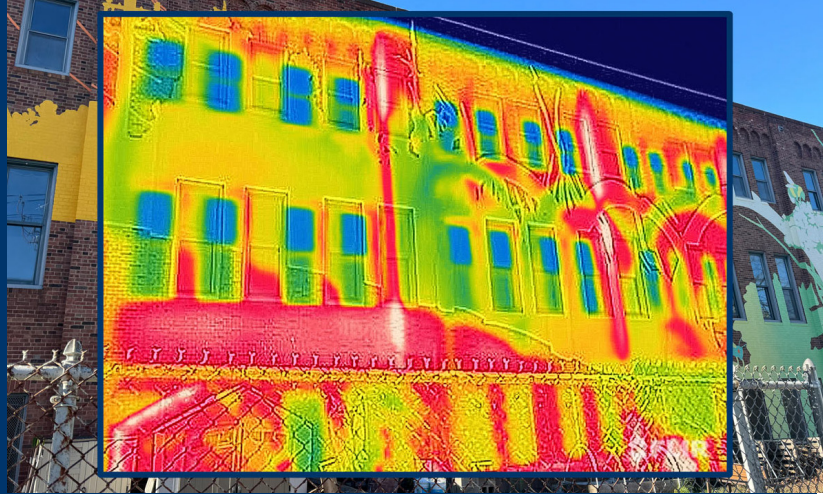
Hixon Center for Urban Sustainability

Cooling Hot Cities: A Portfolio of Urban Heat Interventions



Problem Setting

As cities around the world continue to expand and temperatures rise due to climate change, urban heat is becoming one of the major environmental and public health challenges of the 21st century. By 2050, the amount of urban land on the planet could double, or even triple under high-growth scenarios. Given how cities absorb and retain heat, this expansion itself may increase local temperatures by as much as 5.6°C. Yet because 40–60% of future urban land is not yet built, this moment also presents a major opportunity to shape climate-resilient cities. At the 2026 Franklin Institute Awards, researchers, practitioners, and artists explored three innovative cooling strategies: **(1) urban forestry, (2) cool murals, and (3) cooling shelters.** The conversation examined how urban heat interventions can be tailored to the physical, institutional, and social contexts in which they are deployed.

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Key Takeaways

- Urban heat is highly spatial and unequal, so interventions must be geographically targeted. Heat exposure varies across cities depending on the built environment, canopy cover, and historical development patterns. Prioritization must start with identifying where vulnerability is concentrated, not assuming uniform need.
- Remote sensing methods, including combining long time-series and high-resolution satellite imagery, help identify how cities change over time and where they are hottest. This can support targeted neighborhood-scale interventions.
- Effective prioritization depends on matching solution type to urban form and physical constraints. Trees, cool murals, and cooling shelters each require distinct underlying spatial, material, and environmental conditions.
- Institutional and governance contexts determine implementation pathways and deployment speed, shaping what can be delivered and at what scale.
- Community engagement determines the legitimacy, effectiveness, and long-term durability of all interventions.
- A portfolio approach is necessary because no single intervention can address all forms of heat exposure. Trees, cool murals, and cooling shelters operate across different time horizons and spatial scales, forming a layered response system that must be deployed based on local conditions.

	Urban Forestry:	Cool Mural:	Cooling Shelter:
Description:	Uses tree planting and canopy growth to reduce urban heat through shade and evapotranspiration	Applies heat-reflective paint to built surfaces combined with climate-themed public artwork	Uses solar-powered cooling systems embedded in modular open-air structures to reduce heat stress
Physical Conditions:	Best fit for areas with plantable land, adequate soil volume and water access, and suitable climate conditions and species selection	Best fit for dense built environments with sun-exposed, publicly visible surfaces such as walls, roofs, and pavement	Best fit for bus stops and other high-use public spaces with intense heat exposure, limited shade, and sufficient space for installation
Institutional Conditions:	Depends on permitting, land access agreements, maintenance funding, and coordinated planting programs	Needs property permissions, public art approvals, and coordination across municipal and community partners	Requires permitting, infrastructure approvals, interagency coordination, and technical maintenance capacity
Community Engagement:	Relies on adoption and stewardship by residents, and outreach to the most heat-vulnerable neighborhoods	Co-designed with local residents and artists through symbol gathering and storytelling	Depends on lived experience input on heat stress and everyday mobility needs
Impact:	Slow to scale but high long-term, compounding cooling and co-benefits once canopy matures	Immediate, localized cooling; scalable through replication across available surfaces	Immediate, targeted relief; scalable via modular infrastructure in high-heat exposure zones

Implementation Examples

URBAN FORESTRY

Street tree planting with youth in New Haven
Source: Urban Resources Initiative Greenskills Team

The Urban Resources Initiative (URI) at Yale School of the Environment partners with the City of New Haven to carry out a community forestry program focused on reducing heat exposure while advancing environmental justice and workforce development. Working closely with residents, the parks department, schools, and community organizations, URI plants approximately 1,000 trees annually based entirely on requests from residents. The program combines satellite-informed heat and vegetation mapping with neighborhood outreach to prioritize areas with low canopy cover and high heat vulnerability. Tree planting is combined with youth employment, formerly incarcerated adult workforce programs, multilingual canvassing, and long-term resident stewardship, including community watering and maintenance of newly planted trees.

COOLING SHELTER

Cooling bus shelter design for Philadelphia
Source: Ji Yoon Bae, Thermal Architecture Lab

Dorit Aviv and collaborators developed an off-grid cooling bus shelter prototype in Philadelphia's Hunting Park neighborhood, an area identified as a severe urban heat hotspot with limited tree canopy and high social vulnerability. Designed through community engagement with local residents and organizations, the wooden shelter integrates a solar-powered chilled water system with radiant cooling panels and a conductive cooling bench. It creates thermal relief in open-air environments without relying on conventional air conditioning. After measuring substantial reductions in perceived heat stress, the project expanded through collaboration with Henning Larsen Architects and AIL research and support from the Ramboll Foundation to create modular cooling shelters that could scale to larger public spaces. A later prototype was installed and tested on Governors Island in New York City and further adapted into mobile cooling stations deployable during heat waves and large events.

COOL MURAL

Final design for the Goffe Street Armory cool mural: "Thermal Reflections"
Source: Michael DeAngelo, 2024

Artist and designer Michael DeAngelo collaborated with the Yale School of Art, Yale School of the Environment, City of New Haven, and community stakeholders on a large-scale cool mural project at the Goffe Street Armory. The mural used reflective paint technologies designed to reduce surface temperatures while simultaneously functioning as a public art installation communicating themes related to urban heat and climate change. The design process incorporated community workshops where local residents and mural apprentices contributed symbols, imagery, and ideas connected to heat, climate, and neighborhood identity. Installed on a 250-foot wall adjacent to a community garden, the mural has become both a cooling intervention and a form of visual climate communication that translates scientific research into a sensory, publicly accessible experience.