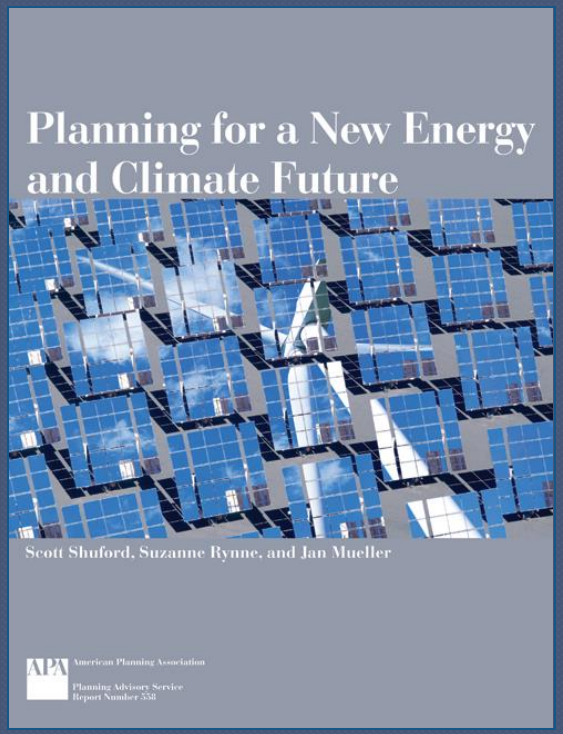
City Planning for Our Energy and Climate Future

ESIP
July 11, 2013
Scott Shuford

Planning for a New Energy and Climate Future

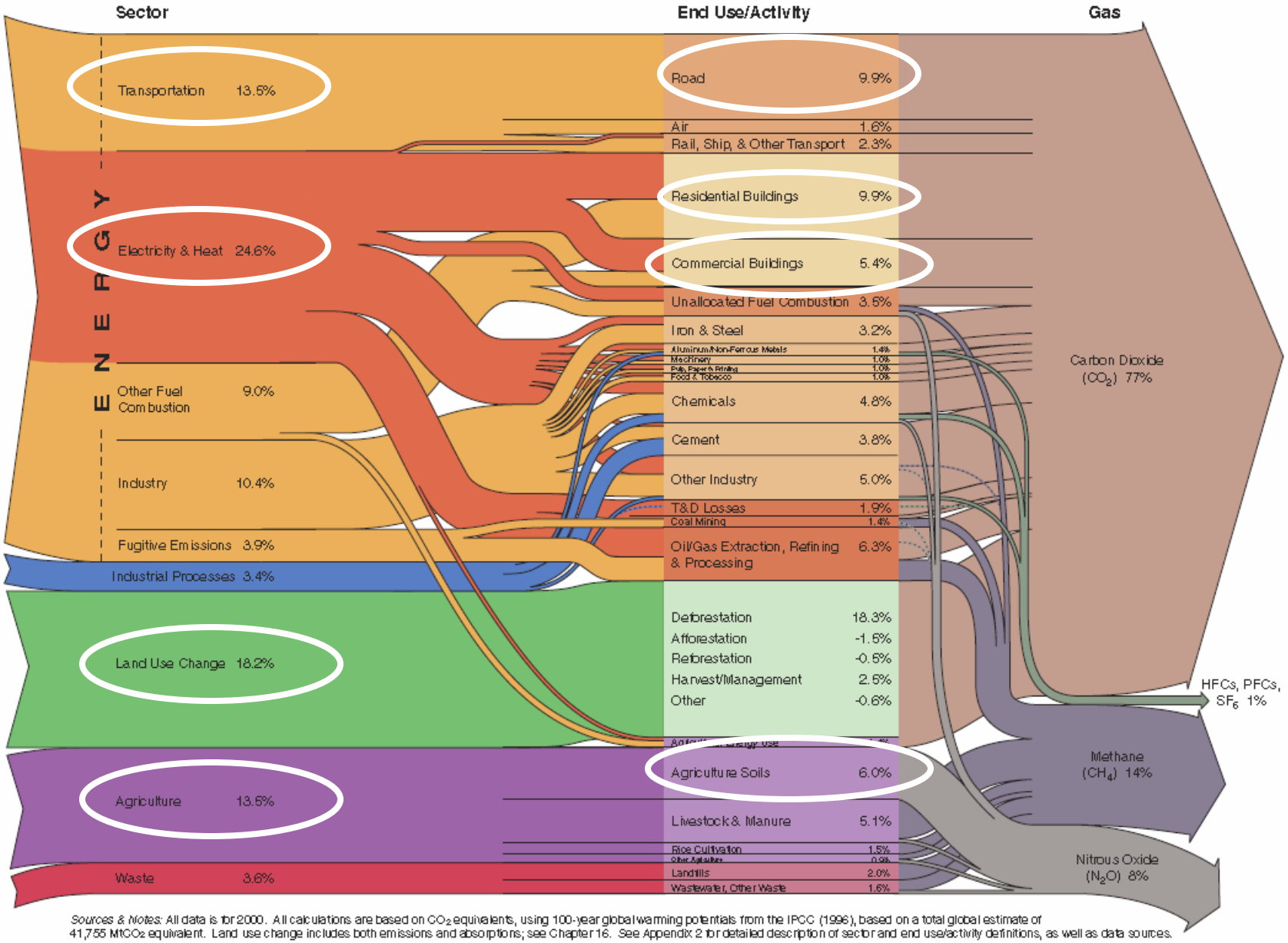
- PAS Report – Collaborative effort
- Funding support from Surdna & George Gund Foundations, ENRE Division, & NOAA
- Help planners incorporate energy and climate change considerations into their work
- Assist communities and regions to
  - Reduce energy use & GHG emissions
  - Adapt to a changing climate
  - Transition to renewable energy



Outline

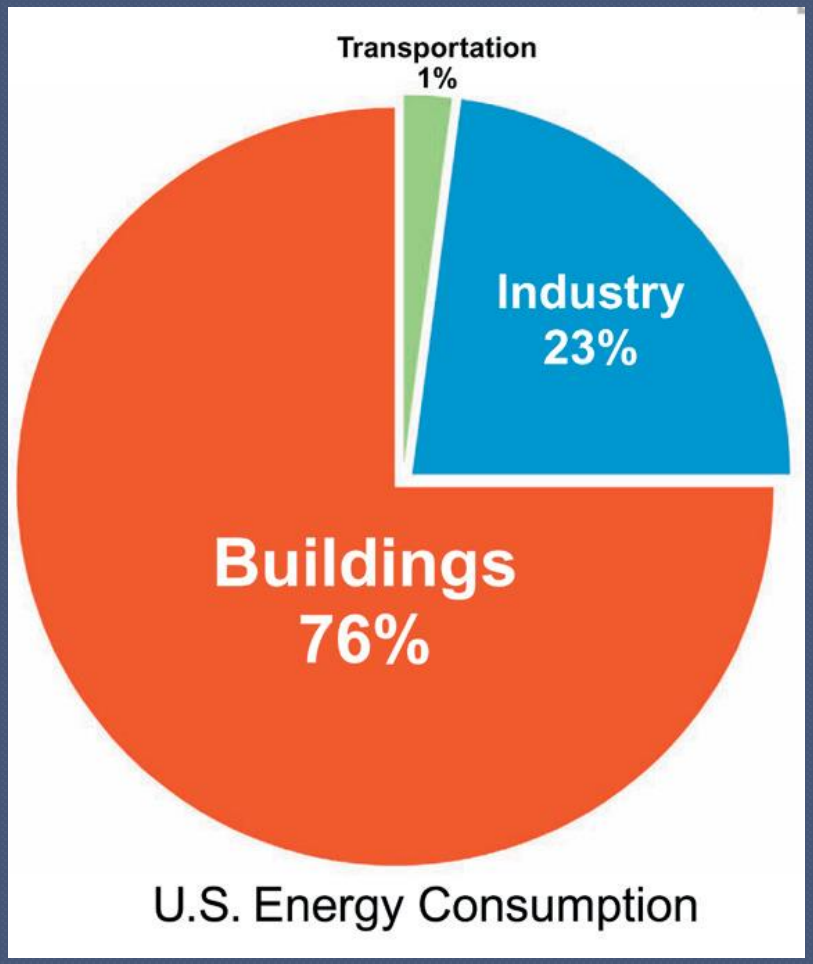
- Why are cities important to the issues of climate change and energy?
- What are some of those issues and what are cities doing about them?
- What cities are leading the way?

World GHG Emissions Flow Chart



Sources & Notes: All data is for 2000. All calculations are based on CO_2 equivalents, using 100-year global warming potentials from the IPCC (1996), based on a total global estimate of 41,755 $MtCO_2$ equivalent. Land use change includes both emissions and absorptions; see Chapter 16. See Appendix 2 for detailed description of sector and end use/activity definitions, as well as data sources. Dotted lines represent flows of less than 0.1% percent of total GHG emissions.

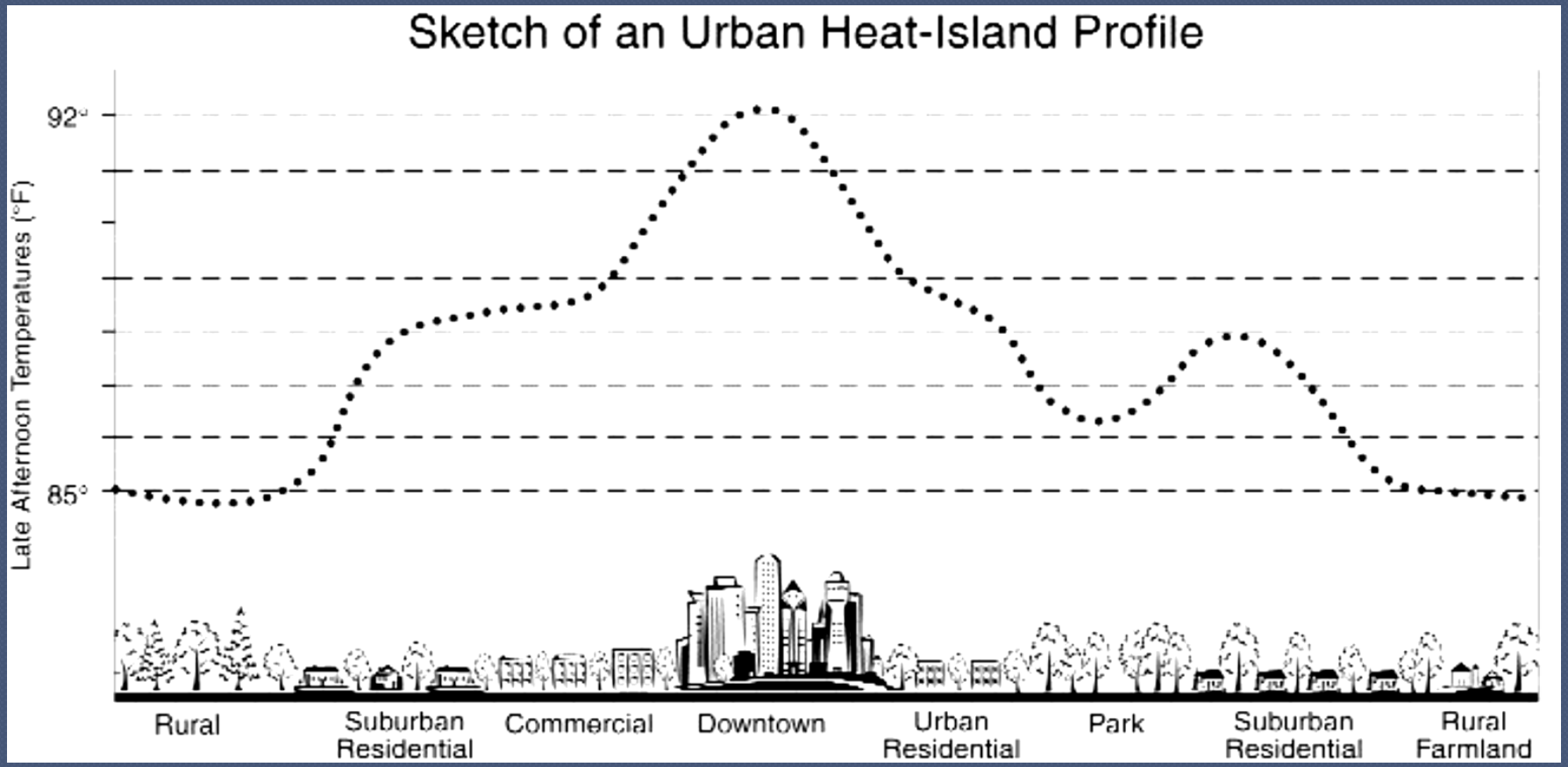
Building Impact on Climate Mitigation



- The graphic shows where electricity is used in the US
- By the year 2035, three quarters of the built environment in the U.S. will be either new or renovated.
- The AIA has a carbon neutral goal by 2030.

Source: American Institute of Architects (AIA)

It Will Be Hotter in Cities



Source: Lawrence B. Livermore National Laboratory, Berkeley, California

Greensburg, Kansas

An EF-5 tornado hit Greensburg, Kansas in May 2007. Despite near total devastation, the community was determined to re-build but in a new way:

- Public buildings – LEED-Platinum
- Electricity will come from ten 1.25 MW wind-turbines

http://www.greensburggreentown.org/

Private Governance: Mitigation
The Behavioral Wedge

Dietz et al, Household Actions Can Provide a Behavioral Wedge to Rapidly Reduce U.S. Carbon Emissions, 106 Proc. Nat'l Acad. Sci. 18452 (2009)

Behavior Change	Category	Potential Emissions Reduction (MTC)	Behavioral Plasticity	RAER (MTC)	RAER (%I/H)
Weatherization	W	25.2	90%	21.2	3.39%
HVAC Equipment	W	12.2	80%	10.7	1.72%
Low-flow showerheads	E	1.4	80%	1.1	0.18%
Efficient water heater	E	6.7	80%	5.4	0.86%
Appliances	E	14.7	80%	11.7	1.87%
LRR tires	E	7.4	80%	6.5	1.05%
Fuel-efficient vehicle	E	56.3	50%	31.4	5.02%
Change HVAC air filters	M	8.7	30%	3.7	0.59%
Tune up AC	M	3.0	30%	1.4	0.22%
Routine Auto Maintenance	M	8.6	30%	4.1	0.66%
Laundry temperature	A	0.5	35%	0.2	0.04%
Water heater temperature	A	2.9	35%	1.0	0.17%
Standby electricity	D	9.2	35%	3.2	0.52%
Thermostat setbacks	D	10.1	35%	4.5	0.71%
Line drying	D	6.0	35%	2.2	0.35%
Driving behavior	D	24.1	25%	7.7	1.23%
Carpooling & Trip-chaining	D	36.1	15%	6.4	1.02%
Totals		233		123	20%

Shared Experience

As Extreme Weather Events Become More Common, We Will All Have An Extreme Weather Story or Two

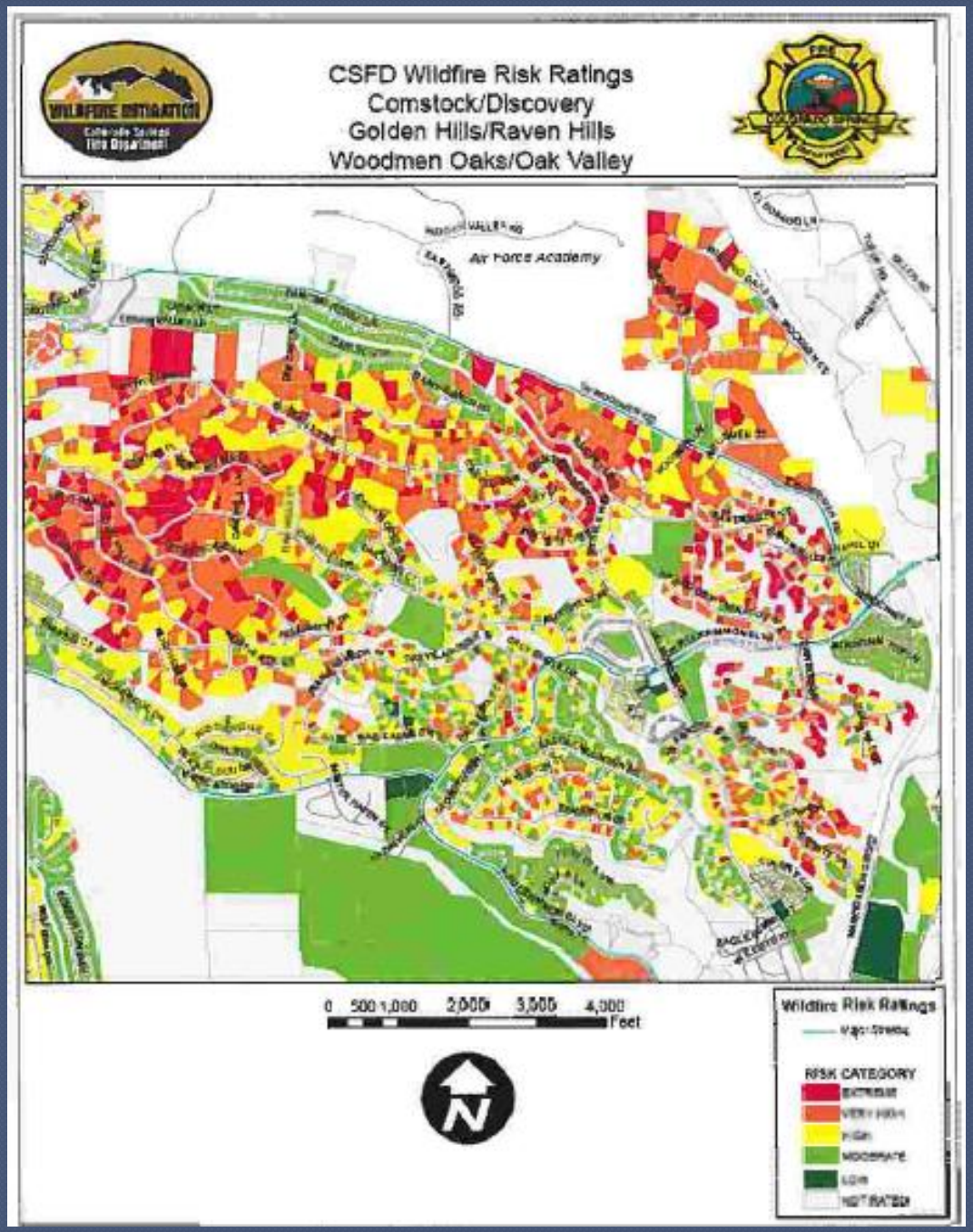
Photo Credits: NOAA, FEMA, DOT, AP

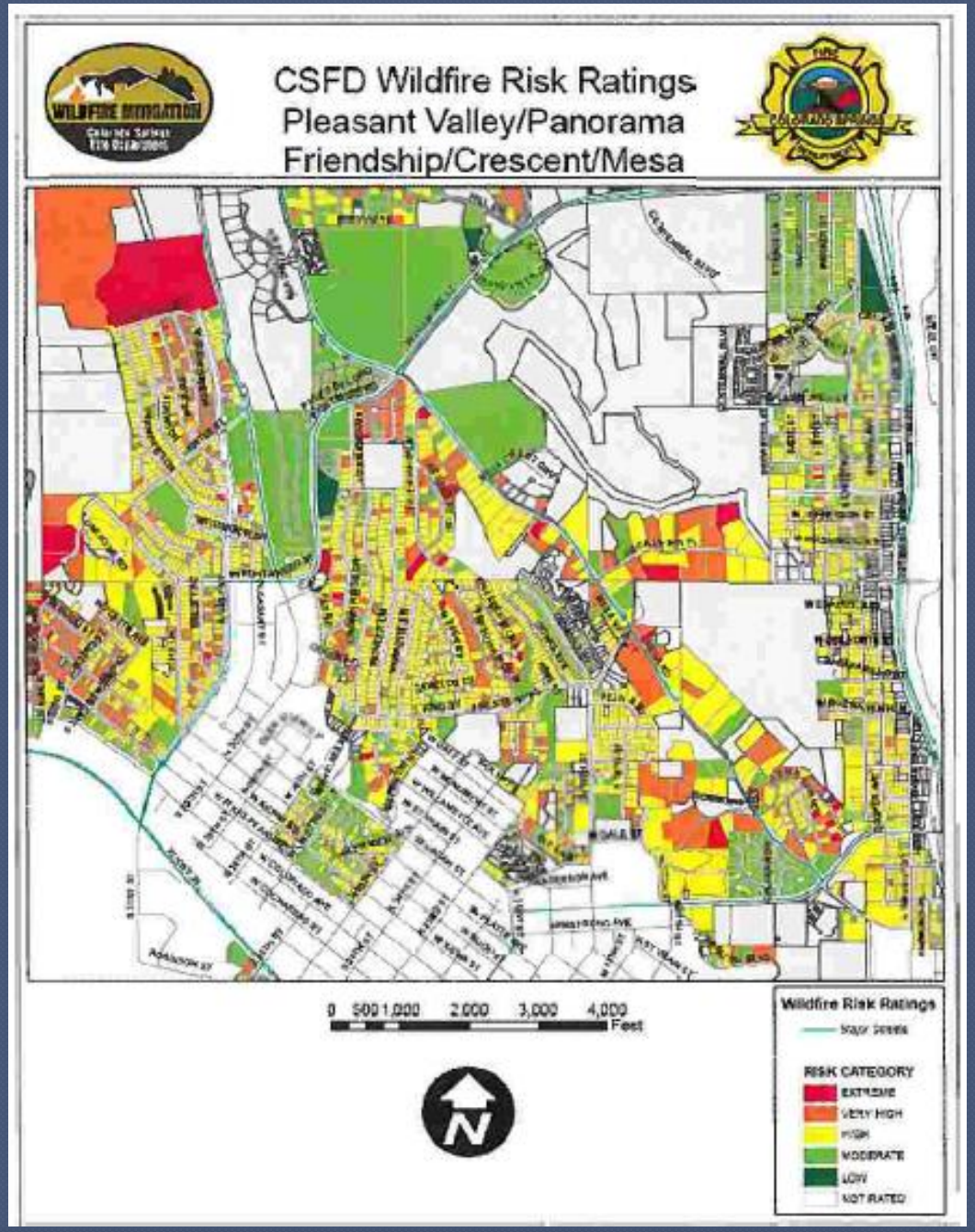
City Issues and Responses

- Wildfires
- Heat and Heat Waves
- Flooding
- Drought

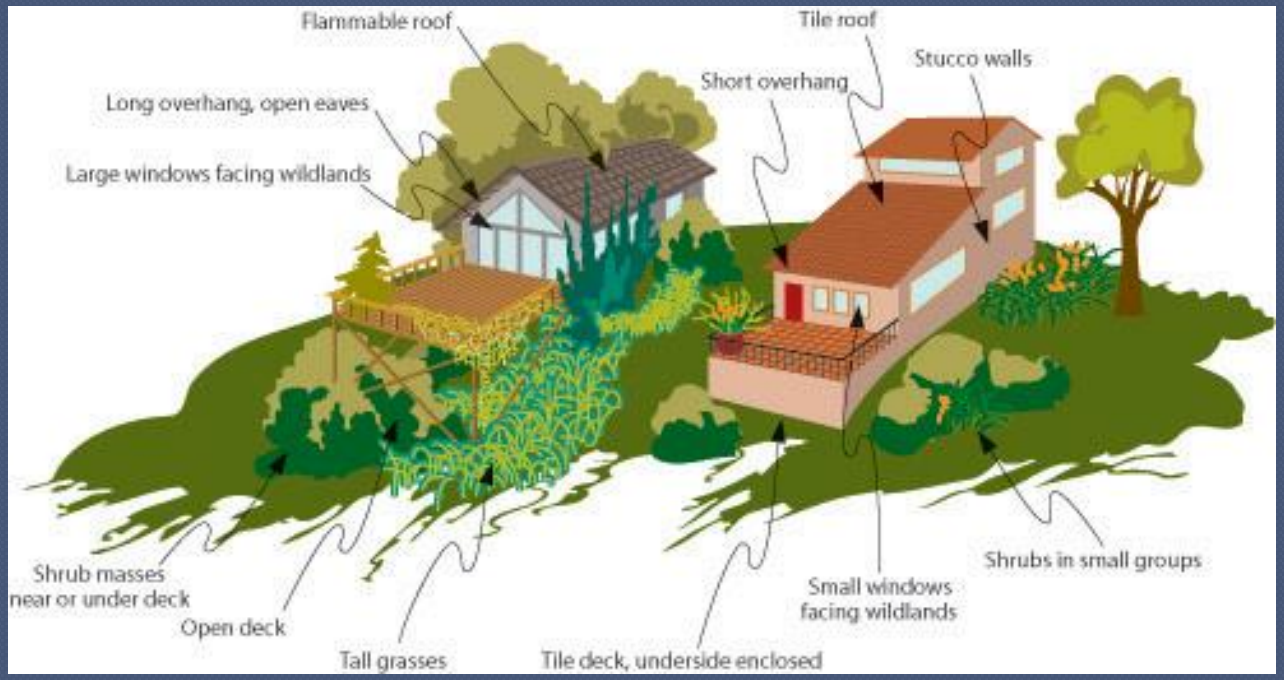
Community Wildfire Protection Plan

✔ Step One: **Convene Decisionmakers**
✔ Step Two: **Involve Federal Agencies (**USFS and BLM)
✔ Step Three: **Engage Interested Parties**
✔ Step Four: **Establish a Community Base Map**
✔ Step Five: **Develop a Community Risk Assessment**
✔ Step Six: **Establish Community Priorities and Recommendations**
✔ Step Seven: **Develop an Action Plan and Assessment Strategy**
✔ Step Eight: **Finalize Community Wildfire Protection Plan**

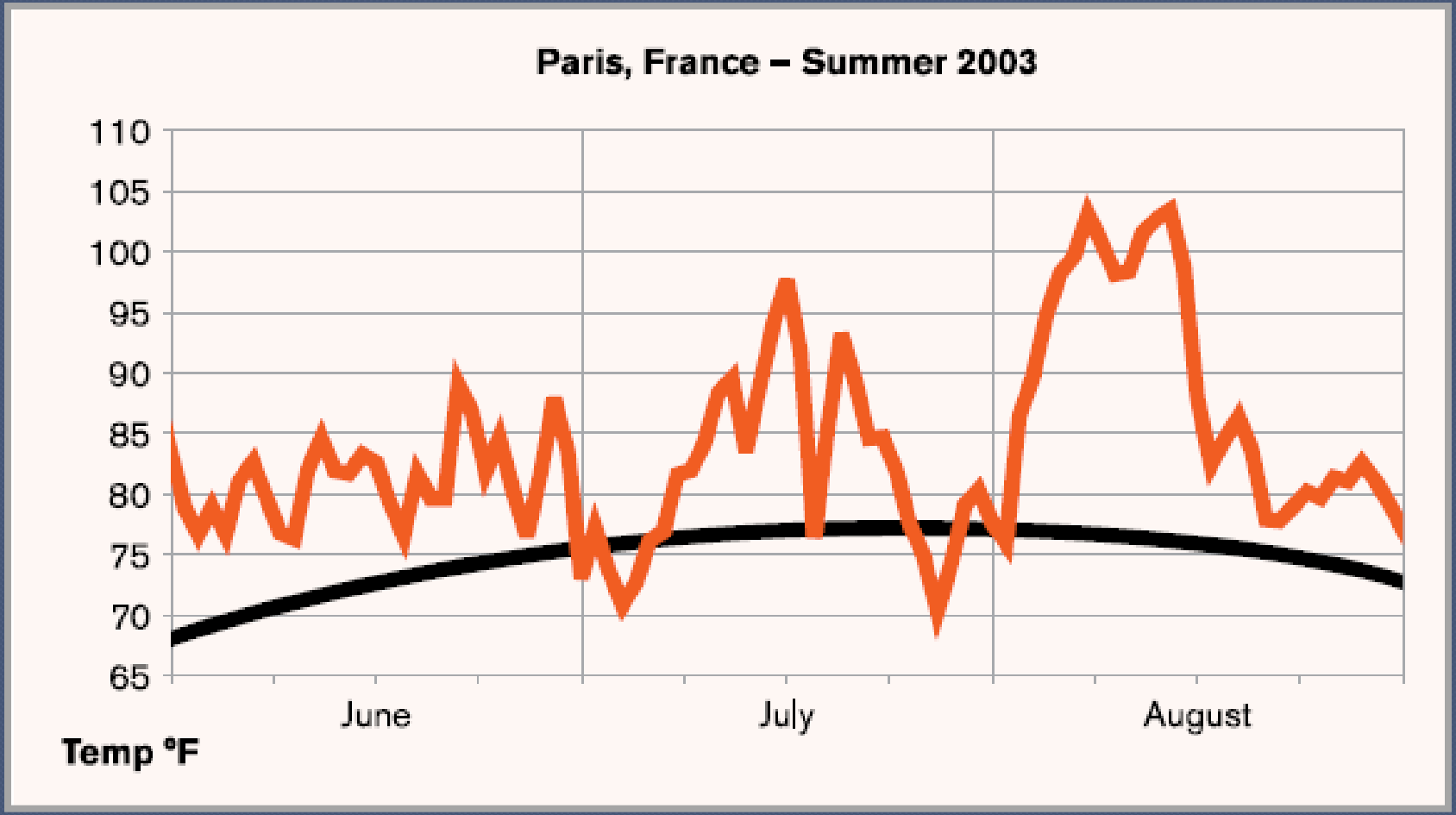

CSFD Wildfire Risk Ratings
Comstock/Discovery
Golden Hills/Raven Hills
Woodmen Oaks/Oak Valley
Air Force Academy
0 500 1,000 2,000 3,000 4,000
Feet
N
Wildfire Risk Ratings
RISK CATEGORY


CSFD Wildfire Risk Ratings
Pleasant Valley/Panorama
Friendship/Crescent/Mesa
0 500 1,000 2,000 3,000 4,000
Feet
N
Wildfire Risk Ratings
RISK CATEGORY
EXTREME
VERY HIGH
HIGH
MODERATE
LOW
NOT RATED

Firewise Communities
www.ncfirewise.org



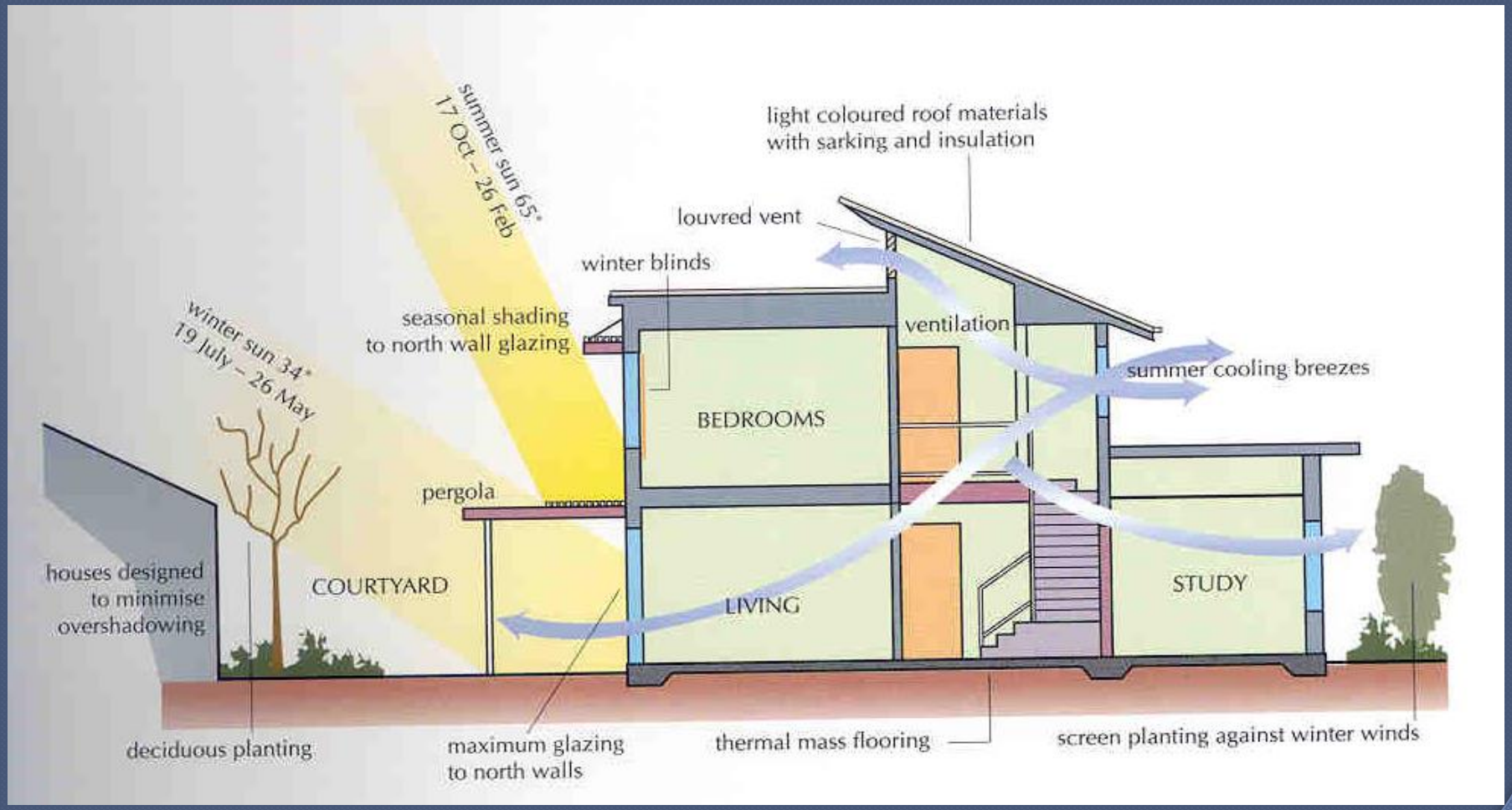
Heat Waves



Excessive Heat Events Guidebook; EPA; 2006

Design for Heat

Buildings and Sites: Energy Smart Design



Source: SolarEnergyWorks

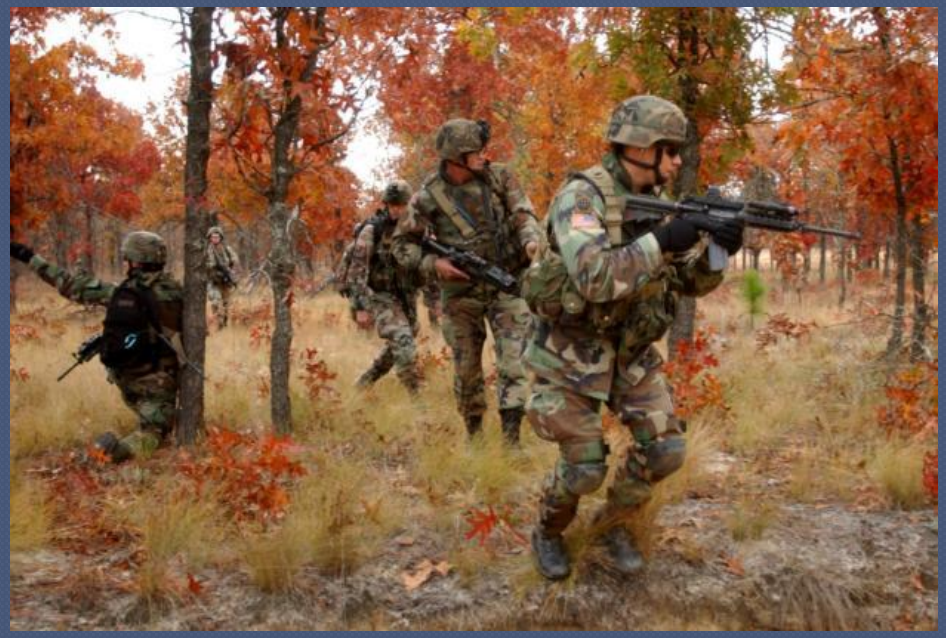

Medium Density Residential Infill
High Density Residential Corridor
Health and Wellness Spa/ Resort District
"WATER"
"AIR"
Transit Center and Public Parking
Office/ Services
Business Development Center
Spiritual Growth Campus
"Old Town" Infill Retail & Services District
Central Plaza
Section "A-A" Through Mixed Use Development
Community Design
Desert Hot Springs
02: Vortex

Heat Effects

Heat Effects – Defense Industry

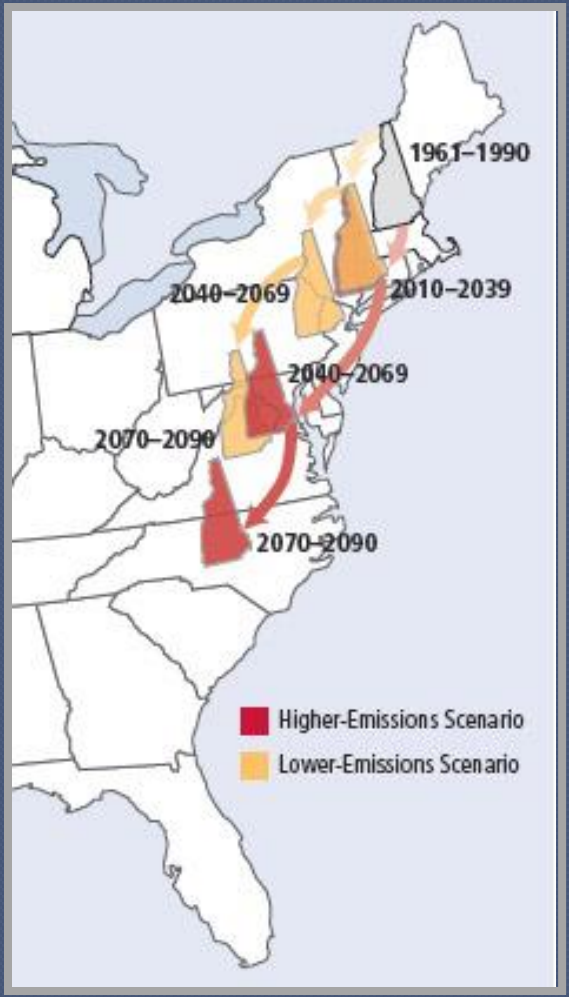
Heat Effects

- Training
- Equipment
- Air Operations and Infrastructure
- Energy Use
- Ecosystem Management



Tourist Economies

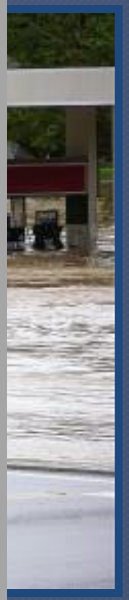
Temperature	Northern VA	NH	Central NC
Average July High	88°	82°	88°
Average July Low	64°	56°	69°
Average Jan. High	42°	28°	48°
Average Jan. Low	22°	7°	29°



Union of Concerned Scientists

Population	Heat Waves	Storms	Floods	Air Pollution	Diseases (Food & Water Borne)	Diseases (Vector Borne)
Persons over 65 (the elderly)	✓	✓	✓	✓	✓	✓
Persons 14 & under	✓	✓	✓	✓	✓	✓
Persons with disabilities or chronic illnesses	✓	✓	✓	✓	✓	✓
Linguistically isolated persons (non-English speaking or English as a second language - ESL)	✓	✓	✓	✓	✓	✓
Socially isolated persons, including the homeless	✓	✓	✓	✓	✓	✓
Single adults with children		✓	✓			
Transportation-challenged (no car or transit) persons		✓	✓			
Persons residing in high crime areas	✓	✓	✓			
Persons residing in mobile homes	✓	✓	✓	✓		✓
Persons with below median incomes	✓	✓	✓	✓		✓
Persons residing in substandard housing	✓	✓	✓	✓	✓	✓
Persons residing in multifamily structures	✓					

Flooding



A Walkable Place . . .

Buncombe County GIS aerial photo; Shuford photos

Biltmore Village, Asheville, NC

. . . Can Become Swimmable.

Photo courtesy of Mark Combs

Design for Flooding

Simple Solutions

Design with Nature

Green Infrastructure

Images from EPA's Green Infrastructure Case Studies; 2010

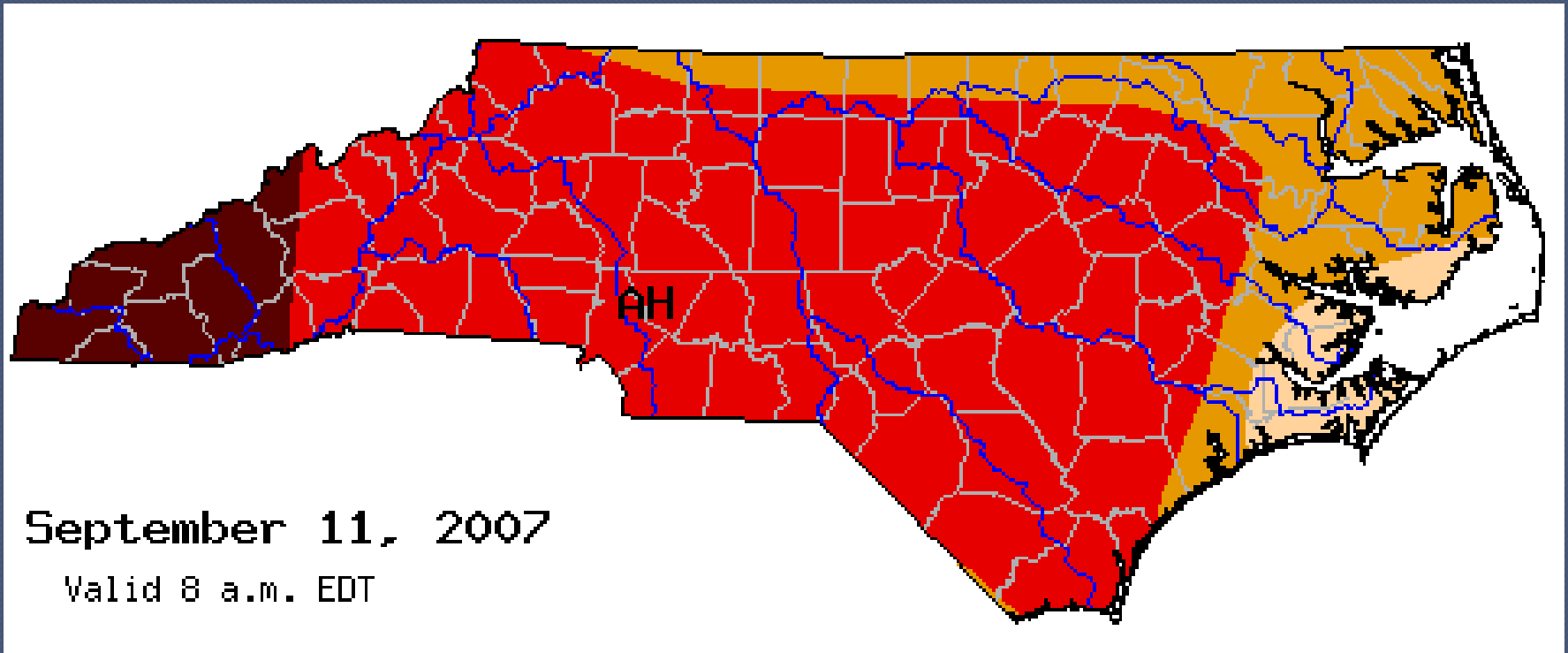
Snowplowing Floodwaters

Source:
FHWA

Sometimes Private Governance is a Mixed Bag

All images – Popular Science

Drought



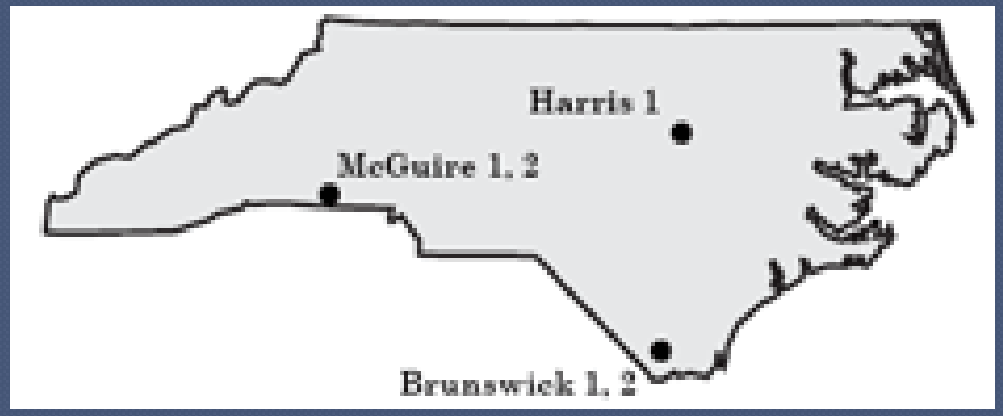
North Carolina Drought Management Advisory Council

www.ncwater.org

Drought - Water Supply Impacts

Drought – Effect on Electric Generation

Nuclear energy - North Carolina's three systems generate nearly 32 percent of the state's electricity.



Case Studies

- King County, WA – The “Whole Organization” Approach
- New York City – The “Comprehensive Planning” Approach
- Chicago – The “Strategic Focus” Approach

King County, Washington

"It sets the process in motion to embed climate change mitigation and adaptation as critical factors in the cost-benefit evaluations of all decisions made by King County."

King County, Washington

How is climate change likely to affect your natural or built resource?

Do you know of, or can you identify, potential economic impacts from climate change?

Questionnaire for King County Departments and Divisions on Climate Change Impacts

This questionnaire has been used for:

- Assessing the potential impacts of climate change on King County's natural and built resources
- Understanding the depth and limitations of our knowledge about the impacts
- Assessing our capacity to adapt to climate change
- Understanding how other activities will affect adaptation strategies in a given area

We ask that you take some time to provide some preliminary answers to this questionnaire, and then there will be a follow up interview about your responses. If there is additional information that you believe is important to include, please take the time to provide any relevant information in the last section, "Additional Information."

General Information

1. Name(s) of person(s), title(s) and division/department completing this survey:

2. What is the natural or built resource that is the focus of this questionnaire response? Please use above sector name:

Assessing Sensitivity

3. How is your natural or built resource sensitive to present day climate variability?

4. How is climate change likely to affect your natural or built resource? Of these impacts, which present the greatest concern and why?

5. What additional information about climate impacts would help further your ability to manage climate change impacts?

6. Do you know of, or can you identify, potential economic impacts from climate change? Please state what the potential or expected impacts are and why they may occur.

New York City

In 2008, Mayor Bloomberg created a Climate Change Adaptation Task Force with these key tasks:

- Inventory existing at-risk infrastructure;
- Develop coordinated adaptation plans to secure these assets based on climate change projections;
- Draft design guidelines for new infrastructure that account for anticipated climate change impacts; and
- Identify adaptation strategies for further study that are beyond the scope of individual stakeholders.

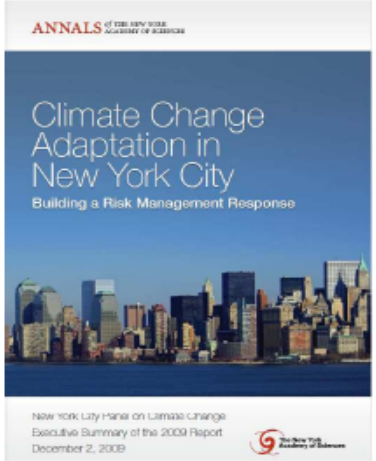
New York City

NPCC Report 2010

Climate Change Adaptation in New York City: Building a Risk Management Response

Report Structure

1 – New York City Adaptation in Context
2 – Adopting a Risk-Based Approach
3 – Climate Observations and Projections
4 – Infrastructure Impacts and Adaptation Challenges
5 – Law and Regulation
6 – Insurance Industry
7 – Indicators and Monitoring



Workbooks

Climate Risk Information
Adaptation Assessment Guidebook
Climate Protection Levels

New York City Panel on Climate Change

New York City

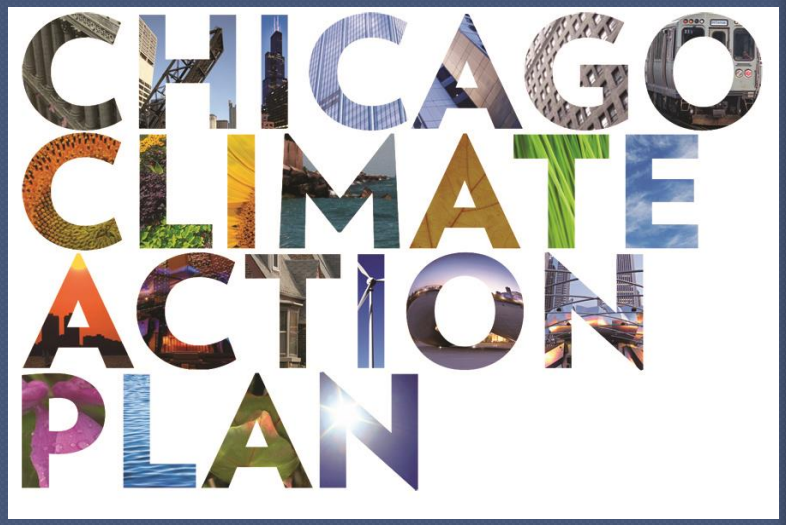
Design Adaptation Process

1. Identify current and future climate hazards
2. Conduct inventory of infrastructure and assets and begin to identify vulnerabilities
3. Characterize risk
4. Develop initial list of strategies
5. Prioritize strategies
6. Prepare and implement Adaptation Plans
7. Monitor and reassess

New York City Panel on Climate Change

Chicago

- Adopted in 2008
- Private Governance: $800 Savings Challenge
- Focuses Adaptive Efforts on Two Key Impacts:
  - Heat
  - Precipitation



Chicago

Adaptation Strategies

1. Manage Heat
2. Pursue Innovative Cooling
3. Protect Air Quality
4. Manage Stormwater
5. Implement Green Urban Design
6. Preserve Our Plants and Trees
7. Engage the Public
8. Engage Businesses
9. Plan for the Future

Chicago

- Sustainable Backyards
- Chicago Conservation Corps (C3)
- Urban Heat Island
- Extreme Weather Operations
- Stormwater Ordinance
- Green Alleys

Image: localecology.org

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