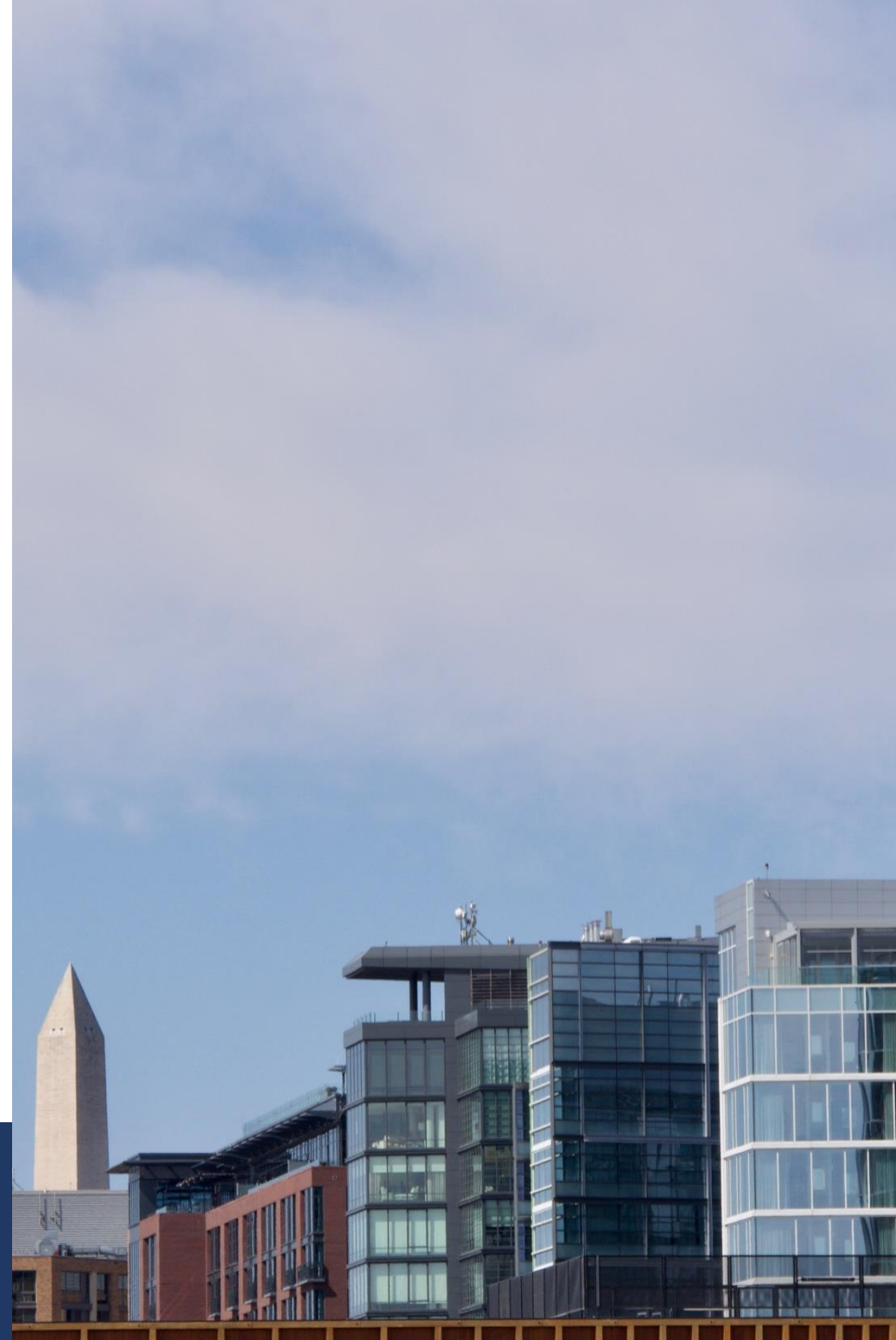
NASEO
National Association of State Energy Officials

NASEO Buildings Committee Webinar:

Achieving Energy Savings Through Smart Surfaces

Welcome! We'll begin shortly.

March 11, 2025



Agenda

NASEO Buildings Committee Webinar: Achieving Energy Savings Through Smart Surfaces

1:00 p.m. – 2:00 p.m. ET

- NASEO Program updates
- Presentation
  - **Moderator:** Blake Shelide, Manager, Codes and Standards, Oregon Department of Energy
  - **Speaker:** Bill Updike, Program Manager, Smart Surfaces Coalition
- Q&A and Discussion

Recent and Upcoming Events

Recent:

- **NASEO-NARUC Grid-interactive Efficient Buildings Working Group Webinar: Scaling Demand Flexibility with Software** - January 30, 2025: This webinar featured Rajiv Shah of Octopus Energy Group discussing issues of scaling demand flexibility and VPP solutions, drawing on Octopus Energy and Kraken Technologies experiences.

Upcoming:

- March 17, 2025, 2:00 – 3:00 p.m. ET: NASEO National Rebates Update Call (State and Territory Energy Offices Only)
- March 20, 2025, 2:00 – 3:00 p.m. ET: NASEO Washington Update (NASEO State and Affiliate Members Only)
- April 30 – May 2, 2025: U.S. Department of Energy's Better Buildings, Better Plants Summit, Capital Hilton Hotel (for more info and to register, please click here)
- May - June 2025: NASEO Regional Meetings (see NASEO Events Page for dates and locations)
- September 8-9, 2025: NASEO National Buildings Summit (more information to be announced)

Thank you!

NASEO Contacts

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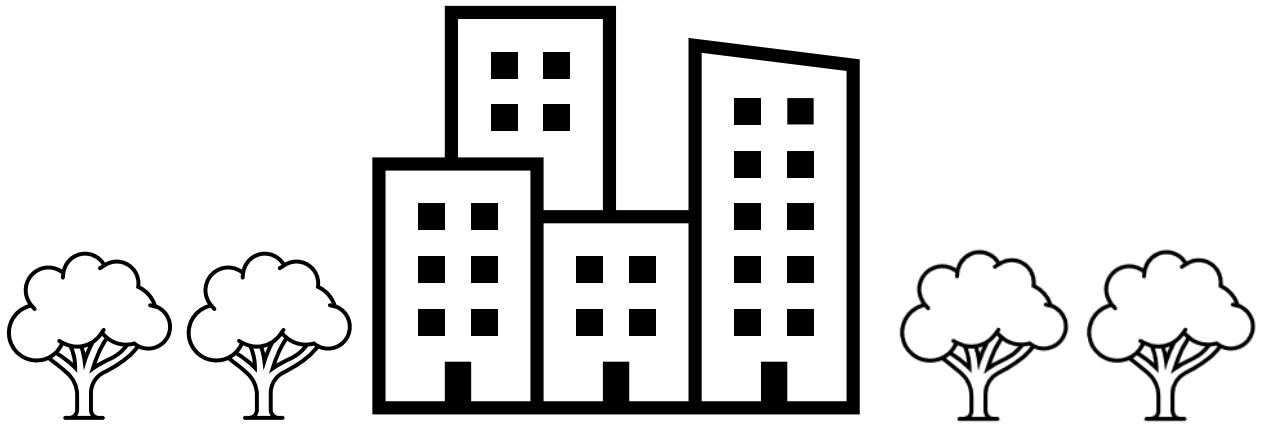
SMART SURFACES COALITION

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.

THINKING OUTSIDE THE BOX



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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

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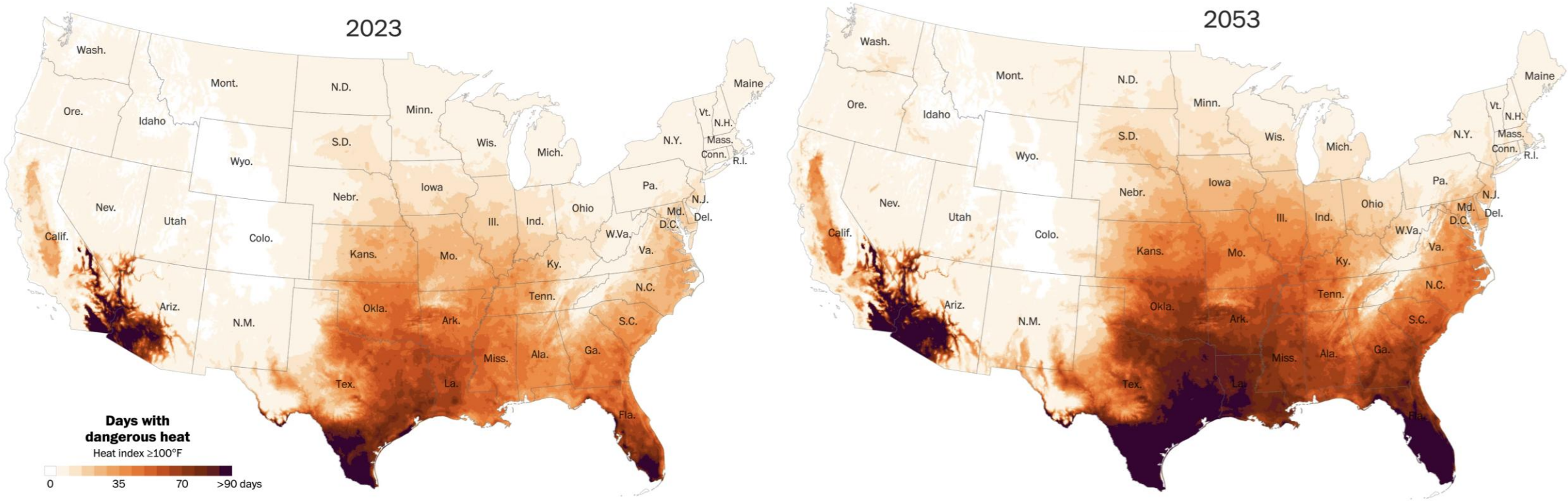
By mid-century, nearly two-thirds of Americans will experience perilous heat waves, with some regions in the South expected to endure **more than 70 consecutive days over 100 degrees.**[1]



[1]Washington Post, 2023

Source: Washington Post

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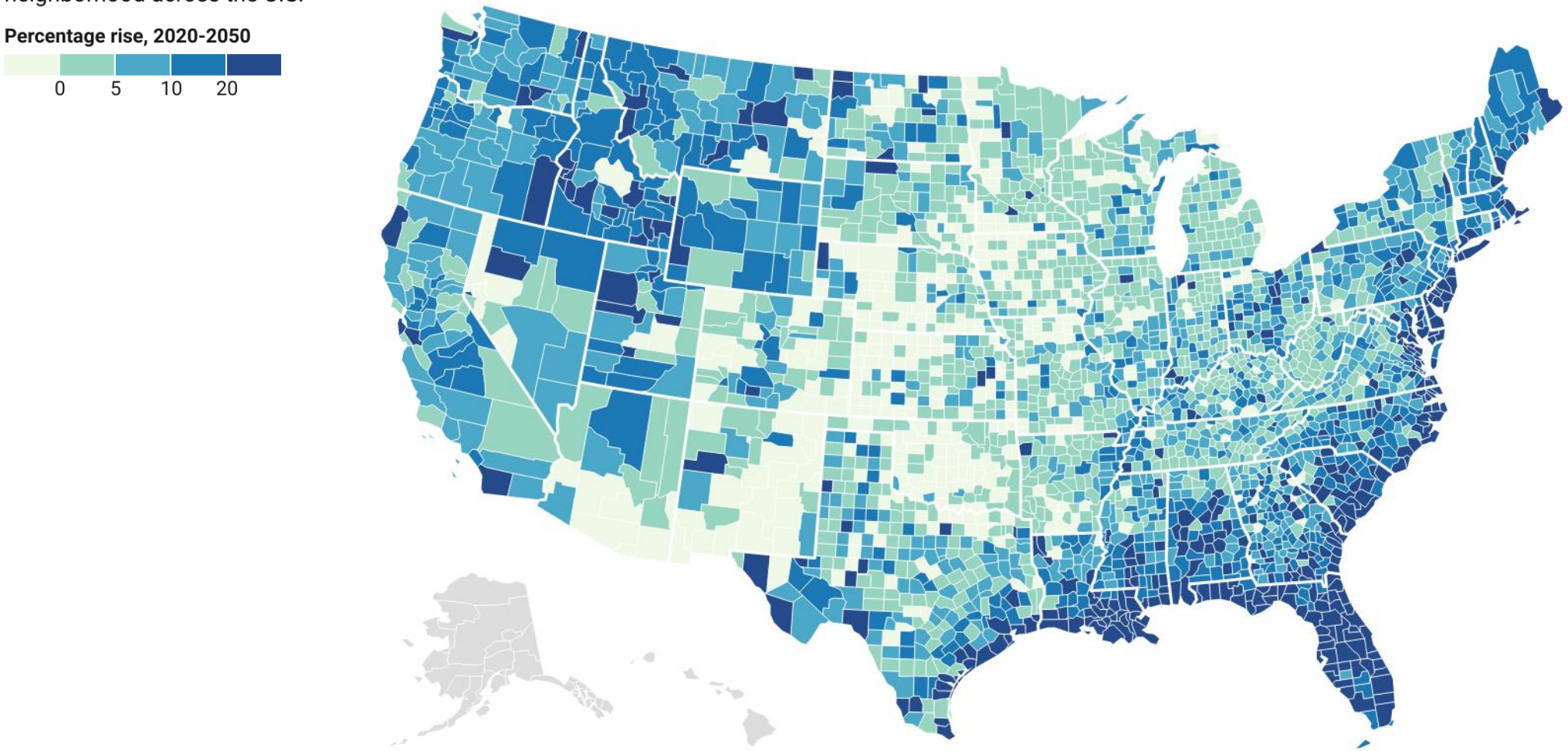
Where flood risk is projected to rise fastest in the US

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

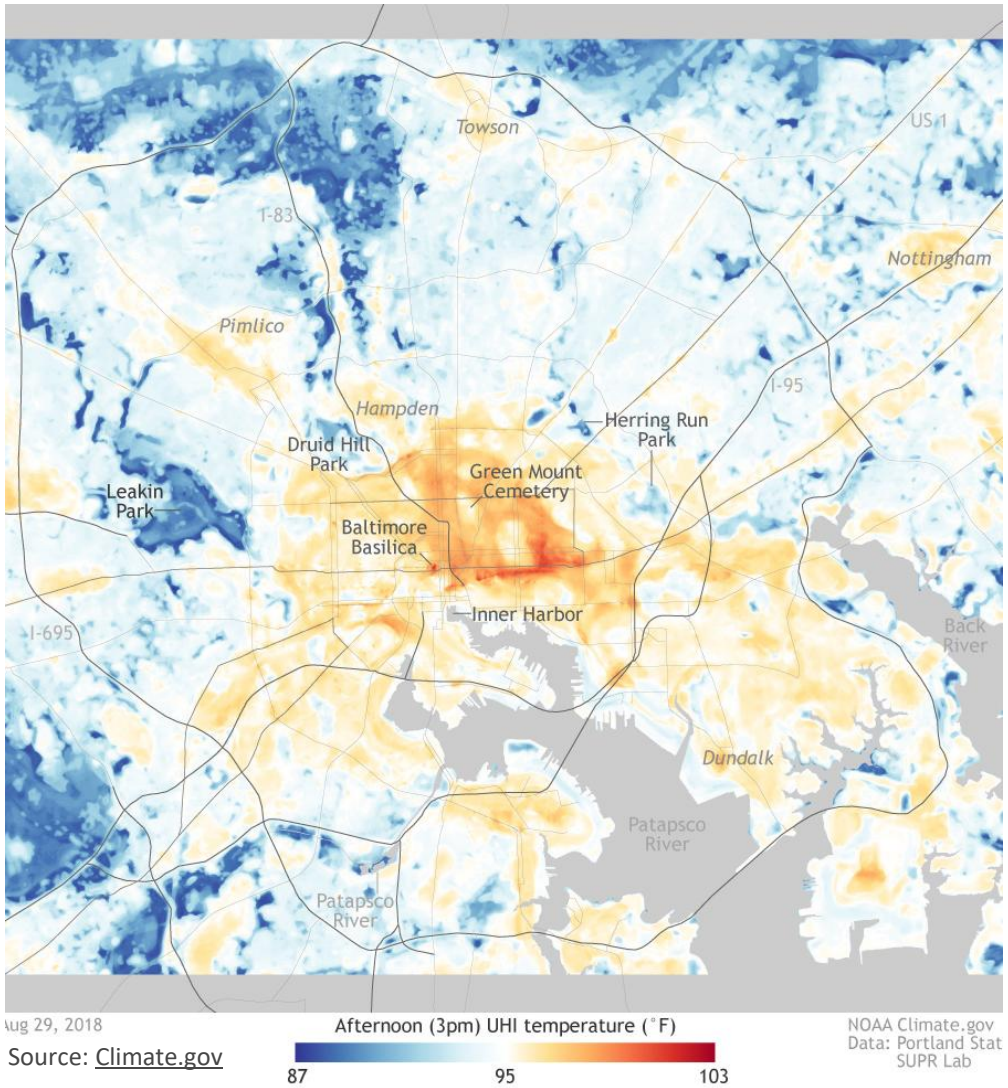
Urban Heat Island Effect

Urban heat islands can be **5 to 9 degrees Fahrenheit hotter** than rural areas during the day and can be as much as **22 degrees F hotter at night.**[1]

Some neighborhoods in cities, often in low-income areas, can be as much as **15-20 degrees F hotter** during the day.

[1]American Forests, 2021

Heat Map of Baltimore, MD



Source: Climate.gov

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Cities for Smart Surfaces

SSC is partnering with metro areas across the US to facilitate the adoption of Smart Surfaces and working with in those regions to support community-led, local Smart Surface implementation projects.

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Cities for Smart Surfaces Project Partners

Project Coordinator

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Data Visualization and Cost-Benefit Analysis

- World Resources Institute
- Trust for Public Land
- Altostratus Inc.
- Open Technologies

City and Community Engagement

- Metropolitan African Methodist Episcopal Church
- National League of Cities
- APHA
- WE ACT for Environmental Justice
- Trust for Public Land
- The Oikos Institute for Social Impact
- City Forest Credits

Federal Funding

- Columbia Law School, Sabin Center for Climate Change Law
- ACEEE
- NASEO National Association of State Energy Officials
- City Forest Credits

Policy + Legal

- Columbia Law School, Sabin Center for Climate Change Law
- American Lung Association
- NASEO National Association of State Energy Officials
- National League of Cities
- Metropolitan African Methodist Episcopal Church
- APHA

Health Research and Communications

- APHA
- American Lung Association
- Upstate Medical University
- Harvard T.H. Chan School of Public Health, C-CHANGE Center for Climate, Health, and the Global Environment

Cost Benefit Analysis for Baltimore

Adoption of Smart Surfaces in Baltimore could result in:

- **$10:1** Benefit-Cost ratio
- **5+ F** peak summer temperature reduction
- **Millions** of tons of CO2e reduced
- **$Billions** in net financial benefits

BALTIMORE MD

City population	610,000
Overall area	92.28 sq mi
New area of Smart Surfaces	13,940 ac
Targets implemented during	2023-2043
Costs and benefits accrued during	2023-2053

$3,305,179,000	-4.2°F	15,288,000 $mtCO_2e$
net financial benefit	peak temperature reduction	avoided emissions

All costs	$(819,706,000)
All benefits	$4,124,885,000
Net present value	**$3,305,179,000**
Benefit-cost ratio	5

1 indicates break-even; higher is better

SSC engagement + analysis with Baltimore led to legislation **within 2 years**

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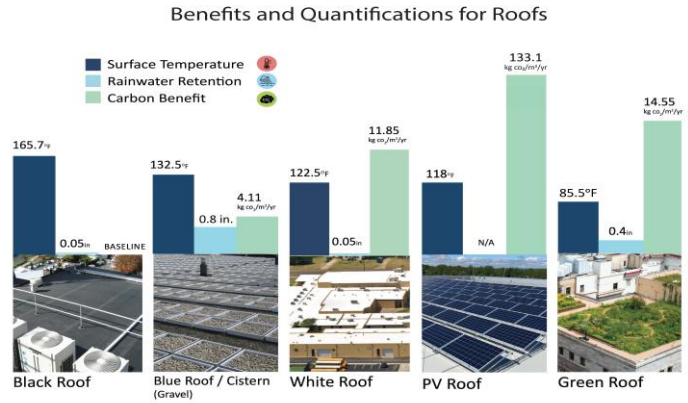
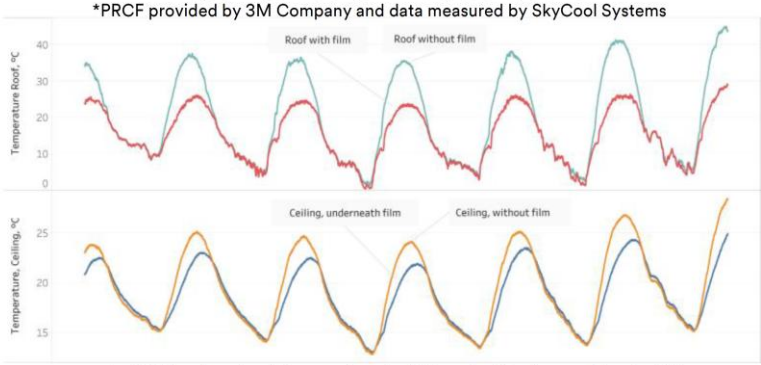
Energy Efficiency Benefits of Smart Surfaces

- **Cool Roofs & Walls**
  - 11-27% peak cooling reductions in residential air-conditioned buildings (3-4% total energy reductions)
  - Retrofitting 80 percent of commercial building roof area in the U.S. would yield net annual energy cost savings of $735 million, and annual CO2e reduction of 6.2 million tonnes
  - For cool walls, research shows up to 27% in HVAC energy cost savings reductions
- **Green Roofs**
  - Cooling season - Up to 84% lower thermal heat gain in comparison to black roofs, up to 72% reduction in heat flux
  - Heating season - 13% to 33% savings compared to black roofs
  - Simple payback of 6.2 years nationally (based on 50-year average annual savings), internal rate of return of 5.2% and an ROI of 224%, based on a net present value of $2.7/square foot
- **Trees**
  - Energy savings up to 25% for residential buildings
- **Radiative Cooling Films & Panels**
  - Energy savings 15-40% - 2x-3x more energy savings than PV generates per unit area
- **Combined Surfaces**
  - Solar + Cool Roof – Increase solar power efficiency by ~10% and energy output 3-4%
  - Solar + Green Roof – Increase solar energy output 3-4%



Passive Radiative Cooling Film on Warehouse TPO membrane roof
Project in partnership with SkyCool Systems
*PRCF provided by 3M Company and data measured by SkyCool Systems



➢ PRCF reduced roof temperature by 17C and ceiling temperature by 4C.

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Peak Demand Reduction Potential for Smart Surfaces

- Our modeling shows we can double the albedo/solar energy reflectance with city-scale smart surface interventions
- We can reduce peak summer temperatures city-wide by 5°F or more, and much more in some neighborhoods -- generally disinvested low-income areas
- Each 1°C/1.8°F of temperature increases peak electricity load up to 4.6%
- Increase of total electricity consumption of up to 8.5% for every 1°C/1.8°F of temperature increase
- Potential for reductions of peak electricity demand up to 10-15% and decreases of total electricity consumption up to 20-25%

SSC Web Tools

✓ Decision Support Tool

✓ Benefit-Cost Analysis Tool

✓ Smart Surfaces Policy Tracker

Together, these three tools help cities and metro areas develop and implement climate, sustainability, and/or resilience policies, plans, grant applications and infrastructure investments

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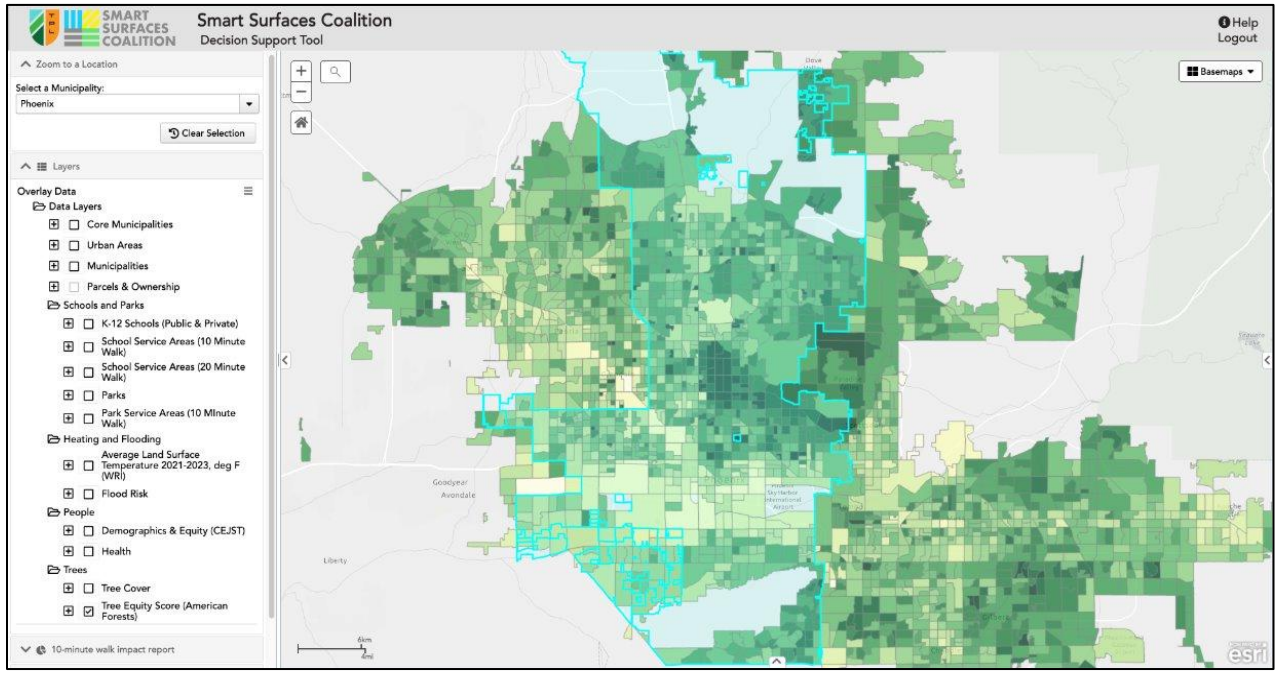
Decision Support Tool (DST)



Supports:

- Communication/education between city staff, policy makers, and public
- Development of city plans, policies, and grant applications
- Project and site prioritization

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Benefit-Cost Analysis Tool (BCAT)

Includes:

- $$, °F, and CO2e impact through 2030, 2040, and 2050
- Benefits from energy, air quality, stormwater, health, and more

Allows municipalities to:

- Model impacts of policy changes and city- and neighborhood-scale infrastructure projects
- Communicate to public, city staff, policy makers, and City Manager/Mayor
- Analyze metrics for city plans and provide data for federal and state grant applications

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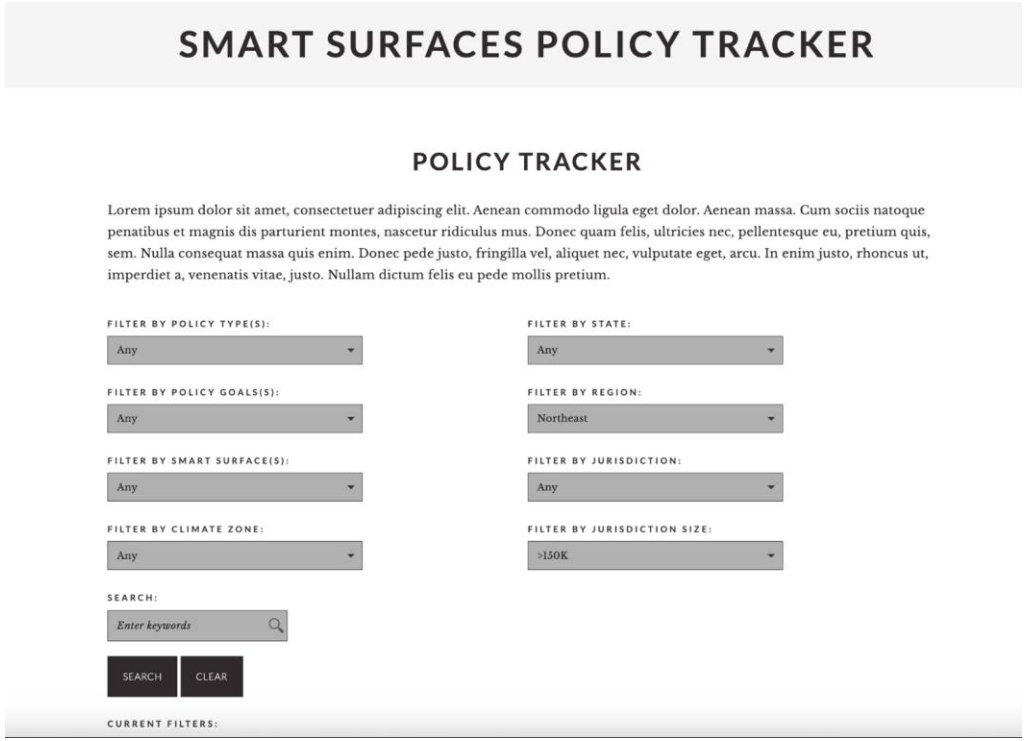
Smart Surfaces Policy Tracker (SSPT)



Allows policymakers to:

- Search for policies by Smart Surface technology, jurisdiction size/location, climate zone, etc.
- Identify/compare policy language from peer cities
- Review 450+ policies to date

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