USDA, DOE and others
• 2000 - 2006: Houston Green; Texas Forest Service, U.S. Forest Service, and HARC
• 2001 - 2006 Cool Houston!

• Regional--Federal--non-profit links
• Science and analysis into stakeholder based regional policy arena
• Many funding sources: Federal funds, seed funds plus foundation grants
• Non-profit research oriented leadership with substantial community support and involvement
Cool Houston Approach

- Based on understanding of regional conditions and likelihood of action from several years of discussions and participation in related activities
- Stretches boundaries of action, but not too much
- Identifies key decision points and key actors making decisions on mitigation measures - not necessarily traditional elected officials or agency heads
- Differentiates stakeholders across mitigation measures -
  - Roofing interests may not care about planting trees.
  - Paved surface decisions tend to be highly differentiated between public sector (roads) and private sector (parking lots).
  - Changing the surface characteristics in a region (many cities/unincorporated areas) requires very different strategies from changing a single city’s surfaces.
Policy Bottom Line

• Urban heat island (UHI) effects and mitigation are multifaceted, hence relevant to a wide range of state and local policies: from features of my yard to global warming.
• UHI is often included as a related or supportive policy component:
  • “Street trees are hereby required on all major arterials at a spacing of 25 feet because research has found that trees improve the quality of life, reduce urban runoff, lessen flooding, increase property values, help the local economy, create jobs, and mitigate the urban heat island effect.” Homer Simpson, Springfield, 1984 (original text by Lisa Simpson)
• Comprehensive, detailed UHI policies are an exception.
Table of Identified Policies by Type and Mitigation

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<th>Paving</th>
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Shaded Letters: other non-US, non-govt. examples
This information was compiled from a scan of literature, web searches, and previous heat island research at HARC.
1. Formal Resolutions

- Local governments have adopted heat island resolutions acknowledging UHI effects and concerns.
- A low-risk approach for elected officials with the opportunity for improving community and leader awareness and for follow-up action.
- Resolutions can be comprehensive or focused on specific measures.
- Examples
  - ICLEI Model Resolution
  - Austin, Texas
  - Cambridge, MA
  - Metropolitan Tokyo
2. Urban and Regional Plans

- Plans include longer-range considerations for urban and regional development that incorporate UHI effects or mitigation.
- UHI in plans as support for other plan goals and elements
- May be comprehensive or applied to specific plan components--serving as basis for design standards, zoning incentives, or subdivision regulations.
- Examples:
  - Gilbert, Arizona: a goal
  - Southern California Regional Association of Governments: directive for assessment of heat island strategies
  - City of Seattle: directional goal
  - State of South Carolina: directional for local governments
  - Forsythe County, California: as a policy promotion
  - City of Fort Worth, Texas: directional goal as energy component
3. Air Quality

- Simple on its face – hotter cities = worse air quality. Solution: lower temperatures will help.

- But, complex under federal SIP policies with current air quality modeling tools, although EPA has provided good opportunities for regions or states choosing to incorporate UHI measures.
  - Example: shade, cool roofs, and cool paving reduce energy demand and thereby reduce emissions at “the power plant”. Air quality modeling and SIP criteria ask “which power plant?”

- Air quality and energy policies at the State level occur in very different policy arenas
  - Air quality policies are often found in state (or local) regulatory setting,
  - While state energy policies and programs are found in public utility agencies, transportation agencies, (now) agriculture, and economic development agencies.

- Examples for SIP Efforts:
  - Houston, Dallas/Ft. Worth, Sacramento, Baltimore, DC metro region, Los Angeles, Atlanta, New York City region

- Reframing UHI Policy Issues
4. Other Regulatory Options

- Procurement Policies
  - EnergyStar® and LEED® standards provide procurement options for state and local governments
  - Locally developed procurement policies can specify use of mitigation technologies.
  - Policies can be used by most governmental entities, such as school districts, for energy savings and to provide leadership

- Development Guides/Controls
  - Tree and Landscape Ordinances
    - Tree protection
    - Street trees
    - Parking lot trees
    - Development landscaping requirements
  - Zoning Regulations

- Building and Energy Codes
Discussion/Questions

- Policy drivers: some aspects of a perfect policy storm
  - energy prices/grid resiliency, rapid growth in climate change awareness, difficulty (and failures) in meeting air quality standards, green building successes
- First steps/low hanging fruit:
  - connecting the dots with stakeholders - energy • air • smart growth • green buildings • climate change • habitat • etc • etc
  - Or, connecting UHI concepts with one excellent dot that has traction. Could be landscape requirements or saving energy or green buildings or carbon offsets or development codes or a new planning process. Identify something and build UHI into this opportunity.
- Primary challenges for heat island reduction:
  - the extent and rapidity of urban surface changes and the level of mitigation needed for measurable thermal changes.
  - having an informed presence at state or local levels for a continued UHI dialogue (someone always there for information and to participate in diverse activities). Whose issue is this anyway?
- Lessons Learned
  - California Title 24 Cool Roof prescriptive regulations; copy and repeat.
  - EnergyStar® and LEED® – good models for promulgating UHI technologies.
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