

Key Messages

The **Global Cooling Watch 2025** report provides pathways to sustainable and equitable access to cooling in a world with growing frequency and intensity of extreme heat events.

Cooling must be treated as essential infrastructure, on par with water, energy, sanitation.

- Heatwaves are the deadliest climate-related events, with hundreds of thousands of deaths annually attributed to them. The problem is worse in cities, where the urban heat island effect can amplify temperatures by 5-10°C.
- Access to sustainable cooling saves lives during heatwaves, and year-round determines whether economies, food systems, schools and hospitals can function. By 2030, heat stress could eliminate work equal to 80 million full-time jobs.
- Yet over one billion people worldwide lack adequate cooling. This could triple by 2050 without any action. Vulnerability is greatest among low-income and high-risk groups - such as women, smallholder farmers, and the elderly - who lack access to cooling, resilient buildings and urban green spaces.
- Cooling—which encompasses space cooling, process cooling, and cold chain—delivers thermal comfort for people, preserves food and medicines, and underpins livelihoods and productive economies.

Adaptation to extreme heat and mitigating greenhouse gas emissions are inseparable – we cannot air condition our way out of the heat crisis.

- Cooling is the front line of heat adaptation, but if delivered unsustainably, it drives greenhouse gas emissions, inequality and grid collapse – since soaring power demand during heatwaves raises outage risks, threatening vital systems.
- The challenge is twofold: to expand affordable, sustainable cooling for adaptation while cutting its energy and carbon footprint for mitigation.
- Without an integrated approach, under business-as-usual (BAU), cooling demand could more than triple from 22 TW in 2022 to 68 TW by 2050, driven by increases in population and wealth, more extreme heat events and improved access in low-income households. This will almost double emissions over 2022 levels - pushing cooling emissions to an estimated 7.2 billion tons of CO₂e by 2050– despite ongoing efforts to improve energy efficiency and phase down high global warming potential refrigerants.
- The most rapid growth in cooling demand is projected in Africa and South Asia where high heat exposure, fast population growth, and low purchasing power create an urgent need for affordable and reliable cooling access.
- A tiered, progressive approach to equitable cooling access that prioritises affordable, low-energy and nature-based solutions across all cooling access levels is essential to cut demand, lower emissions and avoid costly infrastructure.

A Sustainable Cooling Pathway can slash 97% of emissions by 2050, increase access, with an economic upside in the trillions

- The report models a Sustainable Cooling Pathway showing the potential for near-zero emissions from cooling in 2050 and for the first time includes the impact of low-energy and hybrid cooling systems which combine fans with AC.
- This pathway combines:
 - passive cooling – including wall and roof design, glazing, shading, ventilation and green/blue spaces;

- low-energy solutions – including fans, evaporative coolers, hybrid air conditioning and solar off-grid solutions;
 - the adoption of high-efficiency cooling equipment;
 - a rapid phase-down of hydrofluorocarbons (HFCs).
- The pathway would reduce cooling-related emissions by 64% below BAU- from 7.2 billion tons of CO₂e to 2.6 billion tons of CO₂e. When paired with rapid grid decarbonization, cooling emissions could fall to near zero by mid-century.
- 65% of the cuts to emissions comes from widespread use of Passive Cooling and Low Energy Cooling – critical measures that need to be supported by policies.
- The pathway also assumes an HFC phase-down at a faster rate than required under the Kigali Amendment.
- If adopted, the pathway will:
 - provide improved access to cooling for 3 billion people rising heat related mortality and impacts on livelihoods, health and food systems
 - save US\$17 trillion in cumulative energy costs through to 2050
 - avoid up to US\$26 trillion in grid investment in reduced peak power demand

Adopting passive cooling and low-energy solutions like fans is critical for equity.

- Low-income households are least likely to own AC and face the greatest heat risk. By 2050, an estimated 800 million of the poorest households could still lack adequate residential cooling.
- Passive cooling and low-energy solutions deliver the biggest, fastest comfort gains at the lowest cost – especially where electricity access and incomes are constrained
- The potential impact on indoor temperatures from passive cooling strategies range from 0.5°C to 8°C. These solutions have low incremental costs during construction or retrofit, and payback periods ranging from 2 to 8 years.
- Off-grid solar electrification and efficient cooling appliances designed for off-grid use are already unlocking new opportunities to meet unmet cooling needs, especially for vulnerable communities.
- Where air conditioning is affordable, it should be paired with fans in a hybrid cooling system, as this can cut energy use by 30% or more.

Policies to get on Sustainable Cooling Pathway are growing after the [Global Cooling Pledge](#), but they need to move faster and deliver greater impact.

- Pledge signatories committed to reduce cooling-related emissions by 68% by 2050 to get on the Sustainable Cooling Pathway. The latest modelling suggests the need to reduce emissions by 18% by 2030 and 55% by 2040 relative to 2022 levels to remain on the Sustainable Cooling Pathway.
- 29 countries have explicit emissions targets linked to cooling and 134 countries now include cooling in climate plans: National Determined Contributions, National Adaptation Plans, Long-Term Low Emission Development Strategies, or energy plans.
- However, only 54 countries have policies across all three measures consistent with the Sustainable Cooling Pathway: passive cooling in building energy codes, minimum energy performance standards (MEPs), rapid phase-down of high-GWP refrigerants.
- Passive cooling, above all through mandatory building codes, is the most effective measure for sustainable cooling, with strong economic and technical benefits.
- Yet very few countries include mandatory requirements for passive measures in their building codes. For residential buildings, 69 countries mandate improvements to the building envelope.⁶³ require roof insulation, and 58 countries require glazing standards; however, only 19 include mandatory requirements for shading. A similar trend is observed across countries for non-residential building energy codes.
- Countries without codes must develop them with cooling as a priority, providing guidance to engineers, planners and architects.

- MEPS are a widespread policy tool: 167 countries have at least one for cooling equipment and five more are developing them. However, only 25% of MEPS integrate limits on refrigerants' global warming potential, which maximises climate benefits.

Nations and cities must move from emergency response mode to proactive, multi-level governance on extreme heat and cooling.

- Historically, heat action plans - led by meteorological or disaster agencies - focus on early warning and emergency relief, while cooling policies – led by urban, energy or environment ministries – address urban design, buildings, efficiency, refrigerants.
- The escalation of heat as a chronic disaster risk is shifting focus from short-term warnings and preparedness to systemic heat mitigation and cooling access, merging heat adaptation and cooling mitigation under a shared governance framework to safeguard health, food security and productivity.
- The local nature of heat and the critical role of subnational governments in delivering services means that governance must be multi-level and empower subnational governments to translate policies into safer, cooler cities and communities.
- Empowering local and subnational authorities to lead on passive urban cooling (trees, blue-green spaces, reflectivity, shade) cuts peak temperatures 10-25%, can reduce or avoid AC needs, and delivers climate justice to poor neighbourhoods.
- Coordinated policies embedded in NDCs, NAPs, National Cooling Action Plans (NCAPs) and Kigali Protocol implementation, underpinned by cross-cutting institutional coordination, are essential to align heat resilience and cooling access.
- To bridge action on extreme heat and cooling, the Brazil COP30 presidency and UNEP Cool Coalition have launched the Beat the Heat implementation drive – a collective effort to localize the Global Cooling Pledge and bridge gaps in policy, finance and delivery of heat resilience and urban cooling.

Top-line recommendations for governments, industry and institutional stakeholders.

- Integrate mitigation and adaptation in planning and governance so that cutting cooling emissions also enhances protection for vulnerable populations.
- Recognise heat as a disaster requiring systemic cooling solutions.
- Combine emergency preparedness for heat with holistic measures to drive access to cooling for thermal comfort and transport and storage of food and medicines.
- Build governance frameworks linking climate, health, energy and development.
- Treat heat protection and cooling as a public good, not a consumer privilege, with leadership from local governments to integrate cooling into critical public infrastructure, including housing, schools and kindergartens.
- Prioritise passive and Nature-based Solutions – including urban design – to cut cooling loads, mitigate the urban heat island effect and reduce grid stress.
- Combine passive with low-energy or hybrid, high efficiency and low-GWP cooling systems, as per the Sustainable Cooling Hierarchy.
- Coordinate policies that create greater access to cooling with policies to increase the capacity and reliability of electricity supplies.
- Mobilize finance to low-energy cooling solutions through innovative models such as “Cooling as a Service”, green bonds and climate-risk insurance.