SMART SURFACES COALITION

The Smart Surfaces Coalition is made up of more than 40 leading national and international organizations with a shared commitment to creating **cooler**, **healthier**, and **more resilient** cities by cost-effectively working to reduce the impacts of extreme urban heat and flooding.

# What Are Smart Surfaces?

Infrastructure strategies that cost-effectively manage urban heat and stormwater while maximizing health, energy, climate, and resilience co-benefits

Cool Roofs

Green Roofs

Porous + Permeable Pavements

Solar Photovoltaics

Cool Pavements

Trees and Rain Gardens

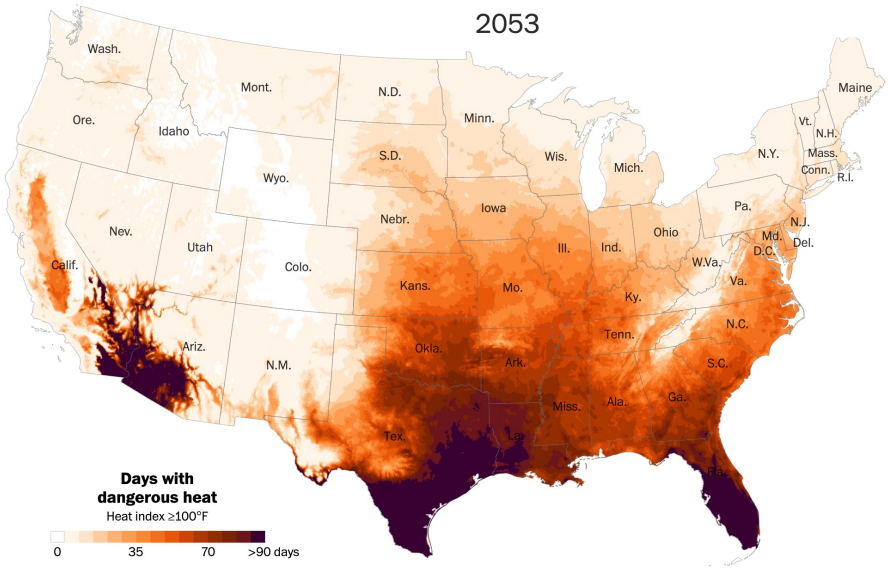
Low- and Zero-Carbon Concrete

Combined Surfaces

Source: Smart Surfaces Coalition & Carnegie Mellon University

SMART SURFACES COALITION

By mid-century, nearly two-thirds of Americans will experience perilous heat waves, with some regions in the South expected to endure **more than 70 consecutive days over 100 degrees.**[1]



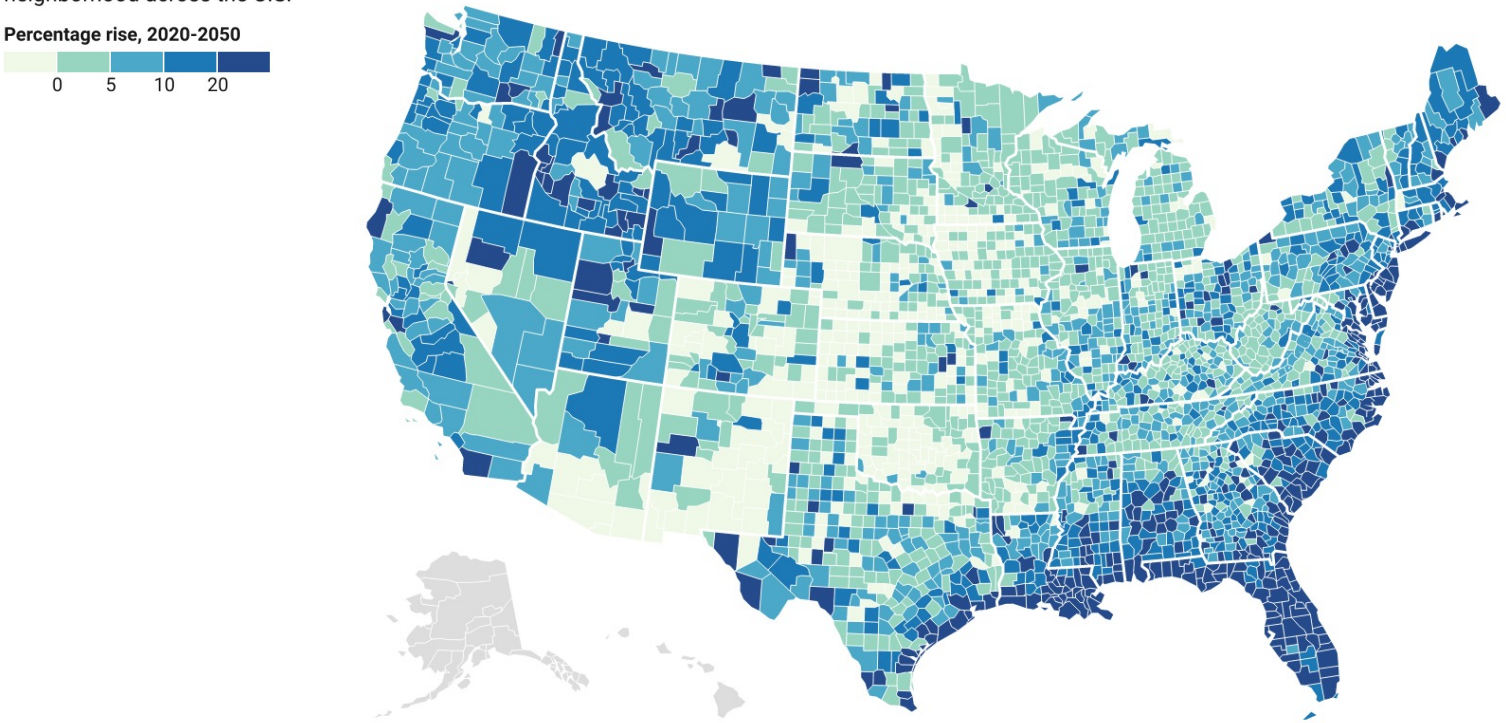

[1]Washington Post, 2023

Source: Washington Post

SMART SURFACES COALITION

## Where flood risk is projected to rise fastest in the US

A new analysis projects changes in flood risk between 2020 and 2050 by zooming in on every neighborhood across the U.S.

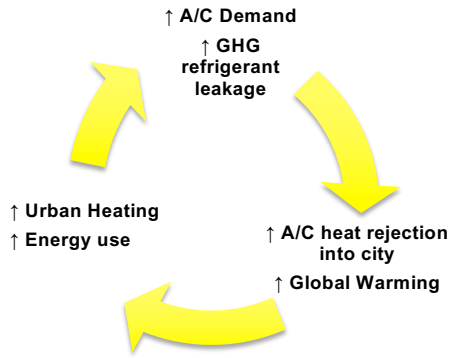



*Flood damage measured in 2020 U.S. dollars.*

Map: The Conversation/CC-BY-ND • Source: Wing, et al. 2022 • Created with Datawrapper

SMART SURFACES COALITION

# Cities Need Rapid Citywide Cooling




## Air conditioning drives climate change and makes cities hotter

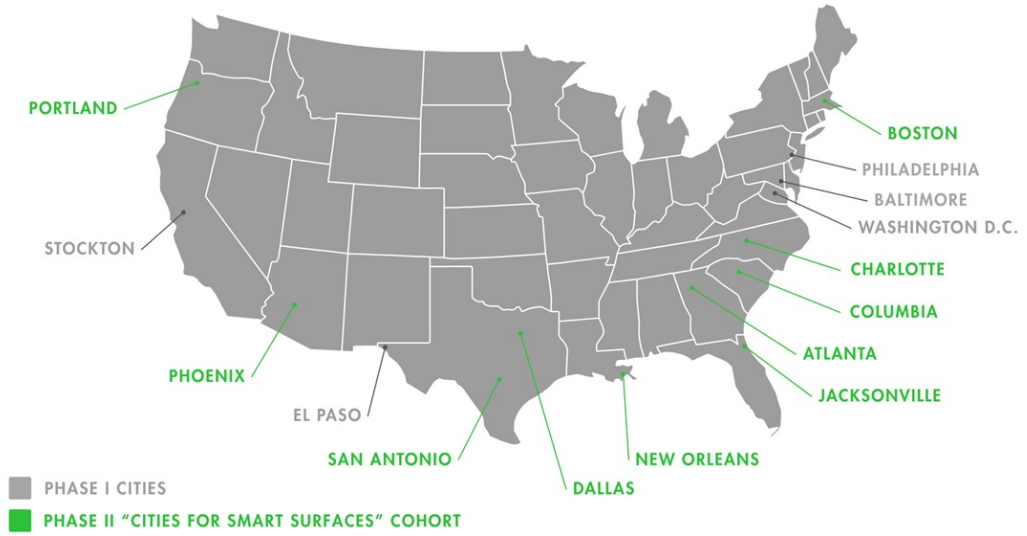
- **Climate Change:** In the US, AC already contributes over 300 megatons of $CO_2$ annually.[1] AC use is projected to more than double by 2050 under business-as-usual. [2]
- **Urban Heat:** AC exhausts heat to outdoor air, which can increase urban temperatures by 3°F during multi-day heat events.[3]
- **Heat Deaths:** During heat waves, mortality risks increase by 2.5% per every 1°F increase in temperature.[4]
- **Peak Demand & Cost Increases:** During high-heat days, each 1°C/1.8°F of additional temperature rise increases peak electricity load up to 4.6% & total electricity consumption up to 8.5%

SMART SURFACES COALITION

1. US EPA 2. Columbia University 3. Salamanca et al 4. Anderson et al

# Cities for Smart Surfaces Program

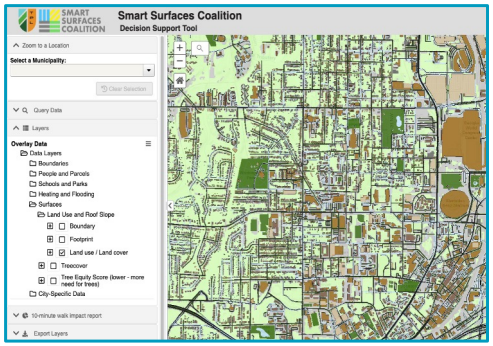
SSC has partnered with 15 metro areas across the US to facilitate policy, program and project adoption of Smart Surfaces




SMART SURFACES COALITION

# Policy & Planning Platform Tools

## Decision Support Tool




Provides cities with highly detailed characterization of albedo, porosity, surface and ambient temperatures, along with census-tract level population health and equity data.

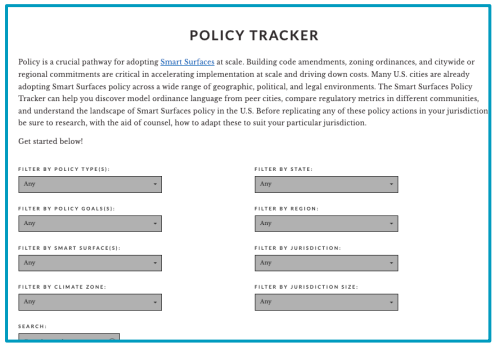
Watch DST Demo

## Benefit-Cost Analysis Tool


Enables cities to model the financial, health, environmental, and energy impacts of Smart Surface infrastructure interventions using at the census tract, city, and metro area levels.

Watch BCAT Demo

## Smart Surfaces Policy Tracker




Enables cities to search from 2,000 Smart Surfaces policies and codes from all states to craft policies. SSC also developed model policy language to enable citywide adoption.

Visit SSPT Site

# Project Implementation Platform Tools

- ✓ **Smart Surfaces Spec Sheet** – spec sheet with cost & benefit data and suggested thresholds
- ✓ **Smart Surfaces "Spec Deck"** – slide deck of detailed specifications + case studies
- ✓ **Project Checklist** – List of smart surface strategies with eligible credit info for LEED/Envision
- ✓ **Project Level Calculator Tool** – Excel based tool for calculating benefits of projects
- ✓ **Project Benefits One-Pager** – Designed one-pager that automatically populates benefit data from calculator

SMART SURFACES COALITION

# Key Co-Benefits from City & Metro Adoption of Smart Surfaces

| | Full City Adoption | | | | | Full Metro Adoption** | | |
|---|---|---|---|---|---|---|---|---|
| **City / Metro** | **Urban Core Cooling** | **Maximum Cooling** | **Electricity Savings** | **Stormwater Managed (Gallons/Yr)** | **Health Benefits** | **Electricity Savings** | **Stormwater Managed (Gallons/Yr)** | **Health Benefits** |
| Atlanta | 3.2 °F | 6.9°F | $244,580,000 | 16,158,000,000 | $246,920,000 | $2,103,080,000 | 264,497,000,000 | $1,348,810,000 |
| Boston | 4.5 °F | 7.3°F | $81,350,000 | 6,336,000,000 | $531,880,000 | $609,820,000 | 112,717,000,000 | $1,254,350,000 |
| Charlotte | 2.7 °F | 6.6 °F | $320,040,000 | 33,521,000,000 | $429,140,000 | $477,430,000 | 63,271,000,000 | $547,040,000 |
| Columbia | 3.5 °F | 5.3 °F | $70,630,000 | 12,394,000,000 | $120,290,000 | $225,530,000 | 37,500,000,000 | $246,150,000 |
| Dallas | 3.5 °F | 6.9 °F | $466,580,000 | 39,891,000,000 | $915,550,000 | $2,086,280,000 | 241,922,000,000 | $3,396,350,000 |
| Jacksonville | 4.6°F | 6.3 °F | $406,800,000 | 77,465,000,000 | $1,701,170,000 | $440,670,000 | 65,758,000,000 | $1,615,920,000 |
| New Orleans | 3.1 °F | 6.8 °F | $149,640,000 | 17,802,000,000 | $1,012,590,000 | $353,360,000 | 43,242,000,000 | $1,119,600,000 |
| Phoenix | 2.1 °F | 4.6 °F | $692,380,000 | 11,215,000,000 | $777,430,000 | $1,507,100,000 | 26,848,000,000 | $874,920,000 |
| Portland | 3.3 °F | 7 °F | $109,020,000 | 13,931,000,000 | $983,340,000 | $308,080,000 | 49,000,000,000 | $1,127,590,000 |
| San Antonio | 3.6 °F | 7.5 °F | $422,190,000 | 48,103,000,000 | $1,432,550,000 | $523,510,000 | 62,977,000,000 | $1,627,210,000 |
| ***Total*** | **3.4 °F (Avg)** | **6.5 °F (Avg)** | **$2,963,210,000** | **276,816,000,000** | **$8,150,860,000** | **$8,634,860,000** | **967,732,000,000** | **$13,157,940,000** |

**Modeling assumes 90% low-slope cool roof adoption, 50% steep-slope cool roof adoption, 25% cool pavement adoption, 1% solar, 3–4% of surfaces converted to permeable pavers/bioretention, and city-customized tree canopy targets. Implementation is assumed to be linear, occurring from 2025 – 2040,* ***with benefits accruing through 2050.***

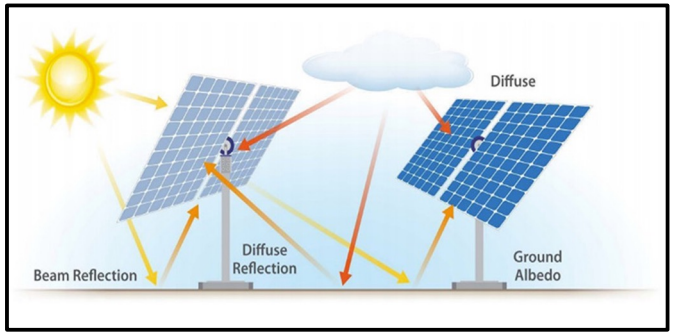
***Metro adoption includes city adoption. Cooling estimates not available for metro area due to data availability limitations.*

SMART SURFACES COALITION

# Mining Data from Cities for Smart Surfaces for Other Analysis

Cool roofs provide:

1. **lower surface and air temperatures**
2. **increased irradiance** from reflected solar radiation




National Laboratory of the Rockies

Green Building News

A 2023 meta study found that cool roofs can boost energy production of monofacial and bifacial solar systems by **0.7%** and **4.55%** respectively, per 0.1 albedo increase.

*Initial SSC analysis has found that, over a 25-year lifespan, bifacial solar panels on a cool roof can generate **20+% more electricity** than monofacial panels on a conventional dark roof. This corresponds to an increase of **44-80% in NPV** (25 years, 5% nominal discount rate).*

SMART SURFACES COALITION


SMART
SURFACES
COALITION