FEDERATION OF AMERICAN SCIENTISTS

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Framework for a Heat Ready Nation

We can be heat ready. Here's how.

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About FAS

The **Federation of American Scientists (FAS)** is an independent, nonpartisan think tank that brings together members of the science and policy communities to collaborate on mitigating global catastrophic threats. Founded in November 1945 as the Federation of Atomic Scientists by scientists who built the first atomic bombs during the Manhattan Project, FAS is devoted to the belief that scientists, engineers, and other technically trained people have the ethical obligation to ensure that the technological fruits of their intellect and labor are applied to the benefit of humankind. In 1946, FAS rebranded as the Federation of American Scientists to broaden its focus to prevent global catastrophes.

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We can be heat ready. Here's how.

Extreme heat events exact a terrible human and economic toll on U.S. residents. Each year, extreme heat results in thousands of deaths and hundreds of billions of dollars in damages to critical infrastructure and economic productivity. To protect themselves, more and more individuals are going into hundreds of dollars of debt to afford life-saving energy. And an increasing share of local government resources are going to heat response activities each year.

Shattered heat records, heat domes, and prolonged heat waves are increasing in frequency across the United States. In 2025 alone, early heat waves temporarily turned places in Texas into the hottest places on earth. The Pacific Northwest, the Midwest, the Mid-Atlantic, and New England smashed early-summer temperature records. Even Alaska issued its first-ever heat advisory. According to the World Meteorological Organization, the past ten years were the ten warmest years on record.

Despite the growing frequency of extreme heat events, federal, state, and local action is fragmented and uncoordinated. Heat readiness for all communities across the United States remains an elusive goal given a lack of integrated planning, unstandardized tracking and assessment, limited multi-jurisdictional response protocols and procedures, and few sources of financial assistance for risk mitigation. The current status of efforts at each level of government include:

- **Federal actions:** The Heat.gov website was built to be a source of information for subnational governments and a partnership of federal agencies was working towards a National Heat Strategy. But there is no clear federal governance structure for extreme heat nor dedicated funding to support and sustain it. Cuts to programs and staff by the current Administration have hollowed out federal heat expertise and changes to the Federal Emergency Management Agency (FEMA) will likely impact any federal responses to extreme heat events.
- **State, territory, and Tribal actions:** More than half of U.S. states did not include extreme heat in their Hazard Mitigation Plans as of 2023. More analysis is needed to understand the readiness of territories and Tribes. Just four states have a dedicated heat action plan that guides whole-of-government activities on extreme heat. All requests to date from Governors to declare extreme heat an emergency have been denied by the federal government.
- **Local actions:** More and more local governments, particularly across the U.S. Sunbelt region, are preparing for extreme heat and initiating extreme heat responses (Table 2). But they are doing so with limited resources and staff capacity, without complete data about the impacts of extreme heat (and thus measurable targets to evaluate responses), and without a clear understanding of which authorities are available to respond locally and what needs to be elevated to the regional, state, territory, Tribal, and federal levels.

An overarching challenge is that there is no widely accepted definition of a "heat emergency" to motivate national preparedness and long-term mitigation. Extreme heat presents a clear public health emergency during a major heat wave, with the main impacts being morbidity, permanent disability, or loss of life and uninsured losses associated with factors such as reduced wages and increased healthcare costs. Heat waves can also overwhelm local health systems, creating difficult choices for health professionals regarding which lives to save and accruing unreimbursed costs from treating vulnerable patients. At the same time, the slow-moving emergency of increasingly hot seasons is more difficult to pin down, despite the major effect of chronic warming on critical infrastructure systems and the economy. Many systems, such as housing, water infrastructure, and the grid, were not built in the context of heat threats the United States currently faces and is projected to continue facing. Currently, neither the costs to human health and wellbeing nor the long-term effects of heat on infrastructure are captured by the federal disaster declaration process, which is focused on acute and time-bound structural damage.

Long-term mitigation of extreme heat will require transformative investments in the built environment to weatherize homes, schools, businesses, utilities, and healthcare facilities; build out shade infrastructure and forestry; upgrade

roads, bridges, ports, and rails to withstand higher temperatures; and equip the grid, water systems, health systems, and other service infrastructure to handle surges in demand. Financing this transformation is fiscally out of reach for many communities given a lack of financial assistance and private capital for heat resilience. For example, Hazard Mitigation Grant Program funding can only be made available to states, territories, and Tribes following a Presidential disaster declaration. Further, there are few policies in place that incentivize or require strategies that mitigate the risk of extreme heat, which could supercharge innovation in infrastructure design and steer the transformation.

The Sunbelt region of the United States is experiencing an increasing frequency of extreme temperature events, and is a harbinger of what's coming for the rest of the country. But the Sunbelt is also driving forward innovative solutions to tackle the extreme heat crisis. In April 2025, representatives from states, cities, and regions across the U.S. Interstate 10 (I-10) corridor and expert advisors convened in Jacksonville, Florida and virtually for the Ten Across Sunbelt Cities Extreme Heat Exercise (see Page 13). Subnational government leaders worked to understand the available levers for government heat response, discussed their current efforts on extreme heat, and identified gaps that hinder both immediate response and long-term planning for future extreme heat events.

Through our analysis of efforts to date in the Sunbelt, gaps in capabilities, and identified opportunities, and analysis of previous calls to action around extreme heat, the Federation of American Scientists proposes a 'Framework for a Heat-Ready Nation', a set of policy recommendations for all levels of government and non-governmental actors. **To make the United States heat ready**, we must:

1. **Establish a clear, sustained governance structure and authorities for extreme heat.** Every actor has a role to play in addressing extreme heat, but a structure to seamlessly manage extreme heat events and build resilience is needed. Governments should consider appointing leader(s) who coordinate actions across all relevant agencies and offices and with non-governmental partners.
2. **Accurately assess extreme heat and its impacts in real time.** Local, state, territory, Tribal, and federal governments should work together to establish standardized metrics for identifying and attributing heat-related illnesses, deaths, infrastructure damages and failures; quantifying economic losses; and assessing the costs of response and mitigation efforts. These data should inform thresholds that trigger emergency response protocols, safeguards, and pathways to financial assistance.
3. **Prepare for extreme heat as an acute emergency as well as a chronic risk.** Subnational governments should consider developing heat-response plans and integrating extreme temperatures into their long-term capital planning and resilience planning.
4. **Declare and respond to extreme heat as an emergency when thresholds are crossed.** When specific thresholds are crossed, local, state, territory, Tribal and federal governments should activate response plans and consider emergency declarations. There should be a transparent and widely understood process for emergency responses to extreme heat that focus on protecting lives and livelihoods and safeguarding critical infrastructure.
5. **Develop strategies to plan for and finance long-term extreme heat impact reduction.** With more people choosing to live in places exposed to extreme weather, addressing extreme heat is a life saving and economic necessity for subnational governments. Subnational governments can incentivize or require risk-reduction measures like heat-smart building codes and land-use planning, and state, territory, Tribal and federal governments can dedicate funding to support local investments in long-term preparedness.

Yesterday's extremes are today's forecasts; that is, heat once uncommon in many places is becoming routine and longer lasting. Extreme temperatures are a genuine emergency with respect to public health, economic livelihoods, and overall quality of life in the Sunbelt region and beyond. The time for decisive action is now. Local, state, territory, Tribal, and federal governments, in partnership with the private sector and communities, need to work together to move beyond reactive measures and proactively implement strategies to prepare for longer heat seasons and save lives during extreme heat events and prepare for longer heat seasons.

1 Why focus on extreme heat preparedness and response?

Extreme heat is a rapidly evolving and escalating risk to health, economic livelihoods, and infrastructure across the United States, with even the private sector taking notice of its consequential impacts. Yet extreme heat is still misunderstood in its definition, the full range of its impacts, and the ways that governments can and should be responsible for addressing it.

1.1 Defining "extreme heat"

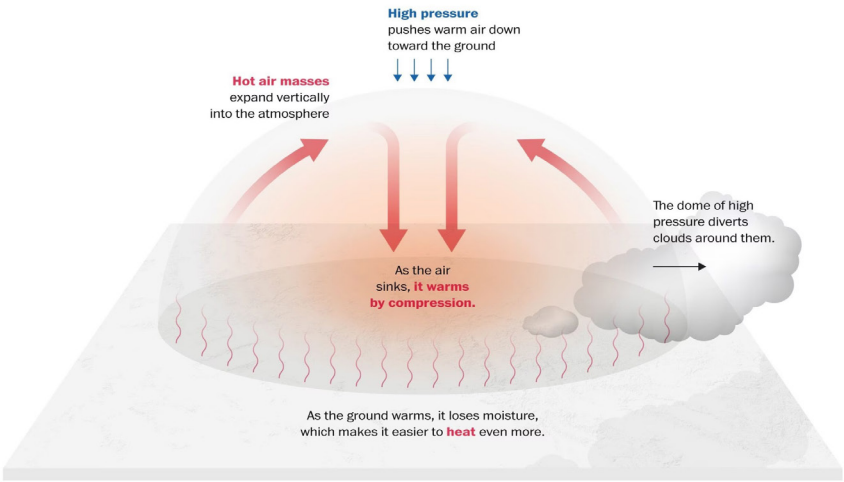
What constitutes an extreme heat event varies significantly by region of the United States. Tolerance thresholds for populations depend on local climate, acclimatization, demographic factors, and built environment characteristics, such as the number of trees in an urban area and the penetration of air conditioning. Acclimatization of individuals depends on their age, levels of exposure, and health conditions, and can also vary throughout the season as the body becomes adjusted to the higher temperatures.

Put simply, triple-digit temperatures may be shocking in one place but relatively routine in another; moreover, even relatively mild temperatures of, say, the mid-80s can pose threats in generally cold places like Alaska. Duration also plays a role, longer extreme heat events can increase the public health risk, wear and tear on infrastructure, and stress on critical resources like energy and water. Enduring exposure to extreme temperatures can impact even the most acclimatized individuals, increasing their risk for heat-related illness and death.

While the public focus tends to be on extreme daytime high temperatures, abnormally high overnight low temperatures are also dangerous for public health, agriculture, and critical infrastructure. High overnight lows make it harder for people, infrastructure, and ecosystems to effectively cool down, increasing overall stress. Humidity also compounds the effects of heat on human bodies. When humidity is higher, it is harder for the body to cool itself down, as sweat cannot evaporate as readily off the skin. The combination of humidity and heat is often represented by two metrics, the heat index and the wet-bulb globe temperature. The heat index uses temperature and relative humidity and is more widely applied. More sophisticated and physiologically relevant, the Wet Bulb Globe Temperature (WBGT), takes into account all of the effects that impact heat stress, temperature, humidity, wind speed, sun angle and cloud cover.

Some terms used to describe extreme heat phenomena include:

- **Heat alerts.** Alerts include (in order of severity) heat advisories, watches, and warnings. The thresholds for issuing these different types of alerts are determined by region. Each National Weather Service Forecast Office has authority over which heat-related alerts they issue as conditions warrant.



WHAT A HEAT DOME LOOKS LIKE. VIA THE WASHINGTON POST

- **Heat wave.** A period of abnormally hot weather that lasts for two to three days. There is no nationally consistent criteria for defining a heat wave. Some heat waves are caused by **heat domes**, a persistent region of high pressure that traps hot air over an area, acting like a dome that forces air downwards and causes further warming. Heat domes can last from days to weeks and are becoming more frequent. During a heat dome, there will be prolonged periods of intense sunshine and escalating heat near the surface, which can increase temperatures by the day and into the night. Heat domes can also trap humidity, as hot air can hold more water, creating dangerous conditions that can reach or surpass limits of human survivability.
- **Chronic extreme heat.** This term refers to when dangerously high temperatures are sustained over the course of weeks and even months. Chronic extreme heat is experienced by many of the localities in the Sunbelt region of the United States, along and below the I-10 Corridor. For example, the period roughly from May through September for the metropolitan Phoenix area is a chronic extreme heat season.

1.2 The impacts of extreme heat

1.2.1 Impacts on public health

Extreme heat is a threat to public health, and is one of the leading causes of weather-related mortality. In 2023 alone, at least 2,300 people died from extreme heat. However, because of discrepancies in cause-of-death attribution, and the knowledge that heat makes certain life-threatening chronic conditions worse, clinicians project that true mortality is actually +10,000 annually. Heat illness, like heat stroke, can also be permanently disabling, as a result of permanent damage to organs like the brain and the heart.

High temperatures can also have more indirect effects, such as by exacerbating underlying medical conditions, increasing the risk for adverse birth outcomes, and disrupting access to essential healthcare. Long-term, chronic exposure to extreme heat can also cause severe kidney damage that can progress to chronic kidney disease, requiring dialysis.

Although everyone can be negatively affected by extreme heat, some people may be more at risk than others. Certain groups have physiological conditions that may increase their risk, such as older adults (e.g. decreased sweat response), younger children (e.g. smaller body surface area), and those taking certain medications, particularly psychiatric medications (e.g. impairs body's thermoregulatory response). Those who are exposed more to extreme heat, such as those without reliable cooling access or shelter or who experience high exposures on the job, will also have a higher risk of developing heat-related illness. This means that the number of people at elevated risk from extreme heat in the United States is in the hundreds of millions. 1 in 6 people in the United States are 65 or older, 1 in 3 U.S. employees are exposed to extreme heat on the job, 1 in 4 households are behind on their energy bills and may be keeping their homes at unsafe temperatures as a result, and 1 in 3 U.S. schools lack or need upgrades to their air conditioning systems to protect against extreme temperatures.

These public health impacts are felt particularly acutely in the Sunbelt region of the United States. In California, one fourteen-day extreme heat event in 2022 caused 4,200 emergency room (ER) visits, 2,000 hospitalizations, 140 adverse birth outcomes, and 200 deaths. In Arizona, the most populated counties, Maricopa County and Pima County, regularly see hundreds of deaths from extreme heat. In Texas, children's heat-related ER visits have nearly tripled over the past decade and the state saw 450 heat-related deaths in 2023. Florida has the highest rate of heat-related illness and ER visits in the nation. Louisiana regularly sees power outages after severe storms, putting many of the state's vulnerable residents at increased risk of heat-related illness and death.

1.2.2 Impacts on critical infrastructure and the economy

All critical infrastructure sectors are affected by extreme heat. Extreme heat can have direct and indirect impacts as well as short and long term impacts:

- **First-order impacts.** First-order impacts are those that are direct and immediate. These include system capacity overloads (e.g., health-care systems that become overburdened when heat illnesses spike, power grids that fail as a result of reduced generation and overwhelming demand, and water shortages due to increasing demand) and physical damages (e.g., roadway, bridge, airport runway and railway deformations due to thermal expansion).
- **Second order impacts.** Second-order impacts are those that are indirect and immediate or near-term, often resulting from the first-order impacts. These include disruptions to critical services as a result of capacity overloads and infrastructure damage that then creates additional public safety hazards, and can also include transportation delays and delays in care delivery.
- **Third-order impacts.** Third-order impacts are those that are indirect and longer-term, resulting from continuation of second-order impacts. These include emergency responder and health care provider burnout, reduced agricultural output and critical manufacturing capabilities, and market and supply chain disruptions.

Each of these impacts translate into economic losses due to infrastructure damage, increased operating costs, and reduced productivity. Unfortunately, current understanding of heat's economic impacts are all estimates due to a lack of rigorous research on the subject. Early understanding of the economic impacts include:

- **Lower worker productivity and increased workers compensation claims.** Workplaces are seeing $100 billion in lost productivity each year because of extreme heat, diminishing output and efficiency of businesses in hundreds of industries. Each excess workers' compensation claim can cost a state $6,500 dollars.
- **Damaged gray (e.g. roads and transportation systems) and green infrastructure (e.g. urban forests).** Extreme heat increases wear and tear on aging roads, bridges, and rail. Road maintenance costs are expected to balloon to $26 billion annually by 2040. Excess heat can also lead to the death of trees, diminishing protective shade.
- **Excess healthcare utilization.** Extreme temperature spikes in emergency room visits and hospitalizations cost the healthcare system $1 billion a year. Each extreme heat day costs the Medicare program an extra $4 per recipient per day. Extrapolated to the entire Medicaid population, costs could top $274 million a day.
- **Power system strain and failure.** Extreme heat puts roughly two-thirds of the country at risk of a blackout. Even a minute of power outage can cost thousands of dollars. The federal government had to issue a power emergency in June 2025 to prevent the grid from failing during a heat wave in the Southeast.
- **Destroyed crops and dead livestock**. A hot drought in 2024 resulted in $14.5 billion in damages as a result of lost crops and livestock.

Extreme heat also has a broad economic toll on entire regions. A 2023 analysis by the Federal Reserve Bank of Dallas of extreme heat's economic impacts on Texas found that most employers saw negative revenue or production impacts due to extreme heat. It also found that hotter states see the most adverse economic impacts when average temperatures are greater than 80F, which frequently occurs in the spring and summer months. As major insurers pay increasing attention to extreme heat, there could be financial consequences to businesses as a result of these rising losses, which could increase overall operating costs.

1.3 Roles and responsibilities for emergency management

1.3.1 Governmental actors

The U.S. approach to emergency management is tiered across each level of government. During an acute event, local communities are generally the first line of defense. States, territories, and Tribes can provide the next level of support and coordination, and the federal government acts as a backstop, stepping in when the scale of the disaster exceeds subnational capabilities. National frameworks like the National Response Framework (NRF) and the National Disaster Recovery Framework (NDRF) guide and coordinate response and recovery efforts across all levels of government and with the private sector and non-governmental organizations.

The information below is illustrative of what response during an acute emergency *can* look like as it escalates across the levels of government[1].

- **Local.** Local authorities, the first line of defense, generally have the most detailed knowledge of an affected area, its infrastructure, and populations. Local governments are responsible for immediate actions to save lives and meet the basic needs of residents, including declaring emergencies. Local entities utilize their own resources, including personnel, equipment, and local volunteer networks, to address the immediate effects of the event. If local resources are overwhelmed, local governments can request support for response to the next level of government, the state, territory, and Tribal level. The process for making this request and the help available differs by state, territory, and Tribe.

- **States, Territories, and Tribes.** When a local government's resources are or are expected to be overwhelmed or the disaster spans multiple localities, a state, territory, or Tribal government may step in to coordinate and provide support. States, territories, and Tribes can mobilize resources, including the National Guard, emergency management agencies, and specialized medical teams, to assist local affected areas. States, territories, and Tribes can also provide financial assistance, policy guidance, technical expertise, and logistical support to help local governments manage the disaster response. Finally, states. territories, and Tribes can issue their own emergency declarations that unlock resources and provide regulatory flexibilities that can be useful in responding to an event.

  If the needs of the affected areas are or are expected to exceed the state's, territories', or Tribe's capabilities, the leadership of the state, territory, or Tribe can request federal assistance through a formal declaration process. Only the Governor of a state or territory or chief executive of a Tribal nation can issue a request to the federal government Federal disaster declarations require a specific set of steps. First, the governor of the affected state or territory (or the leader of the affected tribal government) must make a formal request to the President of the United States. The Federal Emergency Management Agency (FEMA) uses a set of criteria—primarily, but not exclusively, based on estimated damages compared to a financial threshold called the "per capita impact indicator"—to recommend to the President whether to grant the declaration. Ultimately, the decision to declare a disaster rests with the President, though states, territories, and Tribes can appeal a denial by providing additional information on damages and other impacts.

- **Federal**. If the President approves the major disaster declaration request, the federal government provides resources such as funding, equipment, regulatory waivers, and logistical support via multiple agencies. This is coordinated through FEMA, the agency with the primary mission of reducing the loss of life and property from all hazards.

  Additionally, under section 319 of the Public Health Service Act, the Health and Human Services (HHS) Secretary can assist disaster response by issuing a Public Health Emergency (PHE). There is no requirement for a request from an impacted state, territory, or Tribe to declare a PHE. PHEs often follow major disaster declarations, and certain authorities are only unlocked if there is a concurrent major disaster declaration.

  When a PHE is declared, HHS can do the following:
  - Access funds appropriated to the Public Health Emergency Fund (though it is important to note that this fund, while authorized, does not currently have appropriations and has not had appropriations for 25 years).
  - Grant extensions or waive sanctions relating to submission of data or reports required under HHS laws.
  - Deploy National Disaster Medical System personnel and the U.S. Public Health Commissioned Corps to aid emergency response.

1 This framework for emergency management is currently up for debate. Executive Order 14239, "Achieving Efficiency Through State and Local Preparedness" and internal FEMA memos propose changes to national preparedness policies and emergency management procedures.

- Activate the Emergency Prescription Assistance Program that provides uninsured persons with drugs, vaccines, medical supplies, and medical equipment during certain declared emergencies.
- If a Stafford Act declaration is concurrent, issue 1135 Waivers that waive or modify requirements of Medicare, Medicaid, State Children's Health Insurance Program, and the Health Insurance Portability and Accountability Act in order to meet the health needs of populations in the emergency area and reimburse providers for care.

Finally, federal disaster declarations can unlock financial assistance to impacted communities to support their recovery via one or more of the following: Public Assistance, Individual Assistance (e.g. Individuals and Households Program), the Hazard Mitigation Grant Program (HMGP), Small Business Administration Disaster Loans, and if Congress authorizes it, the Community Development Block Grant Disaster Recovery Funds.[2] All of these programs provide financial resources that would be beyond the capabilities of a local, state, territory, or Tribal government for recovery efforts and rebuilding efforts, as well as long-term risk mitigation strategies.

1.3.2 Non-governmental actors

Non-profit organizations, community groups and faith-based organizations, academic and research institutions, the health care sector, voluntary organizations active in disasters (VOADs), the private sector, and other non-governmental actors can add capacity to the responses of local, state, territory, Tribal, and federal agencies. For example, FEMA's Community Lifelines and the Emergency Support Functions rely on the strong participation of non-governmental actors in building community preparedness. Private sector actors from critical infrastructure are also key to implementing short-term and long-term risk reduction strategies.

1.4 Barriers to preparing for, responding to, and recovering from extreme heat emergencies

Extreme heat falls at the margins of two distinct federal disaster authorities, (ii) federal emergencies/disasters under the Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), which are managed by FEMA and are declared by the U.S. President, and (i) the Public Health Emergency (PHE), which is declared by the Secretary of Health and Human Services. There has never been a federal disaster declaration for heat through either the Public Health Emergency declarations process or the Stafford Act declarations process, despite extreme heat being immediately more deadly than any other natural hazard. Extreme heat is also not explicitly included in preparedness efforts authorized under the Pandemics and All Hazards Preparedness Act (PAHPA)

The omission contributes to the lack of recognition of heat as a hazard that deserves specific attention. Indicators of this include extreme heat being insufficiently included or not included at all in local and state hazard mitigation plans and public health preparedness plans. All three attempts by states to secure a Stafford Act disaster declaration for heat have been denied. Federally, there is no framework for responding to extreme heat as a disaster. And while under the Biden-Harris administration as many as 28 agencies regularly convened and strategized to align on programmatic and policy efforts to address extreme heat, these efforts were discretionary rather than directly grounded in statute – and as a result, much of this federal coordinating structure has evaporated under the current administration.

The challenge in declaring extreme heat as a major disaster is that the main damages of extreme heat events is excess human morbidity and loss of life. Preliminary damage assessments required under the Stafford Act are primarily intended to inventory physical damage to the built environment, making it challenging to capture the impacts of loss of life, injuries and illness, and other non-structural harms when requesting federal aid for heat. This is despite the real financial costs of morbidity and mortality. For example, there were 608 confirmed heat deaths in Maricopa County,

2 For recent major disaster declarations, the current administration has withheld HMGP funding.

Arizona alone in 2024. Using the National Risk Index's value of a statistical life ($11.6 million/life) this loss of life has a total cost of $7.05 billion. That is over **120 times** Arizona's state per-capita impact indicator threshold of $57 million for declaring a national disaster, even when using the higher proposed indicator intended to decrease the number of disaster declarations. Even in the most populous state, California, just 26 deaths surpasses the state's per-capita impact threshold. Ignoring acute health impacts and significant loss of life means ignoring extreme heat as what it is–a very real disaster.

1.5 How can governments prepare for extreme heat?

Extreme heat needs to be addressed on different temporal scales depending on regional risk. Acute events, such as heat waves and heat domes, require emergency response protocols, while chronic heat requires preparation for an extended emergency response with the potential for acute events to occur throughout the extreme heat season. A collaborative, coordinated response across government and civil society is needed, especially if regions experience high heat impacts simultaneously and resources become scarce.

The NIHHIS Maturity Model for Heat Governance (Table 1) is an evidence-based framework for governments to assess and improve their readiness to address extreme heat. It outlines a five-level scale across ten dimensions that reflect increasing levels of organizational development and coordination specifically for heat-related activities. The model helps decision-makers identify their current heat governance capabilities and provides a roadmap for progressing toward more effective strategies.

From an institutional perspective, the model emphasizes the importance of clearly defined roles, consistent funding, regular evaluation, and integrated emergency planning. At the lowest levels, heat response is fragmented, underfunded, and reactive, often relying on temporary programs or individual initiatives. As governments mature, they establish formal authority structures, secure dedicated and ongoing funding, engage in community-informed evaluation, and fully integrate into emergency management plans. The model promotes a shift from ad hoc, short-term solutions to a proactive, institutionalized approach that empowers actors to shape policy and mitigate the long-term risk of extreme heat events and chronic higher temperatures.

TABLE 1: MATURITY MODEL, ADAPTED FROM NOAA: A MATURITY MODEL FOR HEAT GOVERNANCE

	DIMENSION	MATURITY LEVEL
INSTITUTIONS	AUTHORITY	Level 1: Ad hoc management Level 2: Implicit authority Level 3: Explicit authority Level 4: Explicit authority documented in heat plan Level 5: Explicitly authority with policy making role
	FUNDING	Level 1: No clear funding mechanism Level 2: Time-limited support for projects Level 3: Funding exists for staff programs but not tied to heat Level 4: Time-limited support for heat specific staff/programs Level 5: Permanent funding for staff/programs
	EVENT PREPAREDNESS & RESPONSE	Level 1: Limited or no evaluation and assessment (E & A) Level 2: One-off E & A Level 3: E & A occurring annually Level 4: E & A occurs during the heat season, public involved Level 5: E & A informs policy/protocol changes, integrated with community engagement
	EVALUATION AND ACCOUNTABILITY	Level 1: Limited emergency management (EM) awareness of heat risks Level 2: EM engagement with heat planners Level 3: Limited experience with heat but appears in hazard plans Level 4: Regular heat/EM coordination emerging Level 5: Hazard planning well integrated with heat planning
PARTNERSHIPS & NETWORKS	COORDINATION	Level1: Limited coordination Level 2: Informal, local coordination Level 3: Formal coordination, may extend across scales Level 4: Cross-scale coordination, private and community organizations involved Level 5: Mature relationships across scales and among varied organizations
	INCLUSIVITY	Level 1: Only public-sector agencies involved Level 2: Public sector agencies consult subject matter experts Level 3: Informal consultation occurs Level 4: Formal advisory or accountability processes exist Level 5: Community interests drive policy decisions
	PUBLIC COMMUNICATION	Level 1: Limited, uncoordinated public messaging Level 2: Periodic messaging tied to heat season milestones Level 3: Campaigns and branding help unify messaging Level 4: Multi-language, multi-venue messaging Level 5: Targeted, two-way communication with most impacted neighborhoods
ASSETS	PHYSICAL INFRASTRUCTURE	Level 1: Cooling centers, electric grid, and housing stock are inadequate Level 2: Small scale projects to improve infrastructure resilience Level 3: Guidance or regulations aim to improve new infrastructure Level 4: System-wide infrastructure upgrades underway Level 5: Infrastructure is “heat ready”
	NATURAL INFRASTRUCTURE	Level 1: Access to natural cooling is insufficient Level 2: Projects to expand natural cooling exist but are uncoordinated Level 3: Plans or regulations exist to expand natural systems that provide cooling Level 4: Plans, programs or regulations successfully expand access to natural spaces for heat relief Level 5: Natural systems are clearly integrated into heat planning efforts
	APPLICATION OF TECHNICAL KNOWLEDGE	Level 1: Local heat hazard data are not available or rarely used in decision-making Level 2: Local heat climatology and heat island influence are unknown Level 3: Heat impact data is regularly collected and assessed Level 4: Relationships among heat drivers, impacts, and outcomes are modeled, assessed, and predicted Level 5: Real-time operational capabilities exist, and actionable information is delivered to relevant users

2 Lessons learned from the frontlines

2.1 About the Ten Across Sunbelt Cities Extreme Heat Exercise

On April 15, 2025, representatives from different states, cities, and regions across the U.S. Interstate 10 (I-10) corridor met in Jacksonville, Florida and virtually for the Ten Across Sunbelt Cities Extreme Heat Exercise. The host organization, the Arizona State University's Ten Across Initiative, focuses on understanding and addressing complex challenges faced by communities along the I-10 corridor, spanning from Los Angeles to Jacksonville. The objective of this meeting was to discuss the roles and responsibilities of local, county, and state partners, and participants worked together to map this out in a state-by-state manner. Each state discussed their current efforts on extreme heat, opportunities to address coordination and communication challenges across jurisdictions, understand available levers for government heat response and how that information is shared, and identify gaps that hinder both immediate response and long-term planning for future extreme heat events. Findings from these discussions are captured below.

2.2 Maturity of preparedness for extreme heat in the sunbelt region

Sunbelt government readiness for extreme heat was evaluated using the National Integrated Heat Health Information System (NIHHIS) Maturity Model for Heat (Table 1). Progress has been made in addressing extreme heat in the Sunbelt region, as evidenced by the number of jurisdictions in the Ten Across network with plans that reference extreme heat, its impacts, and strategies for preparedness, response, and mitigation. More mature jurisdictions are seeing dividends from years of coordinating, planning, and action. For example, increased investments by the City of Phoenix's for heat response practices may have contributed to the decline of heat-related mortality for the first time in years in 2024. Much of this is credited to the City's intensive focus on securing shelter, through 24/7 cooling centers and secured shelter for housing-vulnerable people. Getting there took advanced coordination, communications, and partnership across government offices, non-profit organizations, and private sector partners.

In evaluating heat governance maturity across the Sunbelt states a common thread emerged: many jurisdictions demonstrate growing awareness and are taking steps to respond, but shortcomings persist in achieving fully mature heat resilience as envisioned by NIHHIS.

- There is a patchwork of comprehensive, standalone heat action plans that include all necessary preparedness, emergency response and long-term risk mitigation strategies. Because of this, efforts are sometimes fragmented, relying instead on broader emergency management frameworks where heat may not receive the specific focus it requires
- There are still-evolving coordinating efforts to unify diverse governmental departments, regional bodies and community partners. This can potentially lead to gaps in service delivery or overlapping efforts.
- There are unstandardized strategies for collecting, assessing, and utilizing risk data to design targeted interventions and resource distribution as well as to inform long-term capital planning.
- There are inconsistent or time-limited funding resources for heat-related preparedness, response, and mitigation initiatives hindering long-term strategic plan implementation. This is happening even in jurisdictions with higher maturity levels.
- Preemption laws in some states (Texas and Florida) limit local authority to enact heat protections, specifically worker protections from heat.

TABLE 2: STATE OF ACTION ON EXTREME HEAT IN THE SUNBELT REGION FOR PARTICIPATING GOVERNMENTS

	GOVERNMENT AND MATURITY LEVEL	IS THERE A HEAT PLAN? IF SO, WHAT KIND OF PLAN?	WHICH ACTOR DRIVES PLAN IMPLEMENTATION?	EVIDENCE OF ACTION ON EXTREME HEAT
CALIFORNIA	STATE OF CALIFORNIA (4)	Yes, Extreme Heat Action Plan and an Extreme Temperature Response Plan	Extreme Heat Action Plan driven by the California Natural Resources Agency. Extreme Temperature Response Plan driven by the Office of Emergency Services	Extreme Heat and Community Resilience Program; CalHeatScore; Insurance assessment; Declaration of heat as an emergency in 2022.
	LOS ANGELES COUNTY (3)	In development, County Heat Action Plan	Chief Sustainability Office. With support from the Department of Public Health and the Office of Emergency Management	Heat surveillance and public alerts and communications; Regional network of cooling centers; Indoor temperature threshold in development; Toolkit for schools dealing with heat.
	CITY OF LOS ANGELES (3)	In development, Heat Action and Resilience Plan. Framework for the plan has been developed.	Climate Emergency Mobilization Office, the Climate Resilience Division of the Emergency Management Department. The Chief Heat Officer leads the division, and recently hired a Deputy Heat Officer.	The Heat Relief 4 LA Public Awareness Campaign; Heat Safety Resources and Handouts in 15 languages; The Cool Spots LA map; Coordinated networks of cooling centers; LA Extreme Heat StoryMap exploring the impacts of extreme heat.
	CITY OF SAN DIEGO (3)	In development, Extreme Heat Action Plan. Heat mitigation strategies in Climate Resilient SD plan	City Planning Department	Urban Heat Vulnerability Index; "Cool Zones"
	CITY OF SANTA MONICA (2)	No plan that includes extreme heat; coordinates with LA County on response	N/A	Coordination with the County on cooling centers and provides basic heat safety information; Some focus on mitigation through trees.
ARIZONA	STATE OF ARIZONA (4)	Yes, Extreme Heat Preparedness Plan, focused on response and long-term preparedness	Governor's Office of Resiliency, Chief Heat Officer	State Emphasis Program for Heat Safety; Chief Heat Officer; Operates Arizona Heat Preparedness Network; Extreme heat declared as a state of emergency in 2023.
	MARICOPA COUNTY (4)	No publicly available plan. Maricopa County operates the Heat Relief Network	Maricopa County Department of Public Health	Leading heat-health surveillance program; Heat Relief Network coordinates a vast system of hydration, cooling, and respite centers.
	CITY OF PHOENIX (4)	Yes, Heat Response Plan and Shade Phoenix Plan. Heat is also in the Climate Action Plan.	Cross departmental leadership teams including the Office of Heat Response and Mitigation.	Heat Response operations run continuously May-Sept; 30 actions in the heat response plan including 24/7 cooling centers, first responders training, heat safety measures for workers, and public communications.
	CITY OF TUCSON (4)	Yes, Heat Action Roadmap, a combined response and resilience plan. Plan includes 10 intersectional strategies and 61 actionable items.	Chief Resilience Officer	Protections for city contractors and city employees; Southern Arizona Heat Summit; Network of heat-relief infrastructure and relief kits available; Collaboration with Pima County on heat-health surveillance.

TABLE 2: STATE OF ACTION ON EXTREME HEAT IN THE SUNBELT REGION FOR PARTICIPATING GOVERNMENTS

	GOVERNMENT AND MATURITY LEVEL	IS THERE A HEAT PLAN? IF SO, WHAT KIND OF PLAN?	WHICH ACTOR DRIVES PLAN IMPLEMENTATION?	EVIDENCE OF ACTION ON EXTREME HEAT
TEXAS	STATE OF TEXAS (1)	No standalone plan, heat is included as a hazard in the State Hazard Mitigation Plan.	N/A	State level heat safety information; Negative actions include a "Death Star" law that preempts local action to protect workers from extreme heat.
	CITY OF AUSTIN (3)	Yes, there is a Heat Resilience Playbook	Office of Climate Action and Resilience	Focus on infrastructure resilience and expanding natural cooling solutions; Operates cooling centers and robust heat-health surveillance; Collaboration with Austin Energy on weatherization.
	CITY OF EL PASO (1)	No plan that includes extreme heat as a hazard.	N/A	Offers cooling centers during extreme heat warnings.
	CITY OF HOUSTON (3)	Yes, Houston Excessive Heat Plan, a response plan	Office of Emergency Management	The city activates heat emergency plans and provides cooling centers; H3AT heat mapping campaign
	CITY OF SAN ANTONIO (3)	Yes, heat response plan, with a comprehensive heat resilience playbook and actions inventory in development.	The Office of Emergency Management coordinates the response; additional departments support based on expertise.	Hot weather resource page; Places to Stay Cool Activation; Targeted outreach to the most vulnerable neighborhoods and populations; Heat-Related Illness Dashboard.
LOUISIANA	STATE OF LOUISIANA (2)	No standalone plan, extreme heat section in Climate Action Plan and Hazard Mitigation Plan	N/A	Operates a heat-related illness dashboard; Heat declared as an emergency in 2023.
	CITY OF NEW ORLEANS (3)	Yes, Heat Mitigation Plan in development. Heat is identified in the City's Hazard Mitigation Plan	Office of Homeland Security and Emergency Preparedness	NOLA Ready prepares the community for heat, Office of Resilience and the Health Department are involved.

TABLE 2: STATE OF ACTION ON EXTREME HEAT IN THE SUNBELT REGION FOR PARTICIPATING GOVERNMENTS

	GOVERNMENT AND MATURITY LEVEL	IS THERE A HEAT PLAN? IF SO, WHAT KIND OF PLAN?	WHICH ACTOR DRIVES PLAN IMPLEMENTATION?	EVIDENCE OF ACTION ON EXTREME HEAT
FLORIDA	STATE OF FLORIDA (1)	No standalone plan, extreme heat is included in the Hazard Mitigation Plan.	N/A	State-level heat safety information, research (Florida BRACE); Some regulations (nursing home cooling); Negative actions include preempting local heat protections for workers.
	JACKSONVILLE (3)	Yes, Stay Cool Jax plan. The Resilient Jacksonville strategy includes heat.	Resilience Office	Established a task force; Activates cooling centers and transportation assistance during events; Crafting standards for Emergency Operations Center to track heat impacts; Plans for long-term adaptation strategies.
	TALLAHASSEE (2)	No standalone plan, in the Comprehensive Emergency Management Plan Annex and the Tallahassee Community Resilience Plan	Office of Emergency Management, City and County Administrations	Partner calls to coordinate services for vulnerable people; Provides general heat safety information; Activates public facilities as cooling centers and tracks their utilization; Additionally, advises the public to use publicly accessible, privately owned buildings.

2.3 Gaps and barriers for extreme heat preparedness and response

The Ten Across exercise revealed the following gaps and barriers in extreme heat preparedness and response:

When planning

- **Governance structures and policies are lacking.** Responsibility for addressing extreme heat remains unclear across local, state, territory, Tribal, and federal levels, from preparedness to response to risk mitigation. There is a need to design coordinated decision making during extreme heat events, both within local governments and across local governments, counties, and regional partners like health departments, emergency management, and regional planning offices. There is also a need to understand how state, territory, and Tribal governments and the federal government support local preparedness and response.
- **Not all relevant staff are appropriately trained and integrated into heat planning and programming.** Given the multidimensional impacts of extreme heat on communities, all city, county, state, territory, and Tribal employees should have a basic awareness of the impacts of extreme heat to their programs and how to integrate preparedness and risk-mitigation strategies into their work. Training on extreme-heat response is especially important for public-sector workers on the frontlines of supporting impacted communities (e.g., public safety, libraries, water/utilities departments).
- **Existing heat plans across municipalities, states, territories, Tribes and regions are uncoordinated.** Given the multi-sector impacts of extreme heat, many government agencies need to be involved in response and long-term risk management. No agency can do this work alone, yet planning processes for hazards are often siloed. Effective heat plans need to include vulnerability and risk assessments, civil society partnerships, and be coordinated with surrounding municipalities to increase mutual aid and eliminate competing commitments, such as broad resource and personnel sharing agreements.
- **Funding streams are unreliable.** Rather than a sustainable funding stream dedicated to heat preparedness, emergencies, and risk reduction, one-time and cobbled-together funding is common, increasing the fragility of program delivery. Uncertainty about current federal funding adds new complexity to the funding landscape. Extreme heat preparedness also faces the "wrong pocket" problem, where public investments in preparedness and mitigation yield benefits for other sectors and agencies who do not see or fully understand the connections to that initial investment.
- **Few goals and measurable targets exist for mitigating extreme heat's impacts.** Every heat death is preventable. A target for reducing the number of negative health impacts and deaths, as well as the scale of economic impacts and infrastructure damage from extreme heat has yet to be set by many jurisdictions. This is necessary to support planning processes, budget planning, as well as after-action evaluation. Many local communities also lack the policy tools or legislative authority to act decisively.

When responding

- **Data collection is challenging.** Heat-impact data (e.g. deaths) is not standardized, universally accessible, or always actionable. There is a need for data standardization, reporting of data in a timely manner, and the development of frameworks for integrating different types of data (e.g., on mortality, healthcare systems, emergency medical services, utility systems) to inform decision making. Data regarding real-time usage of cooling centers, extreme heat's impacts on health systems, and financial impacts and losses attributed to heat are needed to justify increased financial assistance, better understand the cascading impacts of extreme heat, and justify disaster declarations.
- **The "true" costs of extreme heat are unknown.** Complete estimates for heat-related impacts, especially in real-time, remain elusive. This includes accounting for:
    - **Health impacts** like loss of life, emergency-room visits, and hospitalizations exist, data on other medical costs, including outpatient, clinic, and increased office visits due to exacerbated conditions.

- **Economic impacts** like increased worker's compensation claims, lost workdays due to illness, and decreased productivity, agricultural product losses and supply chain disruptions, and the economic fallouts of service outages. Looking ahead, the cost of lost investment from industries choosing to relocate or set up business elsewhere due to current and future extreme temperature risks could also be tracked to build the case for risk mitigation investments.
- **Infrastructure impacts** like additional repair costs and critical system failures.

Further, many of the costs of preparing for and responding to acute and chronic extreme heat events are not tracked cohesively or separately. This makes it difficult to support budget justifications for heat actions.

- **Communication and public awareness are not going far enough.** A lack of consistent government reporting on heat's consequences makes it harder to generate public and political urgency. Messaging also needs to be tailored by sector or demographic (e.g., age, language, or cultural accessibility) because levels of exposure and risk differ among those subcategories. Those most vulnerable to extreme heat include those with pre-existing health conditions, older adults, pregnant women, children, the unhoused, and those with substance abuse disorders.
- **There are no widely agreed-upon triggers for a heat emergency.** There is still a limited understanding of when heat crosses "emergency" thresholds. Some local governments are exploring triggers for their emergency response declarations based on the severity of the health impacts, while others are trying to assess the strain on their capacity and determine what additional resources could be marshalled before making emergency declarations. Designing a heat emergency trigger is complex, and can be informed by the severity of the extreme heat event (e.g. daytime and nighttime temperature, humidity, and duration), local risk factors that exacerbate heat impacts (e.g. level of acclimatization, building conditions and air conditioning uptake, and the size of the heat-vulnerable workforce), and the severity of the impacts and costs. Extreme heat may become an emergency for some sooner than others, a challenging dimension for local governments to consider when responding to extreme heat. Procedures for requesting more support, such as state, territory and federal support, should be clear and tailored to the unique impacts of extreme temperatures.
- **The U.S. healthcare system is generally not prepared.** Health professionals are at the front lines of response during heat waves, yet many receive no formal training on extreme heat and its impact on patient health. Staff responding to extreme heat also are being exposed themselves and may not have workplace protections. There is often no clear plan for addressing cascading health-system effects from extreme heat, particularly the risk that emergency rooms become overwhelmed due to unmanageable numbers of heat-illness cases. Preventative care like crisis services and behavioral services are fragmented and underfunded, meaning that the most vulnerable are at increased risk.

When reducing long-term risk

- **Most infrastructure is not designed for the 21st century climate.** Aging infrastructure in the United States is vulnerable to increased heat variability and intensity. For example, during the Ten Across exercise, concerns about grid failure and subsequent water provisioning failures were paramount. If either or both of these services goes down during an extreme heat event, entire regions will be at risk for profound health impacts, potentially thousands of hospitalizations and hundreds of deaths.
- **Housing is not designed and prepared for the 21st century climate.** Shelter is one of the most essential protections from extreme heat and its health impacts. Yet even in the hottest regions of the country, designs and codes for housing, such as choice of materials, weatherization strategies, and cooling systems, do not fully consider the impacts of extreme heat. Well-designed building codes can mitigate heat's risks by reducing strain on the grid and protecting occupants in the case of a power outage.
- **Rural heat mitigation and adaptation is largely missing from heat governance conversations.** Much attention has been given to urban heat mitigation and adaptation across city management. However, rural communities also experience extreme heat and do not have the municipal infrastructure or emergency response network

in place to mount a sustained response and mitigate long-term risk. State, territory, and Tribal governments can play a critical role in ensuring all communities are prepared for extreme heat.

2.4 Principles for effective heat governance

Given all of the challenges facing subnational governments' preparedness and responses to extreme heat, it is important to establish where to start the work of addressing extreme heat and its impacts. Cross-cutting principles for effective governance from the convening's discussions are below. The following section provides more specific recommendations for action.

- **Promote Heat Literacy**: Implement educational initiatives that enhance the public understanding of the physiological impacts of heat, the identification of heat-related illnesses, and evidence-based illness prevention strategies across all age groups.
- **Facilitate Early and Motivational Risk Communication:** Utilize communication strategies that convey heat-related risks and protective measures effectively to diverse audiences, fostering informed decision making and behavioral changes.
- **Cultivate Collaborative Community Engagement:** Actively involve community stakeholders and local businesses in the co-creation and implementation of heat resilience strategies, fostering social capital and local ownership.
- **Employ Data-Driven and Evidence-Based Best Practices:** Utilize robust data collection and analysis to inform the development, implementation, and evaluation of heat mitigation and adaptation interventions, ensuring efficacy and accountability.
- **Prioritize Access to Thermal Safety and Hydration:** Implement policies and programs that guarantee universal access to adequate cooling and drinking water infrastructure and resources, addressing disparities in exposure and vulnerability.
- **Design Targeted Interventions for Vulnerable Populations:** Develop and deploy specific strategies for susceptible populations including older adults, individuals with comorbidities and disabilities, low-income people, mobile home residents, and heat-exposed workers. For example, local governments can offer free and affordable transit to cooling centers.
- **Engage in Iterative Improvement and Adaptive Management:** Embrace a continuous quality improvement framework, leveraging post-event analysis and feedback to refine strategies and enhance the effectiveness of future heat response efforts.
- **Foster a Culture of Collective Responsibility**: Promote an ethos whereby individuals, communities, organizations, the private sector and government institutions recognize shared responsibility in mitigating heat risks.

3 Call to action: building a heat ready nation

Preparedness is the most effective way to prevent deaths, economic losses, and infrastructure damages from extreme heat. Informed by lessons learned from the Ten Across governments about the current state of heat response in the most impacted regions and the desired future state of heat response, we make the following five recommendations for all stakeholders to enable a **Heat Ready Nation**:

1. Establish a clear, sustained governance structure and authorities for extreme heat.
2. Accurately assess extreme heat and its impacts in real time.
3. Prepare for extreme heat as both an acute emergency as well as a chronic risk.
4. Declare and respond to extreme heat as an emergency when thresholds are crossed.
5. Develop strategies to plan for and finance long-term extreme heat impact reduction.

These recommendations together comprise a **"Framework for a Heat Ready Nation"** that will require a tiered approach across all levels of government in the United States. The following sections break down roles for local, state, territory, Tribal, and federal governments, as well as non-governmental actors, to implement the framework.

Of note, the evolving landscape of disaster preparedness and response will impact how subnational governments can respond to extreme heat. The current administration has stated intent to shift disaster responsibilities to states, potentially through changes to disaster declaration criteria and reduced grant funding. The federal government has also dismantled essential extreme heat capabilities through staffing cuts, funding rescissions, and data and information pauses. This means that local, regional, state, territorial, and Tribal authorities should be prepared to address extreme heat with their own authorities, capabilities, and funding.

3.1 Establish a clear, sustained governance structure and authorities for extreme heat

If no actor owns the extreme heat problem, then no actor is responsible for the problem. In many places, there is no government authority legally responsible for addressing extreme heat, which leads to poor response to heat waves when they happen and limited long-term planning for future extreme heat conditions. Governments at all levels should identify leaders responsible for stewarding cross-agency short-term and long-term planning; bringing governmental and non-governmental stakeholders together in times of emergency to safeguard lives, property, and critical infrastructure; and working towards continuous improvement of policies and procedures. Further, effective preparedness hinges on robust coordination across jurisdictions (counties, cities, Tribal nations) and with the private sector to address regional risks that transcend political boundaries. Subnational governments should proactively form relationships with other governments in their region, and establish formal agreements with key private actors.

3.1.1 Local role

Local governments should designate an extreme heat lead responsible for convening relevant offices and departments, such as emergency management, public health, public safety, transportation, economic development, public housing, social services, planning, and the non-governmental actors, like community-based organizations and utilities. Capacity for heat preparedness will vary depending on the size of the government. Regional coordination is therefore essential, especially in metropolitan areas where heat impacts transcend multiple jurisdictional boundaries. Counties should steward this broader regional coordination, helping to establish formal agreements and regular communication channels between neighboring cities, counties, and regional planning organizations to ensure a

unified approach to issues like cooling center networks, public transportation during heat emergencies, and heat response personnel.

3.1.2 State, territory, and Tribal role

State, territory, or Tribal leadership should designate an extreme heat lead, such as a Chief Heat Officer or Chief Resilience Officer, with the authority to identify and convene extreme heat coordinators across key agencies, such as Departments of Health, Emergency Management, Labor, and Energy and Public Service Commissions. The extreme heat lead should leverage local liaisons, such as regional emergency management coordinators and county administrators, in order to build an understanding of local preparedness efforts and need for state, territory, and Tribal government-level support, such as technical and financial assistance.

3.1.3 Federal role

The federal government should create a formal structure and dedicated funding to manage heat and mitigate risk across the dozens of relevant offices and agencies. Congress should identify a designated authority or authorities for extreme heat to be formally in charge of the heat problem. For example, one possible approach is to create an incident command system amongst the federal agencies with disaster authorities that touch on extreme heat (HHS, FEMA, USDA), that could be modeled off of analogous initiatives like the National Hurricane Program.

3.1.4 Non-governmental role

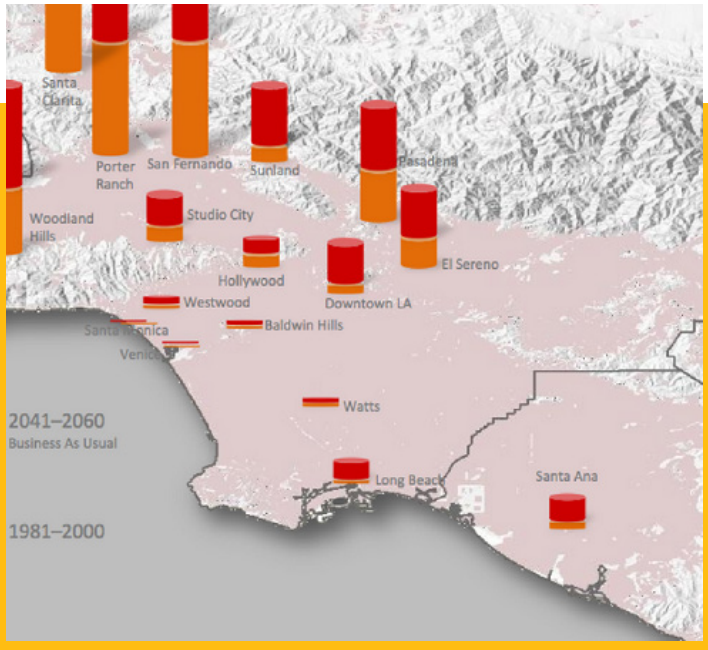
In preparing for extreme heat, governments should identify all of their non-governmental collaborators and articulate to them their essential role in response and risk mitigation activities. A non-exhaustive list of non-governmental partners and their potential roles includes:

- **Community-based organizations,** such as faith-based organizations and neighborhood associations, can be trusted voices for disseminating early warnings from the National Weather Service and local health departments, translating these alerts into accessible languages and formats and utilizing trusted community channels for outreach. As leaders in their communities, they can identify individuals who might require extra assistance during a heat wave and establish systems for regular check-ins.
- **Academic and research institutions** can support governments in identifying the most promising interventions to safeguard lives and property, support efforts to research the impacts of extreme heat on populations and critical infrastructure, and analyze available data to identify opportunities for government intervention.
- **Private sector partners,** such as local businesses, can be incentivized to open their doors as heat-relief centers to expand upon what local governments can offer.

SPOTLIGHT

Los Angeles County stewards a county-wide Heat Action Plan

If Los Angeles County was a state, it would be the eleventh largest state in the nation. 10 million people live in 88 cities in Los Angeles County, each with a different set of capacities, unique governance structures and level of heat readiness. The goal of Los Angeles County's Heat Action Plan is to serve as an all-of-government policy agenda to drive region wide action, investment, and collaboration to protect communities against extreme heat. County-wide coordination will ensure all communities in the region can advance their heat readiness.



TEMPERATURE EXTREMES PREDICTED IN 2040 AND BEYOND.
SOURCE: L.A. COUNTY

- **Utilities** should be included in tabletop exercises that examine threats to critical power and water infrastructure under extreme heat, and in the emergency operations center during a major event.
- **Voluntary Organizations Active in Disasters (VOADs)** can assist in recruiting and training volunteers for potential heat response duties.
- **Philanthropic partners** can aid in resourcing response activities that are beyond local government's capacity, such as issuing grants to community-based organizations to organize heat-safety campaigns, and providing start-up capital for mitigation efforts.
- **Medical providers and healthcare institutions** play a pivotal role at the frontlines of heat response, spanning prevention and preparedness and acute care:
    - Before a heat wave, healthcare providers are a crucial link to educating at-risk patients, especially those with chronic conditions and can discuss hydration strategies, the early signs of heat-related illness, and adjusting medications, if necessary. Medical providers can also work with patients to develop personalized heat action plans outlining steps to take during a heat wave, including who to contact and when to seek medical help.
    - During a heat wave, hospitals should be prepared for a surge in patients with heat-related illnesses and provide adequate staffing, supplies of fluids and cooling equipment, and establish protocols for managing heat stroke and heat exhaustion. Community health workers can play a vital role in reaching out to vulnerable populations.

3.2 Accurately assess extreme heat and its impacts in real time

Without a clear picture of the impacts of extreme heat and the costs the hazard is exacting on individuals, businesses, and subnational governments, it is nearly impossible to design effective response and long-term risk mitigation programs and policies. Subnational and federal governments should work together to establish standardized metrics for identifying and attributing heat-related illnesses, deaths, infrastructure damages and failures, and economic losses. Subnational governments should also collaborate on systems for tracking heat response expenditures, necessary to inform requests for additional assistance. Public data gaps will need to be filled through partnerships with the non-governmental sector.

3.2.1 Local role

Local governments should improve their collection of data on the health, infrastructure, and economic impacts of extreme heat and use that information to guide policy decisions. For example, local public health departments are the leads on investigating heat-related illness and death and can be partners in quantifying the total toll of extreme heat events. Yet many medical examiners and coroners receive little-to-no training on identifying heat-related mortality. As a result, many heat-related deaths are mislabeled as another cause, so the role of heat in the death is ignored. It is also critical that these impacts can be collected and reported in real time, as per federal policy, all damages must be linked to the extreme weather event to be eligible to receive assistance.

Local governments should also improve their tracking of the resources (e.g. staffing capacity, financial assistance) dedicated to heat preparedness and response activities in order to understand the impacts of heat response activities on their budgets. A gap analysis between response capabilities available and desired response capabilities would also help local governments justify assistance requests from the state, territory, or Tribal government.

3.2.2 State, territory, and Tribal role

To provide universal access to data and information for all jurisdictions, regardless of capacity, states, territories, and Tribes should strengthen tracking of the impacts of extreme heat on the state, territory, or Tribe. This can include bolstering public health monitoring and tracking of heat-related health impacts, emergency department visits, hospitalizations, and deaths in near real-time. Broadly accessible and publicly available tracking and data allows for a clearer understanding of the extreme heat event's impact and identifies places for targeted assistance.

States, territories, and Tribes should also establish a comprehensive baseline for the broader financial impacts of extreme heat. To do this, state, territory, and Tribal governments should create standardized assessment frameworks for the costs of extreme heat to support future requests for federal assistance in the event of a severe extreme heat event. For example, California's Department of Insurance pioneered a heat-impacts assessment that found that the total impact of seven extreme heat events in the state was $7.7 billion.

3.2.3 Federal role

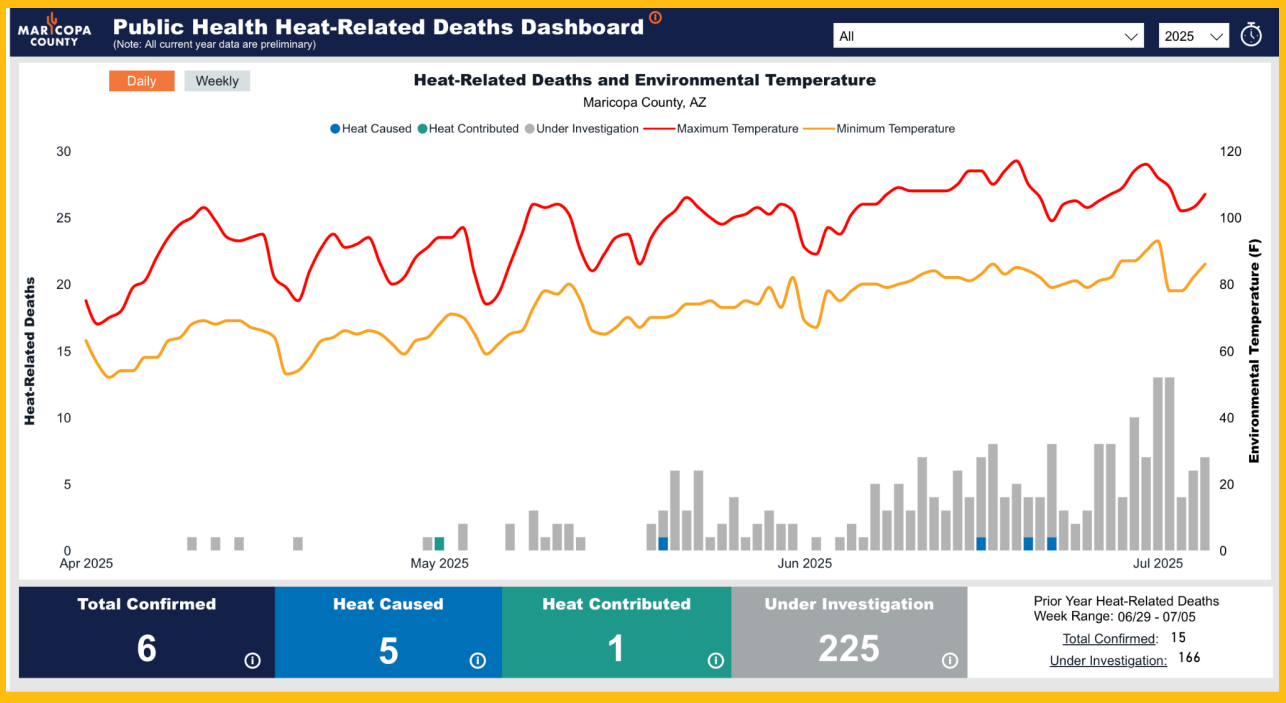
The federal government should continue expanding its suite of "weather plus impact" tools like HeatRisk, connecting extreme temperatures to potential impacts on the electric grid, emergency response system, agriculture, and transportation system. HeatRisk, which looks at the impact of extreme temperatures on population health, has been widely used by subnational governments to design triggers for their emergency response protocols and make decisions on response activities during the heat season.

The federal government should lead on producing standards for data collection that improve the accuracy of tracking the impacts of extreme heat on health, infrastructure, and the broader economy. The federal government should produce guidelines on how to track uninsured losses, experienced by subnational governments, individuals, businesses, and critical infrastructure operators. Standards ensure that all places around the country are assessing the impacts of extreme heat in comparable ways. Standardized measurements will make it easier for the federal

SPOTLIGHT

Partnerships between cities and county public health departments in Arizona

Maricopa County, Arizona, and Pima County, Arizona have created some of the most comprehensive heat death tracking systems in the country. Maricopa County's medical examiners flag deaths as heat-caused or heat-contributed and identify factors that led to death, such as a lack of cooling present in the home or a demographic risk. In Pima County, death investigators make sure to ask about heat or identify heat risks when trying to determine causes of death. Both counties report their heat-related illnesses and deaths weekly. The state of Arizona now maintains statewide statistics, which capture the impacts of non-urban communities. Better data has been crucial for mobilizing a more comprehensive response in these Arizona counties.



HEAT MORTALITY TRACKING DASHBOARD FOR MARICOPA COUNTY, ARIZONA. SOURCE: MARICOPA.GOV

government to evaluate requests for federal disaster assistance as well as evaluate costs and benefits of grant funding requests from subnational governments.

3.2.4 Non-governmental role

Non-governmental actors should be brought into conversations with government leaders on how to better track the impacts of extreme heat. Without coordination, this critical information will remain fragmented, impacting policy decisions made in the height of the crisis and in long-term planning and risk mitigation. Some examples of non-governmental data include:

- **Community-collected and validated data** can identify which populations are most vulnerable to extreme heat.
- **Research data** can help governments identify the current state of impacts from extreme heat as well as evaluate the effectiveness and scalability of policy interventions.
- **Healthcare data** can help governments identify the most medically vulnerable patients and understand the full scope of impacts to the hospital and public insurance.
- **Utility data** can give detailed pictures on an individual's energy usage and payment history, useful for targeting messages during heat waves on energy conservation as well as understanding which community members are most vulnerable to a power shut-off during heat season.

Government actors that want to use this private data will need to establish data use agreements (DUAs). These DUAs should be established ahead of the heat season to ensure that information is translated in real time.

3.3 Prepare for extreme heat as both an acute emergency as well as a chronic risk

Preparedness is key to a successful response to any hazard. Extreme heat is no exception. To be prepared, every subnational government should have an actionable heat response plan that is widely informed by and understood by all non-governmental partners. The federal government can support subnational preparedness by updating guidance documents and protocols and providing technical assistance. The federal government should also have a plan for managing widespread extreme heat events, particularly ones that strain critical infrastructure that multiple states and regions rely on like the power grid and health care resources (e.g., IV fluids, cooling requirement).

3.3.1 Local role

Key preparatory actions local governments should include in extreme heat response plans include:

- Setting partner agencies roles and responsibilities as well as the roles of non-governmental partners.
- Training city staff operating public-facing city services (e.g. libraries) on spotting heat-related illness.
- Developing memoranda of understanding (MoUs) with private sector partners for service delivery

SPOTLIGHT

Collaboration across agencies leads to innovative new practices in Phoenix

Heatstroke can lead to severe internal damage and death if not treated within minutes. Through building collaborations with the Fire Department, Phoenix, Arizona has developed new protocols and innovative tools for emergency medical services (EMS) to treat victims. These interventions contributed to the reduction in mortality Maricopa County saw in 2024

ICE IMMERSION BAGS FOR EMS TO RAPIDLY COOL DOWN HEAT VICTIMS. SOURCE: KJZZ

during a heat emergency, including hotels for temporary sheltering, transportation, water suppliers, and cooling technologies.
- Setting safety guidelines and event requirements for athletic and special events held outdoors.
- Working with school districts to establish heat safety protocols for students and staff, including modifying schedules, providing shaded areas for outdoor recess, and ensuring access to hydration and cooling.
- Identifying which rules hinder response (e.g. zoning restrictions for temporary cooling shelters, regulations that prevent establishing outdoor clinics and triaging centers), how those can be waived, and who might have the power to waive them.
- Issuing culturally and linguistically relevant local heat advisories and warnings.
- Activating local cooling centers in libraries, community centers and other public buildings.
- Extending hours at pools and splash pads.
- Conducting welfare checks on vulnerable populations, such as adults over the age of 65,
- distributing water and heat health safety information.
- Identifying emergency authorities that should be instituted to protect lives and property (e.g. power shutoff restrictions).
- Ensuring local hospitals are prepared for an increase in heat-related health emergencies.
- Establishing plans for locally-relevant cascading disasters cascading disasters, like water shortages, power grid strain, hurricanes, and wildfires, including contingency plans for water shortages as well as demand-side management of power.
- Designing systems to track effectiveness of and the costs associated with interventions.
- Determining the point at which local capacity is "overwhelmed".

Where extreme heat is becoming season-long, such as the Sunbelt region, it is critical to determine what emergency policies should become "business as usual" to avoid the boom and bust cycle of emergency response. For example, ensuring readiness for extreme heat could be included in long-term planning exercises like capital planning.

3.3.2 State, territory, and Tribal role

States, territories, and Tribes should be ready to facilitate joint planning across local governments, standardize communication protocols like statewide alerts and early warning systems, encourage data sharing from local governments, and establish mutual aid agreements between local governments and between states, territories, and Tribes. States, territories, and Tribes should specifically design technical assistance to support their rural populations, recognizing that non-urban areas face increasing vulnerability due to factors like agricultural work exposure, older housing stock, limited public transit to cooling centers (if they exist), and less resilient power infrastructure.

States, territories, and Tribes should create an emergency response plan for extreme heat events, both chronic and acute. This plan should include the following information:

SPOTLIGHT

Removing transportation barriers in Jacksonville, Florida

Recognizing that access to cooling centers is critical during extreme heat events, the City of Jacksonville's "Stay Cool Jax" plan prioritizes getting people to these centers. This effort is a partnership with the Jacksonville Transportation Authority (JTA). On designated Heat Emergency days, when the National Weather Service issues advisories or warnings meeting specific criteria, the JTA provides free transportation to activated cooling centers.

OPTIONS FOR PUBLIC COOLING IN JACKSONVILLE.
SOURCE: JACKSONVILLE.GOV

- What triggers an emergency, designating incident periods and command.
- The workforce training and capacity needs to care for heat-affected populations, such as by requiring that health professionals licensed and working in the state, territory, or Tribe should have some level of heat-health training.
- Possible policy actions available at the state, territory, or Tribal level to support local and regional governments (e.g. regulatory waivers, shut-off protections, eviction moratorium, interstate workforce compacts).
- Operational needs of key response assets across the state, territory, or Tribe like ambulances and hospital beds as well as the power supply to the grid.
- When to bring in the state or territories National Guard for transportation of water or setting up additional cooling stations.
- When to request assistance from neighboring states, territories, and Tribes, such as for personnel through the Emergency Management Assistance Compact and the Interstate Medical Licensure Compact, and resourcing sharing.
- Preparing for mandatory evacuations if conditions become life threatening (e.g. a major power outage during a heat wave event).
- If the need arises, a protocol for formulating expected damages and requests for assistance for the federal government.

3.3.3 Federal role

National-level frameworks for heat preparedness should be created to provide guidance on risk assessments, threshold definitions, and resource mobilization. These frameworks can then inform customizable templates and toolkits that subnational governments can adapt to their specific contexts, ensuring a baseline level of preparedness and a common language for addressing this shared threat. Additional activities to support national preparedness include:

- Establishing extreme heat regional scenario planning and tabletop exercises.
- Incorporating extreme heat into Emergency Support Functions, the National Incident Management System, and the Community Lifelines program.
- Helping states, municipalities, Tribes, and territories integrate heat into Hazard Mitigation Planning and emergency planning.
- Incorporating extreme heat into existing preparedness grant programs from FEMA and HHS.
- Fostering collaboration, exchange of knowledge, and formal agreements (e.g. the Emergency Management Assistance Compact) across state, territory, Tribal, and local governments to avoid the duplication of efforts, streamline activities, and accelerate the adoption of effective practices.
- Standardizing a definition for what event could count as a heat emergency, for example, by examining at what thresholds extreme heat events begin exceeding state, territory, and Tribal capabilities, such as overburdened emergency response systems and healthcare facilities, overloaded grid infrastructure, and water shortages.

3.3.4 Non-governmental role

Non-governmental actors should be a part of all planning activities for the heat season and reflection, learning, and improvement reflections for future events. As a part of preparedness efforts, every engaged non-governmental actor should know their exact role in supporting response activities and what the government agency may call on them to do. For example:

- Community-based organizations should know if the local government will need their help supporting distribution of heat education materials and assisting in supporting more vulnerable populations such as the unhoused.
- Community institutions should be ready to open their doors as cooling centers.
- The health sectors should be ready to coordinate with public safety and public health on managing increased patient load.
- Utilities should have a strategy for handling increased demands for services like energy and water.

After-action reviews, facilitated by governmental heat leads, can bring together all non-governmental collaborators to determine what strategies were effective, what challenges were encountered, and which populations might have been inadvertently overlooked. The lessons learned can then be used to improve resource allocation and future planning.

3.4 Declare and respond to extreme heat as an emergency when thresholds are crossed

Extreme heat events are public health emergencies, causing significant impacts to population health and safety and leading to thousands of deaths a year. Yet the response roles of each governmental actor and non-governmental actors are unclear, creating uncertainties around who is responsible for what actions during the event. In an ideal scenario, during a severe heat wave, the primary response would be at the local level, focusing on immediate safety measures and community support. The state, territory, or Tribal government can play a coordinating role, and provide additional support if local capacities are strained. The federal government can provide supplemental resources and coordination if the state, territory, or Tribal governments are overwhelmed. Non-governmental organizations can step in or be deployed to fill needed capacity and secure critical infrastructure like energy and water systems. These expectations and roles should be widely understood by all parties involved in any extreme heat response.

3.4.1 Local role

Mayors or County Administrators should swiftly enact their heat response plans. In the moment, local governments should prioritize safeguards that protect the most lives from extreme heat and monitor the vulnerability and potential for failure of energy and water systems to prevent cascading disasters. As systems are strained, Mayors or County Administrators may consider declaring a local state of emergency to highlight the degree of risk to the local population and signal the potential system failures to higher levels of government. Declarations that enable pre-determined local actions and can trigger additional resources and support from higher levels of government would be especially valuable relative to messaging alone. The costs of all efforts to respond should be tracked according to predetermined protocols, in the event response activities can be reimbursed by the state, territories, Tribal or federal government.

While an assumption of what event could "overwhelm" local capacity can be hypothesized, pulling the trigger requires in-the-moment decision making. During an extreme heat events, considerations for when to make the call should include:

- If cooling centers are full.
- If essential resources like water and temporary shelter are depleted.
- If emergency response times are delayed due to the volume of calls.
- If hospitals are at or near capacity.
- If there is a chance of an extended or widespread power blackout or water supply loss.
- If there is extensive heat-related morbidity and mortality.

3.4.2 State, territory, and Tribal role

State, territory, and Tribal governments should monitor heat-wave development and impact across the state, territory, or Tribe and coordinate resources and information sharing between different local jurisdictions. During heat events that impact and overwhelm multiple jurisdictions, Governors and Tribal leaders should consider declaring States of Emergency or Public Health Emergencies, unlocking critical resources, funding streams, and regulatory flexibility to protect residents. Heat has been elevated as a state-wide emergency in Arizona, California, and Louisiana. State, territory, and Tribal governments can save the most lives during the event by preventing utility shut-offs, deploying microgrids, back-up power and energy storage to prevent widespread power failure and its cascading negative health impacts, and dispatching additional emergency response and medical personnel to treat the increased influx

of people with heat illness. All of the costs of responding to the emergency should be tracked in order to support requests for an emergency or disaster declaration by the federal government.

3.4.3 Federal role

While state, territory, and Tribal governments possess resources and authorities to address extreme heat, certain challenges exceed their individual capacity to solve, requiring some level of federal intervention. For example, a catastrophic heat event that is truly widespread and prolonged could overwhelm multiple state, territory, and Tribal emergency response resources, personnel capabilities, and available funding. The federal government should better articulate to state, territory, and Tribal governments' leadership how to trigger a federally-declared heat disaster and what support would entail. This should include the cost and impact thresholds that need to be crossed to receive a declaration, the federal coordination and response capabilities that can be activated, the response and recovery activities that can be reimbursed, the regulatory waivers that can be issued to streamline response (e.g. Medicaid 1135 waivers), and funding for long-term hazard mitigation.

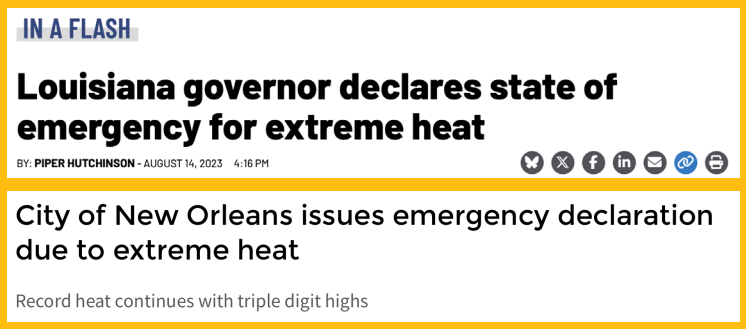
To address the challenges in declaring heat as a federal disaster, Congress can consider the following (1) amending the Stafford Act to recognize loss of life as a damage that should be included in Preliminary Damage Assessments used to inform disaster declaration decision making and (2) establishing declaration pathways for anticipatory responses that prevent heat from becoming a mass casualty event. For example, the Disaster Medical Assistance Teams could be activated for any surge in medical needs. Congress could also strengthen the Public Health Emergency declaration authorities, by appropriating the Public Health Emergency Fund and allowing the PHE alone to unlock state, territory, and Tribal government's access to Medicaid 1135 waivers, critical to paying for health care services during heat emergencies.

SPOTLIGHT

City of New Orleans emergency declaration for excessive heat

New Orleans' Mayor declared an emergency for excessive heat in August 2023, a decision precipitated by a prolonged and unprecedented consecutive period of dangerously high temperatures and heat index values, reaching 115 degrees Fahrenheit or higher. This severe heat overburdened the city's healthcare system, with a reported surge in heat-related calls to emergency medical services and a number of confirmed heat-related deaths.The lack of significant overnight cooling further exacerbated the situations, preventing human bodies and infrastructure from recovering from the daytime heat. A corresponding state-wide emergency was also issued.

In response to the emergency declaration the City of New Orleans implemented several key measures to protect residents. These included extending the hours of numerous community centers to serve as public cooling sites, with some locations offering extended weekend hours and even overnight sheltering for unhoused individuals. The event highlighted the importance of interagency coordination and the critical role of public information campaigns like *NOLA Ready* in disseminating vital safety information during extreme heat events.


IN A FLASH

Louisiana governor declares state of emergency for extreme heat

BY: PIPER HUTCHINSON - AUGUST 14, 2023 4:16 PM

City of New Orleans issues emergency declaration due to extreme heat

Record heat continues with triple digit highs

STATE AND LOCAL EMERGENCY DECLARATIONS FOR EXTREME HEAT IN LOUISIANA

3.4.4 Non-governmental role

Through established partnerships with non-governmental actors, governments extend their response capabilities during a heat wave. For example, community-based organizations (CBOs), VOADs and local businesses can support response official cooling centers or establish informal neighborhood cooling locations. CBOs and other trusted messengers should also serve as reliable information hubs, providing updates on available resources, reiterating heat safety tips, clarifying emergency messaging, and countering any misinformation that may arise. CBOs can also serve as frontline defense in reporting individuals found in distress or in unsafe conditions. Finally, there should be clear pathways for directly funding or later reimbursing private organizations that are tasked to support heat response, such as health care institutions.

3.5 Develop strategies to plan for and finance long-term extreme heat impact reduction

Addressing extreme heat is an economic necessity for subnational governments, as more and more people desire to live in places that are resilient to extreme weather. Yet places like the Sunbelt region are one of the most vulnerable regions in the country to extreme heat and other extreme weather risks. If the Sunbelt region does not invest in making their communities more liveable despite extreme heat, they are likely to see population losses in the decades to come. With extreme heat here to stay, proactive measures are a necessity that leverage the capabilities of governments, such as planning, regulation, and public financing, and non-governmental actors, such as private financing, proactive investments in infrastructure hardening, research and development, and codes and standards setting.

3.5.1 Local role

Local governments should promote full integration of extreme heat risk reduction into capital planning, focusing on building infrastructure that can withstand future temperatures. Further, to protect local residents and reduce the demand on the health care system during the worst heat waves, local governments should take proactive actions like:

- Establishing and enforcing cooling standards for all types of housing, including rental properties. These standards should mandate maximum indoor temperatures. For renters, landlords should be required to provide tenants consistent access to adequate cooling through air conditioning and other cooling strategies. For owners, funding should be made available to ensure these upgrades are affordable.
- Financing energy efficiency upgrades in the public housing stock and exploring innovative cooling technologies to reduce energy burdens for residents.
- In states where local governments can go beyond code, set beyond existing building code measures like a passive survivability standard for new construction.
- Setting local ordinances for community cooling strategies like cool roofs and trees.
- Establishing zoning regulations that increase shade and green spaces.
- Establishing heat safety regulations for public sector workers and contracted workers, ensuring access to shade, water, and rest breaks.

3.5.2 State, territory, and Tribal role

The scale of necessary infrastructure upgrades often extends beyond a local government's budgetary capacity, especially for smaller cities and rural communities. State, territory, and Tribal governments steward resources from taxation and federal funding, and should work to consider long-term risk of extreme temperatures in funding decisions. State, territory, and Tribal governments should also explore innovative financing mechanisms like green

banks to blend public and private financing to resource larger projects like expanding tree canopy and green spaces in vulnerable communities.

State, territory, and Tribal governments should also coordinate and manage insurance markets implicated in long-term heat risk mitigation through their Departments of Insurance or similar agency. This can involve assessing the increasing risk extreme heat poses to property, health, and life insurance, designing new insurance products like parametric insurance and risk pools, ensuring market stability, preventing discriminatory practices, and leveraging public insurance products to mitigate extreme heat's fiscal risks, such as incentivizing workplace heat safety planning as a way to reduce workers compensation claims.

State, territory, and Tribal governments should also leverage their authority to set and enforce codes and standards to mitigate heat's risks. For example, state, territory, and Tribal governments can set building codes that require higher energy efficiency standards and passive survivability strategies. State, territory, and Tribal governments can also ensure that the power infrastructure is prepared for extreme heat by requiring private utilities to institute risk mitigation measures to prevent heat-related power outages, such as grid hardening, demand-response programs, and protocols for managing outages, and set requirements for back-up power for supplying critical facilities like nursing homes and hospitals.

3.5.3 Federal role

Hardening critical infrastructure (roads, grids, etc.) for more and more extreme temperatures represents a significant financial hurdle for individual State, territory, and Tribal governments. For example, modernizing the entire electrical grid to handle peak loads and integrate decentralized renewable energy sources will cost billions of dollars, figures that will surpass State, territory, and Tribal governments' budget capacities. The federal government should work with subnational governments to identify areas where federal funding is crucial to undertaking critical risk mitigation efforts, as well as explore innovative financing mechanisms to scale up effective practices like revolving loan funds. Where possible, federal funding should prioritize multi-hazard resilience, understanding that more jurisdictions are grappling with extreme heat and other hazards, like wildfires and hurricanes, at the same time.

SPOTLIGHT

Cities across Texas are prioritizing resilience, particularly energy resilience

Following the catastrophic grid failure during Winter Storm Uri in 2021. Texas cities have been preparing for future risks to the energy system and building their own energy resilience. Following Hurricane Beryl, Houston has been installing back-up power at publicly owned buildings to ensure the city can offer cool spaces if the grid fails. Austin, Texas has created a Heat Resilience Playbook, a set of multi-faceted heat mitigation strategies for the city to consider when making capital investments, and the city has been partnering with Austin Energy to increase energy reliability. Finally, in San Antonio, Texas, emergency managers are preparing for future scenarios of a major power failure during an extreme heat event, investing in cool pavements as a passive cooling strategy that can benefit residents even when the power is off, and integrating resilience measures within capital improvement projects. Motivated in part by local government demand, ERCOT, Texas' grid, has added additional capacity, private utilities have been required to make grid upgrades and supply back-up power as a part of settlements following major outages, and the Texas has created a new $1.8 billion fund for microgrids deployment at critical infrastructure sites.

MICROGRIDS FOR RELIABLE BACK-UP POWER IN TEXAS. SOURCE: ENCHANTED ROCK

3.5.4 Non-governmental role

Governments will need to partner with non-governmental actors to build community resilience to the immediate and future threats of extreme heat. Every non-governmental actor should examine their potential role in reducing the risk of extreme heat, and seek out partnerships with government actors to aid in implementing their risk-mitigation agendas. For example, opportunities for non-governmental action include:

- **Community-led innovation.** Community-based adaptation projects range from creating shaded pedestrian routes to establishing neighborhood cooling centers to expanding awareness sharing about heat through community social media sites. Community-based organizations should work to build social cohesion and robust community networks, such as New York City's "Be a Buddy Program", ensuring that neighbors can effectively support each other through mutual aid networks.
- **Heat-resilient codes and standards.** Local, state, territory, Tribal and federal governments rely on internationally recognized codes and standards to set regulations and requirements. For example, the International Code Council can set a maximum indoor temperature threshold for buildings, with a complimentary performance standard on how to achieve that threshold, such as through high-efficiency cooling systems, better insulation, cool and reflective roofing materials, high-performance windows, and passive cooling designs, as well as set zoning codes for urban heat island mitigation.
- **Collaboration between building and grid operators.** Grid-interactive efficient buildings (GEBs) can manage their energy consumption in real-time, leveraging emerging technologies like demand-response systems. By reducing energy consumption strategically during times of peak load, these buildings can help alleviate stress on the grid and ensure reliability. By reducing overall energy consumption, they also save building occupants money. Local, state, territory, and Tribal governments can facilitate partnerships between housing and building owners and utility companies and grid operators to increase the number of GEBs in a community, increasing overall resilience of the energy system during extreme temperatures.
- **Venture capitalists and investors identifying opportunities for new technology.** Tech start-ups focused on adaptation receive less funding than mitigation start-ups. This funding gap manifests in two ways (1) many good ideas for adaptation are not getting funded and (2) many high-impact interventions are not getting the funding they need to scale. Policies that prioritize risk-mitigation strategies will spur the market, which should be complemented with private sector investment to mature these companies.
- **Businesses mitigating risk to operations and their workforces.** Extreme heat directly impacts business continuity and workforce productivity, and escalates health-related employee costs through increased medical and workers compensation claims. So, to mitigate long-term risk, the private sector should proactively invest in evidence-based and comprehensive heat preparedness measures like cool spaces, shade infrastructure, hydration stations, and training.
- **New treatment paradigms for reducing the rate of heat-related illness.** There is room for improvement in the standard of care for both (1) preventing heat-related illnesses outright and (2) slowing the negative consequences of heat-related illnesses when they happen. The health care and medical research sectors should drive these innovations, with a focus on improving systems for flagging vulnerable patients, leveraging public and private financing to pay for preventative strategies like energy bills and secure housing, and designing new pharmaceutical and non-pharmaceutical treatments for heat-related illness and stroke. There should also be expanded training for health care providers on the impacts of extreme heat on health.

TABLE 3: SUMMARY OF ROLES BY ACTOR TO ENABLE A HEAT READY NATION

RECOMMENDATION	LOCAL ROLE	STATE, TERRITORY, TRIBAL ROLE	FEDERAL ROLE	NON-GOVERNMENTAL ROLE
Establish a clear, sustained governance structure and authorities for extreme heat.	Establish a leader who can convene all relevant offices and departments. Formalize relationships with regional governmental partners.	Establish a leader who can convene all relevant agencies. Develop pathways to liaise with local governments in the state, territory, or Tribe to identify needs.	Establish a leader who can convene all relevant agencies. Streamline disaster response authorities across all implicated agencies.	Understand their role in heat preparedness and response (e.g. health care sector readiness for patient surges, utility readiness for power surges).
Accurately assess extreme heat and its impacts in real time.	mprove real-time collection of data on the impacts of extreme heat. Improve real-time collection of costs of heat response activities.	Develop state-wide surveillance dashboards of heat impacts. Design standardized frameworks for assessing the costs of extreme heat to the state, territory, or Tribe.	Expand the suite of tools for assessing the impacts of extreme heat on critical infrastructure. Produce standards for data collection of the impacts of extreme heat.	Develop data use agreements with governmental partners to share data on the impacts of extreme heat.
Prepare for extreme heat as both an acute emergency as well as a chronic risk.	Create locally relevant heat response plans. Identify resources available that are contingent upon emergency declarations. Determine key thresholds for escalating responses to additional levels of government.	Facilitate cross-jurisdiction coordination, like planning, data-sharing, and alerts. Develop an emergency playbook and response plan for extreme heat events.	Develop national frameworks for heat preparedness. Facilitate heat coordination across states, territories, and Tribes. Integrate extreme heat across existing emergency response programs and policies.	Participate in all planning activities and after-action reviews for each heat season. Work with governmental partners to understand needs and opportunities for engagement.
Declare and respond to extreme heat as an emergency when thresholds are crossed.	Declare a local state of emergency during extreme heat events and implement heat response plans. Have a clear understanding of when the response should be escalated to the state, territory, or Tribal government. Plan for the use of declarations and similar tools to garner additional resources in support of local efforts.	Monitor how an extreme heat event is impacting local governments across the state, territory, or Tribe and be in regular communication with local actors. Declare a state of emergency if many local governments in the state, territory, or Tribal lands are being overwhelmed. Have a protocol for making requests for federal assistance.	Provide clarity to state, territory, and Tribal governments on how the federal government can step in to address extreme heat emergencies. Amend existing federal disaster policies to streamline federal responses to extreme heat (e.g. clarifying loss of life as a damage, creating pathways for anticipatory responses).	Prepare to extend the response capabilities of governmental partners. Track the costs of heat response activities to support potential reimbursement requests.
Develop strategies to finance and plan for long-term extreme heat impact reduction.	Integrate extreme heat risk reduction into capital planning. Set and enforce codes, regulations, and standards that safeguard health during extreme heat events.	Prioritize resilience to extreme heat in funding decisions. Leverage insurance markets to incentivize strategies that reduce the long-term risk of extreme heat. Set and enforce codes, regulations, and standards.	Provide funding to upgrade critical infrastructure to weather extreme temperatures. Work with subnational governments to identify where there are gaps in funding for risk mitigation to inform federal Appropriations.	Identify unique roles for reducing the risk of extreme heat to communities. Develop partnerships with governmental actors to support risk-mitigation goals.

A heat ready nation is possible

We are rapidly approaching a critical juncture marked by increasing frequency and duration of extreme heat waves coupled with funding fragility and rollbacks to preparedness policies. **Despite these challenges, there is a need for urgent, decisive action on extreme heat.** The stark difference between ongoing, regular municipal functions that carve out time to pursue heat actions and the amplified, life-saving interventions demanded by this escalating crisis highlights the inadequacy of existing resources. What is required now is a coordinated effort and braided system of sustainable funding streams to support comprehensive, coordinated heat action plans. The cost of inaction is not merely economic; it is measured in preventable illness, deaths and diminished livelihoods. Governments can no longer afford to treat extreme heat as "business as usual" or a peripheral concern. This is a clear and present emergency demanding visionary leadership and strong commitment. The health, wellbeing, and future of our communities depend on the bold and immediate steps we take today.

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