

AT A GLANCE

TURNING DOWN THE HEAT

PATHWAYS TO ADAPT PEOPLE, SYSTEMS
AND ECONOMIES FROM EXTREME HEAT RISK

Turning down the heat

Extreme heat — What is it, and why is it an issue?

Extreme heat, driven by climate change, presents serious health, economic and social challenges, particularly for vulnerable communities. It increases healthcare costs, reduces productivity and threatens food security through diminished agricultural yields. The impact is amplified by existing inequalities, as marginalized groups face greater risks. To effectively manage heat risks, a collaborative and proactive approach is essential, integrating resilience strategies across sectors and addressing the root causes of vulnerability to ensure community well-being and sustainability.

Extreme heat refers to sustained periods of unusually high temperatures, which are becoming more common due to global climate change. This phenomenon presents a broad range of risks, affecting health, the economy, agriculture, transportation and water resources. It's an economic and a social issue, amplifying inequalities, pushing up healthcare costs and causing significant disruptions to business processes. And although the impact of extreme heat on wildfire and drought risk might be expected, it can also lead to more unexpected impacts, such as [accelerating the growth of foodborne pathogens](#), causing higher rates of foodborne illnesses and placing further stress on already strained healthcare systems.

Extreme heat is a growing concern for people and communities across the world

Extreme heat poses serious **health risks**, including heat stress, heatstroke, respiratory issues and exacerbated cardiovascular conditions. Climate change is expected to cause US\$2 billion–US\$4 billion per year in [direct health damage costs by 2030](#). Heatwaves, particularly in urban areas, can increase mortality rates and [place](#)

[strain on healthcare systems](#). This will be particularly prevalent in older populations.

Extreme heat also exacerbates existing social and racial disparities. Communities of color and low-income groups are more likely to live in regions with higher surface temperatures with limited access to greener, cooler spaces. These populations also tend to have higher rates of preexisting health conditions, making them more susceptible to heat-related complications. Heat that persists during the night is particularly challenging, as people who may have been able to benefit from air-conditioned workplaces, schools or public buildings during the day have to cope with over-heated houses in the night. Air conditioning is common in some places, but in regions not previously exposed to heat, informal settlements or low-income housing situations, there is often no proper cooling system in place.

In addition, the strain on health services and power grids during heat waves highlights the urgent need for infrastructure improvements to support community resilience to extreme heat events.

Impacts of extreme heat are felt across sectors and economies

It is estimated that extreme heat and humidity already cause annual economic losses equivalent to [675 billion hours, or 1.7% of global GDP](#). Across the US alone, heat-related productivity losses currently cost around [US\\$100 billion annually](#), with projections estimating this will double by 2030. Globally, this impact is even larger as rising temperatures lead to a significant drop in workforce efficiency, damage to infrastructure and disruption to supply chains. In Marsh's recent [Corporate Climate Adaptation Survey](#), participants rated heat stress as one of the most relevant perils today.

Heat stress diminishes labor productivity, especially in outdoor sectors such as construction and agriculture. In India, extreme heat resulted in the loss of [490 billion labor hours in 2022](#) alone. The cost of these losses affects not only the workers but also national economies, particularly in regions highly dependent on manual labor.

Extreme heat severely affects agriculture, reducing crop yields and increasing water demand for irrigation. Heat stress on crops and livestock leads to decreased food production, threatening food security. Agricultural productivity is hampered as some regions face prolonged droughts, which further contribute to [higher food prices](#).

High temperatures degrade infrastructure such as roads, railways and bridges, and disrupt the transportation of goods. The transportation and storage of perishable goods, including pharmaceuticals, in particular, is compromised due to the risk of spoilage during delays or disruptions in heatwaves. Furthermore, extreme heat can cause physical damage to vehicles and lead to [delays in shipping and deliveries](#).

Water shortages are aggravated by heatwaves, which reduce water availability for agriculture, manufacturing and power generation. Industries reliant on large water supplies, such as food production and certain manufacturing processes, face increased costs and potential shutdowns. Power production is also affected, [particularly hydroelectric and thermal power plants](#) that depend on water for cooling. The strain on water resources is expected to escalate, particularly in already water-scarce regions, further affecting global supply chains.



How to transform society's approach to heat risk management? A strategic blueprint

Extreme heat risk management requires a people-centric view alongside more efficiency in our supply chains, use of technology and innovative building approaches. This requires different tools and measures. Some simple, common-sense solutions can go a long way; for example, shifting work patterns to cooler periods or ensuring that people stay hydrated. But there is also the need for more strategic and forward-looking planning. Importantly, businesses and governments need to include heat risk management in urban planning, business continuity, employee well-being, economic strategy and community resilience.

Although the urgency and scale of the challenge differ across regions and geographies, so does the availability of tools and measures to address extreme heat. Figure 1 on the following page serves as a strategic blueprint for governments and organizations alike. It delineates advanced methodologies and transformative adaptations for managing heat-related risks, underscoring the imperative of considering both incremental and transformative adaptation across communities, critical infrastructure, and anticipating the multifaceted challenges posed by rising temperatures. These interventions depend on assessment and analysis of risk levels, trends and economic impacts, which remain largely underdeveloped, particularly for cascading issues arising from extreme heat in supply chains and for health impacts. Importantly, extreme heat also interacts with other risks; for example, during hot periods, the risk of wildfires can increase. And extreme heat tends to be intertwined with very dry conditions, amplifying water stress.

These interdependencies highlight the need for well-thought-through heat strategies that tackle root causes as well as direct and indirect impacts of extreme heat. The three ways forward outlined in Figure 1 are often needed in combination and across sectors and geographies — in many locations, all three ways should be integrated into heat resilience strategies.



Figure 1. How to adapt to extreme heat

Three ways to transform extreme heat risk management	Examples of innovative strategies and solutions
 <p>Learning to live with extreme heat Build resilience for people, communities, and own assets to extreme heat events.</p>	<ul style="list-style-type: none">• Raise awareness, and address employee and community health-related risks through education programs, improved early warning systems, cooling centers and adjusted working patterns.• Assess and amend benefits to cover employees and their families to ensure business sustainability.• Promote asset-level adaptation, such as engineered and natural-cooling measures and smart building materials.• Leverage parametric solutions to build financial resilience to extreme heat-related disruptions, including in low- and middle-income communities.• Develop heat-resistant crops, medication and food supplies.
 <p>Building system-level protections Implement large-scale interventions to protect critical assets and ensure financial resilience to extreme heat and its compound consequences.</p>	<ul style="list-style-type: none">• Build wider contingency into business operations by managing the impact of supplier disruptions due to extreme heat and associated crisis.• Invest in retrofitting critical infrastructure to withstand greater temperatures. Implement integrated national health management approaches.• Enhance resilience by considering adaptation measures to ecosystem services exposed to extreme heat and associated risks.
 <p>Preparing for adaptation limits Consider wholesale changes to entire regions and systems to address breach of temperature thresholds that exceed human and ecosystem health.</p>	<ul style="list-style-type: none">• Leverage state-of-the-art climate risk models to consider transformation adaptation options beyond threshold scenarios, including:<ul style="list-style-type: none">– Redesigning cities and buildings– Establishing incentive programs for community relocation– Planning sectoral transitions away from heat or water-scarce areas– Promoting social welfare through equitable relocations and transition• Develop flexible strategies that evolve with changing climate conditions and societal needs to prevent or delay reaching adaptation limits.

What steps to take? Examples of heat risk management strategies for corporates, governments and the finance sector

To transform the way society responds to extreme heat requires action from many stakeholders, but, in particular, there are key roles for corporates, public sector and government, and insurance.

Corporates: Increase heat resilience by moving from risk analysis to action

Extreme heat will likely impact every business on the planet in some way, but no two companies' exposure is identical. Some sectors, such as construction or agriculture, are much more vulnerable than others.

To increase heat resilience, corporate risk managers need thorough and tailored assessment to provide a clear picture of what's at stake and what adaptation options are available.

This review should include assessment of the impact on workforce equity and sustainability as well as consideration of wider systems-level factors, including suppliers, infrastructure and customers. Impacts from heat can be indirect, delayed and invisible to existing tracking systems.



What corporates can do	Examples of current initiatives
1. Protect the workforce	In North America, The National Commission on Climate and Workforce Health, in partnership with Mercer, promotes more leaders creating heat-stress-management plans that include training, prevention strategies and emergency response. Some key initiatives include providing easy access to cool drinking water, encouraging regular hydration breaks, encouraging lightweight clothing and scheduling strenuous activities for cooler parts of the day. For more information, download the Commission tip sheets . Further innovations currently being explored include employer programs to support home resilience measures such as subsidizing cooling or shading investments or support payments via parametric insurance schemes to assist employees during periods of heat.
2. Technology-assisted monitoring	Use technology-assisted monitoring to improve working conditions. Even with the most altruistic policies in place, there are some industries where workers are disincentivized to take breaks, either personally or by their managers. Using technology to monitor body temperature can create policies free from judgement and can improve auditability. We're starting to see these strategies in action with solar installers using wearable thermometers or drones to remotely monitor temperature, as was done during the pandemic in Bengaluru, India .
3. Retrofit the workplace	A range of measures can be put in place to maintain acceptable indoor temperatures. Examples are air conditioning or alternative cooling systems, such as radiant cooling. One benefit of radiant cooling is that it does not require dehumidification, which can account for 60% of air conditioners' energy budgets in humid locations . Additionally, this process can include reevaluating where cooling is necessary. For mobile workers, this includes their transportation. For example, UPS recently announced it is in the process of adding air conditioning to its delivery trucks after heat-related illnesses and one death.
4. Future-proof business processes and assets	In its recent Corporate Climate Adaptation Survey , Marsh found that firms have already implemented a range of adaptation measures, the most frequent being improvements to business continuity planning and testing as well as investing in engineering measures to protect assets from increasing climate physical risks. Traditionally more common for floods and windstorms, these considerations are starting to get extended to extreme heat; for example, by using heat-resistant materials or moving vulnerable assets to less hot areas.
5. Build supply chain resilience	Beyond company assets, business leaders cannot afford to overlook climate risks to their supply chains — whether through disruption to materials, production or shipping. Using supply-chain analysis and business intelligence to interpret heat-risk exposure, risk managers can help their corporations gain a better understanding of their risk profiles and tolerance levels. Combining risk expertise with new technology can open up a whole new dimension of early intervention to avoid supply chain breakdowns during periods of extreme heat. With the ability to map organizations' supply chains more comprehensively than ever, the AI-powered platform Sentrisk is redesigning the way businesses manage global supply chain risk. The technology leverages proprietary analytics to pinpoint low-, medium- and high-risk vulnerabilities down to site-, supplier- or component-specific level.
6. Consider wider community and ecosystems measures	Importantly, taking action early not only increases heat resilience, it can also create other benefits, such as greater employee satisfaction, community resilience and environmental co-benefits. For example, when corporates consider nature-based solutions to protect their assets from extreme heat, such as greening measures around business premises, additional community benefits may arise. Identifying these co-benefits strengthens the business case for investment. Another example is offering community cooling spaces in commercial centers.

Public sector/governments: Use policy and public finance levers, and engage in cross-sectoral initiatives to increase heat resilience

Governments can take several key actions to address extreme heat risk and protect their populations, including:

Formulate detailed heat-response strategies, which encompass systems for forecasting and monitoring to anticipate and track heatwaves, early alert systems to notify the public of upcoming heat events ([similar to what Copernicus produces for wildfire](#)), educational initiatives to raise awareness about heat-related risks and safety measures, and [specific action plans for responding to heatwaves when they occur](#).

Execute immediate protective actions, such as designating chief heat officers in urban areas to prioritize assistance for the most at-risk populations, set up cooling centers in neighborhoods (particularly for low-income, elderly and young individuals) and ensure the reliable operation of energy and water

systems by enhancing infrastructure resilience to heat; adopting energy-saving practices to alleviate pressure on power grids during heat events; and [promoting heat-mitigation techniques](#), such as green roofs, cool pavements, and increased greenery in public spaces.

Strengthen long-term planning and policies by regularly assessing the effectiveness of heat response initiatives, adopting innovative approaches to enforce building regulations, instituting legal requirements for integrating green and gray infrastructure, and updating plans as necessary, while [incorporating heat considerations into planning and policy development](#), such as establishing safety guidelines for outdoor workers during extreme heat conditions.



Insurance: Help mobilize financial resources for heat resilience

Global campaigns such as the UN Race to Resilience showcase examples of how insurance can de-risk, finance and advance pre-event risk reduction efforts for a range of physical climate risks. Although most of these have not been applied to extreme heat, there is potential for extending scope and reaping the benefits of risk finance in times of extreme heat. In particular, parametric insurance policies can help reduce the financial impacts from extreme heat, as in the agricultural or construction sector, where parametric risk transfer solutions provide payouts for heat- and/or water-stress disruptions.

One example, “[Milkshake](#),” is a parametric program for farmers to cover loss of revenue from reduced productivity of milk cows during heat waves. Another example is support for female entrepreneurs in India through parametric policies.



In 2023, [Blue Marble](#) partnered with the [Adrienne Arsht-Rockefeller Foundation Resilience Center \(Arsht-Rock\)](#) and the Self-Employed Women’s Association (SEWA) to provide cover against the impacts of extreme heat on the health and working conditions of women in India’s informal sector. This initiative is helping women farmers secure financial resilience through quick insurance payouts triggered by predefined weather events, including extreme heat.

Other schemes, such as the community-based catastrophe insurance (CBCI), could potentially be extended to include heat triggers. The program has been initially designed to demonstrate how new flood insurance solutions can create risk-reduction incentives at the community level. This can be applied at different scales, as demonstrated by a CBCI program in New York City, a partnership between the Mayor’s Office of Climate Resilience, the Environmental Defense Fund, [Guy Carpenter](#), the Center for NYC Neighborhoods, and other organizations. The program aims to expand coverage to lower- and middle-income households in New York City through parametric solutions while reducing risk levels through resilience investments.

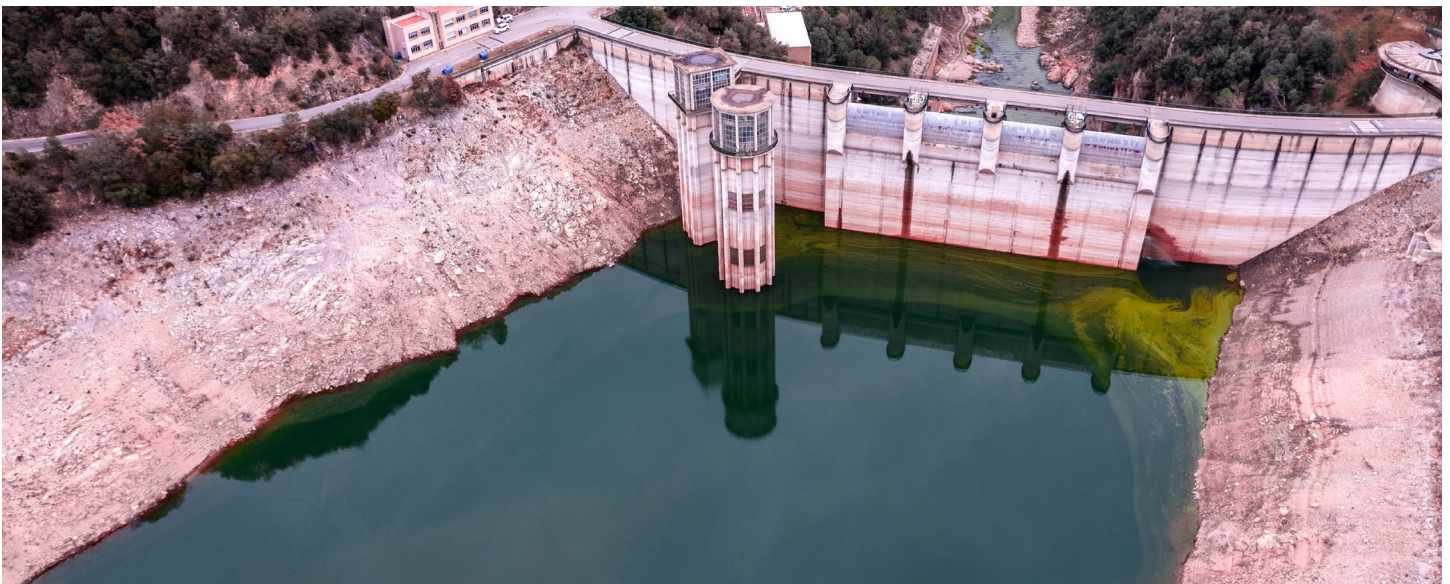


Increasing heat resilience is an important building block in achieving decarbonization efforts in the face of a changing climate

By implementing these measures, businesses, governments and the finance sector can significantly improve their ability to protect people and assets from the growing risks of extreme heat in a changing climate. However, although adaptation is crucial, we all must be aware of its limits: once heat levels pass certain thresholds, existing strategies may become ineffective or infeasible. This underlines the importance of achieving decarbonization goals to limit future temperature increases and ever-escalating extreme heat events.

Achieving decarbonization is hard enough. Doing this while the climate is changing is even more complex. Some sources of renewable energy are already at risk from a changing climate; for example, [hydropower](#). Similarly, extreme heat can present a major challenge to decarbonization efforts due to its effects on energy consumption and the performance of energy, transport and IT infrastructure.

As temperatures increase, the demand for cooling in buildings rises, resulting in higher electricity usage and a possible increased dependence on fossil-fuel-based energy sources during the net-zero transition phase. This spike in energy demand can put pressure on power grids and negate progress made in lowering carbon emissions. Furthermore, lack of heat resilience could diminish the efficiency of renewable energy technologies, including solar panels and wind turbines, complicating the shift to clean energy solutions. This underlines the importance of pursuing adaptation and decarbonization efforts in parallel. Without decarbonization, extreme heat risk will become unmanageable for parts of society in some regions of the world. And without adaptation, the impacts of extreme heat on communities, businesses and infrastructure will continue to escalate.



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