MILKEN INSTITUTE

IN THE HOT SEAT:
Financing Asia's Heat Resilience

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The Milken Institute is a nonprofit, nonpartisan think tank focused on accelerating measurable progress on the path to a meaningful life. With a focus on financial, physical, mental, and environmental health, we bring together the best ideas and innovative resourcing to develop blueprints for tackling some of our most critical global issues through the lens of what's pressing now and what's coming next.

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Milken Institute International connects global markets through regional convenings and research to drive locally grounded, globally informed solutions.

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Introduction

As the world's long-term average temperature surpasses the 1.5°C warming threshold above pre-industrial levels, global priorities are shifting from climate change mitigation to climate change adaptation. The vast majority (around 90 percent) of private investment in climate funds has historically focused on mitigation projects, such as renewable energy, rather than adaptation, such as building resilience to extreme heat and floods.[1]

However, the 30th Conference of the Parties to the United Nations Framework Convention on Climate Change, also known as COP30, centered key discussions on strengthening climate resilience through adaptation financing and capacity building. Just four days in, we already saw the launch of Beat the Heat, a new initiative aimed at accelerating local heat-mitigation solutions and promoting sustainable cooling systems;[2] a new Health Action Plan to guide Brazil's health-care sector in adapting to climate risks;[3] and the release of a new Extreme Heat Risk Governance Framework and Toolkit.[4] Further, specific, measurable adaptation indicators were expected to be added to the Global Goal on Adaptation framework, which had been proposed by the African Group of Negotiators in 2013.[5] Although the growing focus on adaptation at COP30 follows the momentum built since COP26,[6] this year's dedicated spotlight on heat resilience marked a particularly exciting development.

However, efforts to tackle extreme heat are not new. France developed local and national heat-resilience strategies via a concerted multi-ministry effort after a devastating heat wave in 2003.[7] Back in Asia, India launched its first heat action plan over a decade ago in 2013 to mitigate the health risks associated with extreme heat and establish an early warning system against future extreme heat events.[8]

Over time, multilateral resilience hubs such as the Global Heat Health Information Network have emerged, coordinating multidisciplinary partnerships and accelerating action to mitigate heat risks. In the private sector, budding interest in heat-resilience investments can also be observed. From heating, ventilation, and air conditioning (HVAC) systems to cooling vests for drivers in F1 Singapore,[9] heat-related solutions are experiencing increasing adoption and commercialization. In addition, the range of heat-resilience products is expanding steadily, from building materials (e.g., heat-reflective paints, efficient glass) to heat-resistant hybrid seeds.

Amid all these developments, one imperative must not be forgotten—heat-resilience efforts must benefit everyone because extreme heat affects all of us. In this report, the Milken Institute seeks to frame heat resilience as both a public necessity and a private investment opportunity, grounded in Asia's rapidly escalating exposure to extreme heat and growing gaps in adaptation financing that cannot be filled by the public sector alone. By examining emerging financial instruments, innovative market mechanisms, and blended-finance models, we outline how heat resilience can be structured, priced, and scaled as an investable asset class. Finally, we identify the enabling conditions required to mobilize private capital at scale and build a heat-resilient future for Asia.

Methodology

This report is informed by a combination of industry insights gathered through a Milken Institute–led, extreme heat–focused convening, expert interviews, and secondary research from publicly available reports. During the 2025 Milken Institute Asia Summit, the Institute convened approximately 30 leaders from across the climate, policy, and financing ecosystem for a private, off-the-record roundtable discussion held under Chatham House Rule. Participants included senior representatives from development banks, government agencies, insurance and reinsurance companies, payment providers, philanthropic organizations, research institutions, and global and regional investors.

To complement these discussions, the Institute conducted a series of individual interviews with technical experts, market practitioners, and policymakers leading up to and throughout the Summit. Points referenced throughout this report reflect the aggregated perspectives shared during these convenings and interviews. Although not direct quotations, they capture the views, observations, and practical experiences of participants and interviewees.

The objective of these dialogues was to leverage the Milken Institute's networks, thought leadership, and track record in innovative finance to foster a collaborative environment where investors, insurers, policymakers, and development finance leaders could align on the market potential of heat resilience, examine emerging solutions, and identify key enablers to accelerate private capital investment in heat resilience across Asia.

The Case for Action: Asia's Vulnerability Toward Extreme Heat

Rising temperatures are presenting pervasive ramifications for lives, livelihoods, and the broader economy, and their persistence goes far beyond the familiar image of heat waves. Rather than being a siloed "climate-sector" risk, heat is a horizontal threat, cutting across utilities, tourism, transportation, telecommunications, agriculture, health, manufacturing, and more. In Asia, this challenge is amplified—the region is warming faster than most other regions, its population is more exposed, and its economies and systems are more vulnerable. The urgency for action is clear. Yet, as a roundtable participant noted, although heat is becoming the single largest climate-related risk, it remains frequently overlooked and significantly underfunded.

Heat as a Horizontal Threat

Across the utilities sector, elevated temperatures are pushing systems to their limits. Cooling demands soar during hot spells, stressing electricity grids, while water-supply and transmission networks are exposed to thermal stressors and failures. In emerging markets such as India and eastern China, MSCI modeling estimates that extreme heat could impose more than US$3.5 billion in costs on utilities, as soaring demand and mounting infrastructure stress compound the risks.[10]

In the transportation sector, heat exerts both physical and operational strains. Persistent high temperatures can soften asphalt, cause rail-track buckling, and burst urban water and drainage pipes. These consequences undermine mobility, freight delivery, and emergency responsiveness.

The human consequences are even more profound. The health toll from rising temperatures is already climbing across Asia, particularly in Southeast Asia, where heat and humidity combine to create deadly conditions. The 2025 Lancet Countdown on Health and Climate Change found that the rate of heat-related deaths has surged by 23 percent since the 1990s, with an average annual death toll of 546,000 between 2012 and 2021.[11] By 2050, nearly 1.2 billion people (with the vast majority of them in Asia) could be exposed to lethal heat waves, especially with Asia's dense urban centers, aging population, and widespread low-income households.[12] Together, these findings reveal not only escalating human costs but also the mounting strain on health-care systems.

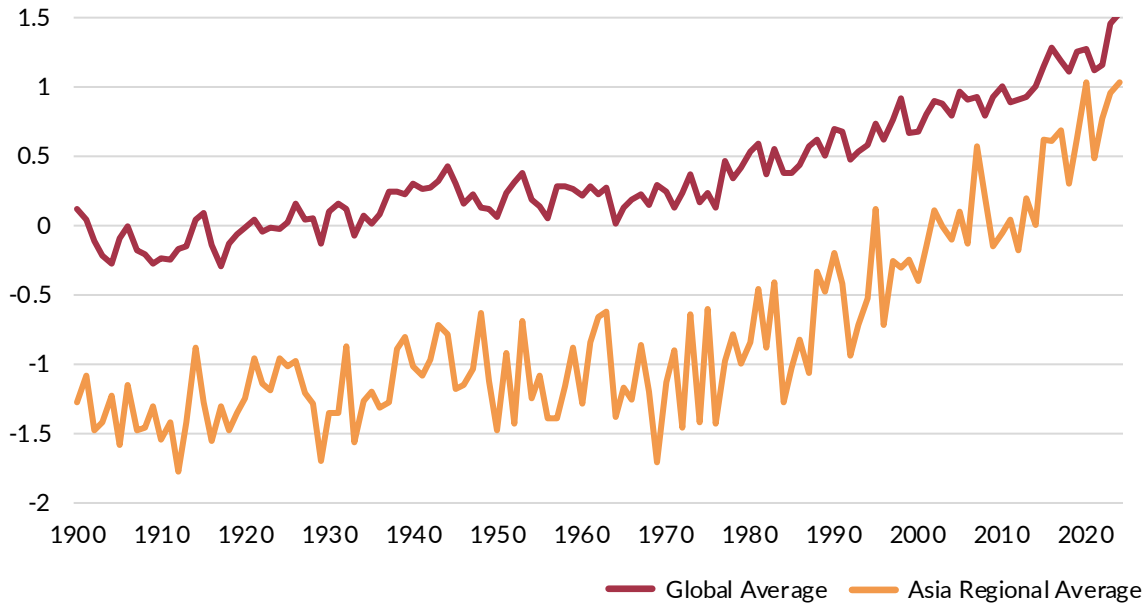
Asia's Vulnerability to Extreme Heat

Hotter at the Core

Asia's vulnerability to extreme heat stems from a convergence of structural, environmental, and socioeconomic factors. The region is not only experiencing faster warming than the rest of the world but also faces compounded exposure due to rapid urbanization, high population density, and uneven adaptive capacity. According to the World Meteorological Organization (WMO), Asia is warming nearly twice as fast as the global average, evidenced by the convergence of Asia's regional

annual average land temperature with that of the global average as seen in Figure 1.[13] The continent's vast landmass drives this acceleration: Asia is the continent with the largest landmass extending to the Arctic, and land areas naturally warm more quickly than oceans.

Figure 1: Annual Global Mean Temperature Anomalies Relative to Preindustrial Baseline from 1990 to 2024



Source: Adapted from WMO Annual Average Land Temperature and Berkeley Earth Data Sets (2025)

Furthermore, the rapid urban expansion that characterizes much of Asia's growth story means that the urban heat island effect adds a significant layer of stress to the region's megacities. Between 2016 and 2020, mean land-surface temperatures in major Asian cities averaged around 2°C higher than in nearby rural zones. In certain urban areas such as Jakarta, Manila, and Bandung, the differential reached as high as 6.6°C,[14] a reflection of dense built environments, heat-absorbing concrete and asphalt, minimal vegetation, and the constant release of anthropogenic heat from vehicles and air conditioning systems.

Moreover, the nature of heat extremes themselves is changing. Heat waves across Asia are becoming more frequent, more intense, and longer lasting. Under a high-emissions scenario, the number of days exceeding a heat-index threshold of 41°C is projected to rise dramatically: by about 250 days in Southeast Asia, and by 50 to 150 days in South, West-Central, and East Asia by the end of the century.[15] This combination of elevated baseline temperatures and prolonged periods of extreme heat creates a compounding threat, eroding resilience in ecosystems, infrastructure, and human health alike.

Economic Vulnerabilities

The impacts of extreme heat in Asia extend far beyond discomfort. They are eroding economic growth, labor productivity, and social stability. While physical exposure to heat is more severe in Asia, the region's economic structure also makes it uniquely vulnerable. With a high population density, dependence on outdoor and manufacturing labor, and limited adaptive infrastructure, every additional degree of heat carries measurable economic costs.

At the macroeconomic level, Asia stands to suffer significant losses. The World Bank projects that extreme urban heat alone could shrink real gross domestic product (GDP) by 1.4 to 1.7 percent in a median city by 2050, and by as much as 11 percent in the worst-affected areas.[16] A multi-city study by the Adrienne Arsht–Rockefeller Foundation found that in 2020, heat-related productivity losses across 12 monitored Asian cities amounted to US$44 billion.[17] The International Labor Organization warns that, by 2030, heat stress could result in the loss of 2.2 percent of global working hours, equivalent to 80 million full-time jobs, with Asia expected to bear a disproportionate share of these losses.[18]

When we zoom in on the sectoral impacts, we see more acutely the threat extreme heat poses for Asian economies. The agricultural sector, still a cornerstone of livelihoods across much of Asia, is equally imperiled. The Self-Employed Women's Association (SEWA) reports mounting GDP losses from climate-driven crop failures.[19] As a roundtable participant noted, even short bursts of extreme heat can devastate yields: just four consecutive days above 37.7°C can reduce corn yields by 4 percent—a loss that, if replicated in China, would equal France's entire annual corn output.

These compounding effects ripple across other key sectors. In manufacturing and supply chains, export-intensive industries such as garment production in Bangladesh and Vietnam are increasingly constrained as temperatures above 30°C trigger mandatory rest breaks for worker safety. Compared to the 2000s, these thresholds are now exceeded in up to 41 more days per year, placing an estimated US$65 billion in apparel export earnings at risk by 2030.[20]

Meanwhile, tourism, which for many Asian economies is a major driver of income, is feeling the heat in a literal sense. Rising heat and humidity are already altering travel patterns. In Indonesia, academic modeling shows that a 1 percent rise in hot-humid days correlates with a reduction in international arrivals by 1.4 percent and per-tourist spending by 0.6 percent, as visitors avoid midday heat or cancel outdoor excursions altogether.[21]

Across Thailand, Malaysia, and Indonesia, outdoor attractions report 5 to 10 percent declines in visitation on particularly hot days, as parks, temples, and beaches become too stifling.[22] As thermal discomfort rises, visitors shorten stays, avoid midday sun, or opt out of outdoor activities altogether. These losses translate into real economic harm, particularly for local jobs and micro-enterprises.

The information and communications technology sector underpinning modern Asian economies is also at risk. In summer 2023, hydropower reserves in Vietnam fell during persistent heat and drought, triggering rolling outages just when cooling demand peaked.[23] As peak electricity demand surges during heat waves, elevated temperatures reduce cooling efficiency and increase system

vulnerability of telecom towers, server farms, and data centers. Power failures during peak heat periods can impair connectivity, disrupt commerce, impede emergency alerts, and degrade services on which millions rely.

These trends and statistics, as one roundtable participant stated, are unmistakable, leaving little room for debate about the growing threat of extreme heat across Asia. The data speak for themselves—rising temperatures are already reshaping health outcomes, labor productivity, and economic stability in the region, underscoring that this matter is no longer an opinion but an evidence-based urgency.

Demographic Vulnerability

Lastly, the consequences of extreme heat are magnified in Asia by both demographic and structural factors, which determine not only exposure but also adaptive capacity. Vulnerability is particularly concentrated in certain types of environments. Urbanized coastal zones and inland humid cities face a double burden of environmental and socioeconomic stressors. Densely built environments, limited green space, and high levels of impervious surfaces intensify the urban heat island effect, driving local temperatures several degrees above those in surrounding rural areas.

Rural populations suffer more than urban ones during heat waves because of the lack of basic essentials (e.g., electrification, air conditioning, and health care).[24] As such, perhaps best stated by another participant at the roundtable, people experiencing poverty are very well able to articulate the economic costs of extreme heat.

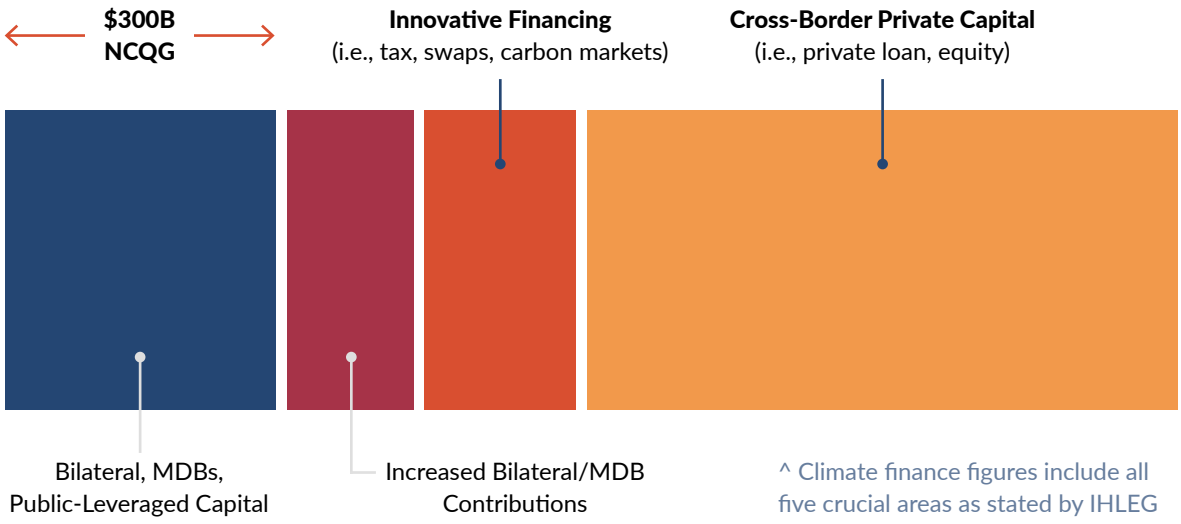
These elevated conditions are especially worrisome in cities with significant elderly populations, such as Thailand and Singapore, where greater than 10 percent of residents are aged 65 or older.[25] Older adults are physiologically more susceptible to heat stress and therefore are more likely to experience heat-related illness or mortality, particularly during prolonged heat waves.[26] This intersection of environmental exposure, social inequality, and limited adaptive infrastructure creates a landscape in which even moderate heat events can have outsized economic, health, and social consequences.

Differing priorities across different socioeconomic groups add an additional layer of complexity to how extreme heat impacts us. Thus, heat-resilience efforts should delve deeper than superficial cooling solutions to address root causes. As highlighted during the roundtable, securing heat resilience may involve tackling fundamental social inequalities, for example, in migrant worker conditions. However, solutions may not always work as intended, because different socioeconomic groups have different priorities. For instance, technological innovations designed to reduce heat stress may also generate rebound effects—workers may exert themselves even more when new tools provide a perceived sense of safety, because their pressure to earn a living often outweighs their concerns for personal health.

Heat-Resilience Financing: Opportunities and Challenges for the Private Sector

Despite the scale of these human and economic impacts, financing for heat resilience remains far from adequate. Although adaptation finance has grown in recent years, the United Nations Environment Programme (UNEP)'s 2024 report still identifies an annual shortfall of $360 billion.[27] The less than 0.1 percent of global GDP currently spent on adaptation must increase thirteen-fold by 2050 to avert substantial economic losses.[28] The scale of the challenge is underscored by the New Collective Quantified Goal agreed upon during COP29 in Baku, which sets a far more ambitious yet realistic target of $1.3 trillion in climate-finance transfers by 2035, roughly four times today's transfers.[29] The role of the private sector becomes increasingly crucial given that greater than 60 percent of the estimated $1.3 trillion target is expected to come from the private sector and non-public innovative capital stack, such as public–private partnerships (PPPs) and debt-nature swaps, as seen in Figure 2 below.

Figure 2: External Funding of Climate Finance Needed by Developing Countries by 2035



Note: Climate finance figures include all five crucial areas as stated by Independent High-Level Expert Group (IHLEG).

New Collective Quantified Goal (NCQG)

Multilateral Development Bank (MDB)

Source: Adapted from World Resources Institute (WRI) interpretation of IHLEG on Climate Finance (2024)

Roadblocks to Private Financing in Heat Resilience

However, the translation of these financial targets into real investment is hindered by persistent roadblocks within the current climate-finance system. First, investors do not perceive financial incentives to invest in Asia's heat resilience, especially when national policies on heat resilience remain nascent, with limited mandates or incentive structures to embed resilience within the financial system.

Second, as an asset manager noted during the roundtable, awareness of adaptation as an asset class is low and, therefore, assessing the cash flow needed for heat-resilience projects is difficult. At the same time, investors, who are wary of the risk associated with investing in emerging markets and sectors, seek steep risk premiums, which further hinders the allocation of capital to Asia's heat resilience. Two investors shared this concern in private interviews held during the Summit.

Third, as explained by Ravi Menon, climate change ambassador for Singapore, during the public session on "The Global Imperative for Investing in Climate Adaptation," investors are experiencing a major capability gap in translating localized climate data into actionable business-specific insights, if localized heat data (which are crucial to informing the investability of resilience projects) are even available in the first place. Finally, a particularly stubborn roadblock is the lack of prominent proofs of concept. The use of innovative capital stack structures to de-risk projects and crowd in private capital is limited. Until someone takes the plunge and shows these structures' viability, investor caution and financial institutions' hesitation to develop new products will persist.

More broadly, unlike climate mitigation, there is no standardized taxonomy that clearly defines heat-resilience adaptation within the broader financial and capital markets. Within the investment narrative, heat-resilience adaptation continues to be perceived primarily as a public-sector responsibility, because most private actors remain unfamiliar with their potential role in and existing market opportunities to finance heat-resilience adaptation projects. Our engagements with stakeholders reveal a disconnect between policymakers, who emphasize societal and economic benefits, and private financiers, who seek clear financial incentives.

The Business Case for Heat-Resilience Investments

Heat-resilience financing has generally been viewed as a public-sector responsibility, resulting in an ecosystem with few incentives and a shortage of bankable models. Strong market signals are even more limited in Asia, where heat-resilience opportunities remain nascent.

According to the Climate Resilience Alliance, the private-finance mobilization rate under current policy conditions stands at just 0.51, that is, for every US$1 of public finance invested, only 51 cents of private capital is leveraged.[30] Public institutions also continue to provide greater than 95 percent of resilience financing in low-income countries, placing significant strain on fiscal budgets with already limited capacity.[31] Together, these figures underscore the structural imbalance at the core of resilience investment, as well as the scale of the financing gap that must be closed to meet the US$1.3 trillion collective financing target.

To incentivize private companies to invest in heat resilience, potential business cases would be best highlighted by extracting the investment narrative from social and economic challenges. For example, heat-resilience measures can protect and enhance asset value, reducing losses from rising temperatures while improving productivity, operational continuity, and long-term competitiveness for the prudent investor. Furthermore, investors can capitalize on emerging market opportunities as growing demand for solutions such as passive cooling, urban greening, nature-based approaches, and climate-resilient infrastructure is opening new markets, alongside innovative business models such as cooling-as-a-service and wearable heat-stress technologies.

In addition, the emergence of new financial instruments creates clearer pathways to quantify and price the value of resilience, creating markets to trade such units. As seen in the expansion of carbon credit markets, investor interest tends to follow the emergence of clear, tradable units of value, suggesting that resilience credits (i.e., standardized units that quantify avoided losses or adaptive performance) could experience similar uptake. Climate-related instruments such as parametric insurance are also gaining traction, with the global market growing by greater than 19 percent annually and the Asia-Pacific segment valued at US$2–3 billion.[32]

Therefore, Asia's vulnerability to heat presents an equally powerful opportunity for investors. The same pressures that threaten productivity, health, and infrastructure also create momentum for innovation and transformation. As one roundtable participant commented, heat action is too often dismissed as welfare or altruism when, in fact, the economic imperative and opportunity to ensure that we safeguard competitiveness and resilience is strong. In this context, the following sections explore how these opportunities can be realized in practice by providing a snapshot of the heat-resilience financing strategies already emerging across Asia.

Leveraging Private Capital for a Cooler Asia

As noted above, financing in this space has historically and predominantly been viewed as a public-sector responsibility, with governments and Development Finance Institutions (DFIs) taking the lead. However, this traditional view is increasingly untenable given the escalating scale and complexity of heat-related risks. As UNEP Executive Director Inger Andersen warned during COP30,

> ***"Cooling must be treated as essential infrastructure, alongside water and energy … but we cannot air condition our way out of the heat crisis."***

Her statement underscores the urgent need for a more coordinated, comprehensive response to rising heat—one that combines public action with private investment because conventional singular approaches are increasingly insufficient on their own. Achievement of this outcome will depend on the design and deployment of innovative policy and financial instruments capable of mobilizing private capital at scale. Such measures range from de-risking facilities, which improves a project's risk–return profile for investors, to resilience credits that provide outcome-based grants for heat-related investments.

This section highlights a selected set of innovative financial measures that are already being deployed at varying levels of maturity to strengthen heat resilience across Asia. Although not exhaustive, these examples illustrate the breadth of mechanisms available today and demonstrate how financial innovation can unlock new pathways for adaptation. By showcasing what has worked, what shows promise, and why, this section aims to inform governments, industry practitioners, financiers, and philanthropists with practical insights into the application and scaling of these strategies to unlock and accelerate private capital investment in a warming Asia.

We have classified these financing measures according to their core functions, to give stakeholders a more holistic view of the diverse tools available for unlocking private capital and to help them identify the most suitable mechanisms given the specific constraints of each market. Although some instruments may serve multiple functions, we list them under the category in which they will likely have the greatest impact (see Figure 3).

Figure 3: Summary of Implemented and Potential Heat-Resilience Financing Strategies

By Function	Instrument	Description	Challenges Addressed
Risk transfer products	• Parametric insurance • Catastrophe bonds • Weather futures	Index-linked insurance payout mechanism offers convenient and immediate risk transfer solutions.	Inaccessibility and limited availability of heat-resilience solutions, particularly for smaller or less sophisticated private actors.
Project de-risking instrument	• First-loss guarantees • Policy-based guarantees • Structured debt	Philanthropic and public capital in blended facilities absorbs higher risk and transfers positive returns.	Unattractive risk return profiles that weaken the commercial lucrativeness of heat-resilience projects.
Results-based incentives	• Resilience credit • Contingent credit line • Debt-for-nature swaps	Results-based incentive structure drives deployment of resilience solutions.	A prevalent "wait-and-see" approach among private actors, reducing the urgency to deploy capital into heat-resilience initiatives.
Capital markets	• Green, Social, and Sustainability bonds • Sustainability-linked bonds	Thematic and performance-based debt structure enables cost-efficient capital raising.	High costs of capital, driven by limited liquidity and the underdeveloped state of the heat-resilience capital market, constraining the development of a scalable, bankable project pipeline.
Market creation	• Public–private partnerships • Joint investment platform • Cooling-as-a-service	Multi-actor collaboration fosters functioning market ecosystem for heat-resilience solutions.	The absence of a well-functioning market ecosystem to enable innovation, investment, and the efficient transaction of heat-resilience solutions.

Note: This table is non-exhaustive.

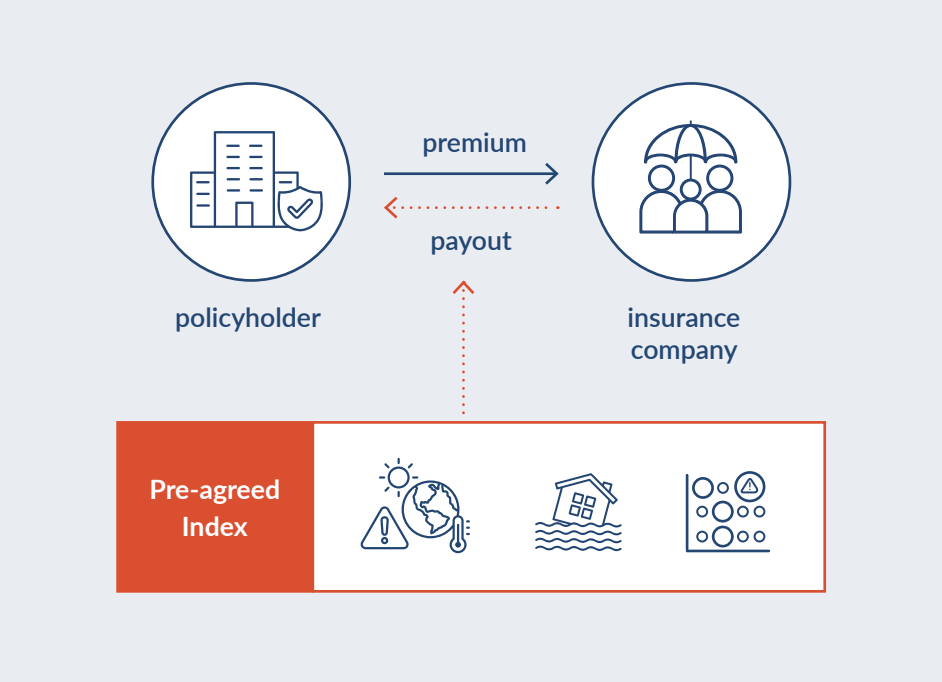
Source: Zurich Climate Resilience Alliance (2025); NAP Global Network and International Institute for Sustainable Development (2025)

Risk Transfer Products

Limited accessibility to heat-adaptation solutions remains a major barrier for many private-sector actors, exacerbating the low adoption rate of such solutions. Although extreme heat affects all segments of society, a substantial share of private-sector participants, particularly those in developing economies of Asia, lack foundational literacy on heat-related risks, the capacity to conduct meaningful cost–benefit assessments of solutions, and the technical capabilities necessary to design and implement company- and context-specific solutions.[33] This situation is reflected in recent findings by S&P Global that only 35 percent of companies globally report having a context-specific adaptation strategy, with most of those failing to quantify the cost of adaptation.[34]

Unlike indemnity-based insurance, which compensates for actual losses only after they occur, parametric insurance provides automatic index-based payouts triggered by predefined and independently verifiable parameters such as temperature thresholds, heat wave duration, or humidity indices (see Figure 4). This instrument bypasses damage assessments, loss verification, or complex claims processes, which significantly reduces transaction costs, makes coverage more predictable, and shortens the time between impact and recovery.[35] This speed and simplicity make parametric insurance particularly relevant for informal workers, small and medium enterprises (SMEs), and governments that face acute economic losses during heat waves. In many markets, it serves as an essential first line of defense, enabling immediate response while laying the groundwork for more sophisticated, longer-term resilience investments.

Figure 4: Stakeholder Chart for Parametric Insurance



Source: Swiss Re (2023)

Example 1: India's Self-Employed Women's Association Insurance Policy

A clear example of how parametric products can offer income protection against extreme heat is the parametric insurance codeveloped by the Self-Employed Women's Association (SEWA), Swiss Re, and Climate Resilience for All in 2024, reaching more than 46,000 women across Southeast Asia. In India, approximately 90 percent of women work in the informal sector and rely on daily wages, which are threatened when extreme heat prevents them from working. By linking payouts directly to specific heat parameters, SEWA's insurance protects lives and workers' livelihoods.

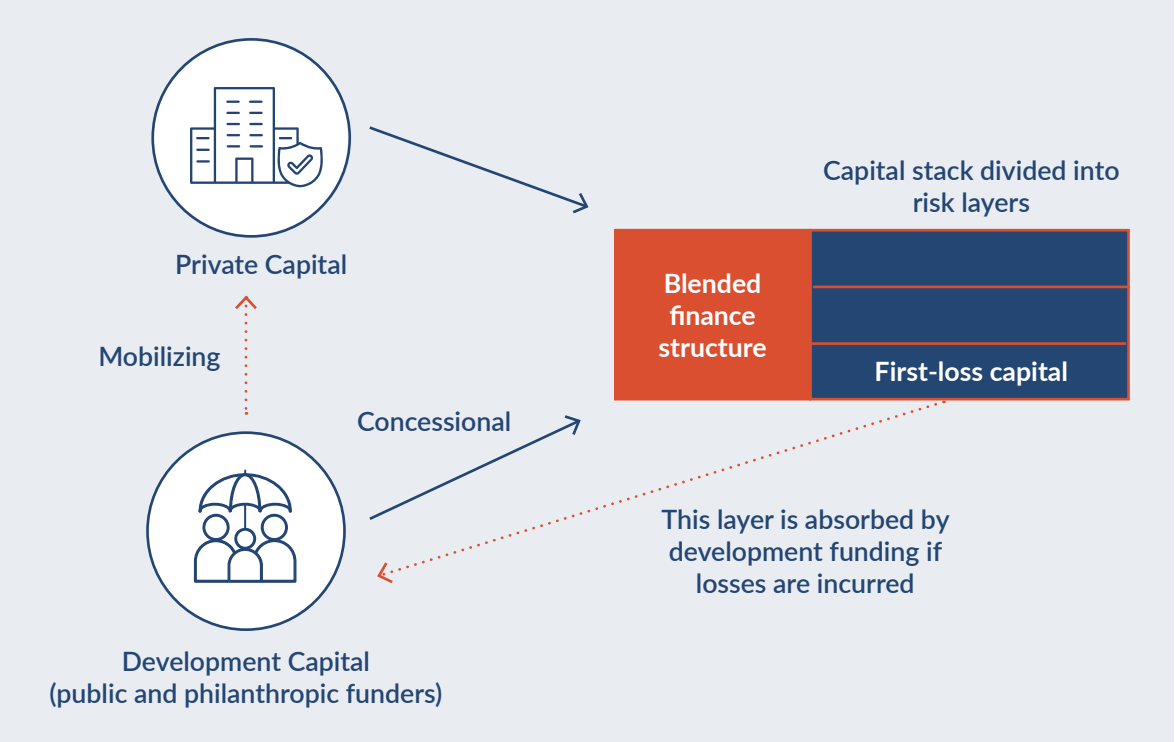
Another key innovation of SEWA's insurance lies in its use of locally adapted heat thresholds to determine payouts. Instead of imposing fixed temperature limits, the policy relies on historical temperature data to establish percentile-based triggers, unique for each participating community. This approach accounts for local climate variations and how heat is perceived by workers accustomed to their regional conditions, ensuring that payouts are fairly and accurately distributed. By adjusting these percentiles, the frequency of payouts can also be further calibrated to balance coverage needs with budget availability—making such solutions economical yet accessible for workers who might otherwise lack the means to manage heat-related threats.

Project De-Risking Instruments

A key barrier to private capital investment, as identified through discussions with institutional investors and private financiers, is the high-risk premium required for project financing in emerging sectors and markets where commercial viability is less established. For example, low-carbon mitigation projects such as solar developments in Vietnam require equity returns nearly twice as high as similar projects in Germany.[36] This elevated risk leads investors to demand higher returns, reducing the investability of many impactful projects. Heat-resilience projects face similar challenges because they often offer lower market returns, longer time frames, and uncertain revenue streams, making them less attractive to investors focused on profitability.[37] Without effective risk mitigation or improved risk–return profiles, private capital will likely remain limited, slowing the growth of essential heat-adaptation solutions.

Recent discussions emphasize the importance of public and philanthropic capital in reducing investment risk in emerging sectors such as heat resilience. Philanthropic and development funds, with greater risk tolerance and lower return expectations, can absorb risk premiums and share potential gains, making heat-resilience projects more attractive to private investors. As seen in Figure 5, a first-loss guarantee model structures development funding to absorb initial losses, reducing overall project risk and aligning the risk–return profile with private investor requirements. These capital sources help to turn early-stage, high-risk concepts into investment-ready projects with more balanced risk–return profiles, ultimately unlocking private capital through blended-finance structures.

Figure 5: Stakeholder Chart for First-Loss Guarantee



Source: Adapted from Convergence (2025)

Example 2: Singapore's FAST-P

The impact of de-risking instruments is evident in Singapore's Financing Asia's Transition Partnership (FAST-P) initiative, managed by Pentagreen Capital. The initiative, which reached its first close of US$510 million in 2025, provides debt financing for energy transition and marginally bankable green projects across Southeast Asia by leveraging public and philanthropic capital guarantees to reduce risk for private investors. Contributions such as Australia's US$50 million through the Southeast Asia Investment Financing Facility, alongside support from British International Investment and the Dutch FMO, absorb risk and share upside potential, transforming projects that might have been too risky into investment-ready opportunities.

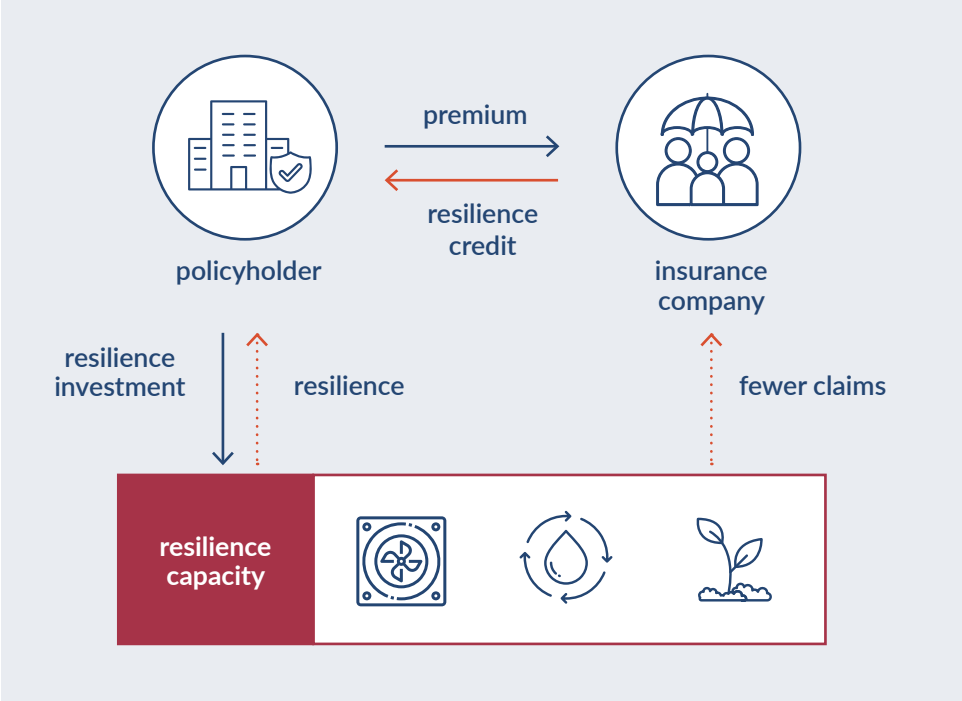
Through this risk-sharing mechanism, FAST-P aims to deploy US$1 billion in debt financing and mobilize up to US$5 billion of private capital into sustainable infrastructure projects across the region, demonstrating how strategic de-risking can make previously marginal projects financially viable. Although no projects have yet been specifically targeted at heat-related risks, similar de-risking approaches could be adapted to support climate- and heat-resilience initiatives in the future.

Results-Based Incentives

The lack of urgency among corporates to adopt adaptation solutions adds another layer of inertia to investment in this sector.[38] Heat-related risks are often treated as a climate externality, prompting private actors to take a wait-and-see approach despite the growing and tangible impacts of global warming. This hesitation is largely driven by structural uncertainty over the division of responsibilities between public and private actors. As Wong De Rui, senior vice president of the Sustainability Office at GIC, noted during the Summit, the gap between commercially viable projects typically undertaken by the private sector and public-good projects under government responsibility "makes it very difficult for us to price climate risk accurately."

Catalytic instruments issued by governments and insurers demonstrate how strategic incentives can encourage private actors to take proactive heat-adaptation measures, enabling them to assume ownership of physical climate risks and overcome their hesitation. Among these instruments, results-based incentives reward the achievement of measurable resilience outcomes, shaping investor behavior and accelerating the market uptake of heat-resilience solutions. Such instruments may take the form of contingent credit lines, through which lenders can access concessional financing upon integrating recognized risk-mitigation solutions (e.g., World Bank IDA Development Policy Loan with Catastrophe Deferred Drawdown), or resilience credits, through which insurers provide premium rebates to policyholders that implement approved adaptation strategies (e.g., FM Global Resilience Credit as seen in Figure 6).

Figure 6: Stakeholder Chart for Resilience Credits, an Example of a Results-Based Financing Mechanism



Source: FM Global (2025)

Example 3: Results-Based Incentives Across Asia

Several precedents in Asia illustrate how outcome-linked structures can effectively mobilize capital for climate resilience. In Bangladesh, the World Bank's Resilient Urban and Territorial Development Project employs disbursement-linked indicators to improve access to climate-resilient urban infrastructure and services, with financing released only after progress, such as constructing climate-resilient homes and adopting hazard-resilient building codes, is independently verified.[39]

In Indonesia, the Indonesia Climate Change Trust Fund deploys performance-based grants, releasing funds to local governments and civil society organizations only upon delivery of verifiable adaptation outcomes, including strengthened early warning systems and resilient land-use practices.[40] Similarly, the Philippines operates a performance-based grant system through its Performance Challenge Fund, awarding grants to municipalities that meet standardized resilience benchmarks, such as climate-responsive planning and disaster-resilient infrastructure.[41]

Although heat-specific applications of these incentive structures have yet to emerge, particularly in the Asian context, these examples illustrate how results-based mechanisms can unlock private capital by clarifying resilience value, reducing uncertainty, and aligning returns with measurable adaptive performance.

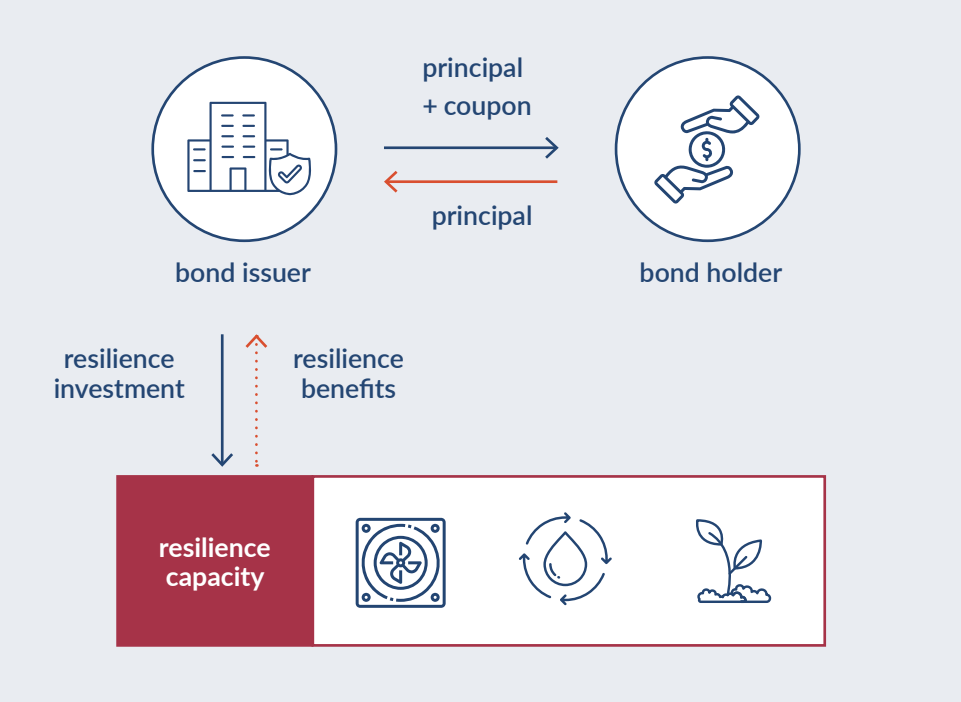
Capital Markets

High capital costs for financing heat-adaptation projects remain a significant barrier to investment.[42] Elevated perceived risk, along with unclear taxonomies and regulations in Asia, increases the cost of raising capital in a nascent and illiquid market. As a result, higher capital costs reduce expected returns and lessen the appeal of adaptation projects for private investors.

When supported by clear standards and credible project pipelines, capital market instruments can mobilize much larger volumes of commercial capital for resilience. In Asia, sustainability-themed debt instruments such as Green, Social, and Sustainability (GSS) bonds are now key channels for adaptation finance. Figure 7 illustrates how resilience bonds, a subset of GSS bonds, increase capital flows for resilience projects. These use-of-proceeds instruments are linked to eligible projects defined by established taxonomies, including the Climate Bonds Resilience Taxonomy, the EU Sustainable Finance Taxonomy, and the GARI CRISP Framework.

Green bonds, in particular, have shown higher average oversubscription multiples than conventional bonds for both EUR and USD issuances.[43] This trend, as remarked on by a roundtable participant, reflects growing confidence among market players, who are increasingly willing to take long-term positions in these asset classes rather than focusing solely on short-term gains.

Figure 7: Stakeholder Chart for Resilience Bonds



Source: Global Center on Adaptation (2020)

Example 4: Hong Kong's Green Bond Program

Hong Kong's Green Bond Program is a leading example of GSS-type bonds in practice. Hong Kong has emerged as the region's largest issuer of international GSS+ bonds, with the US$43.1 billion issued to date representing approximately 45 percent of Asia's total green bond issuance.[44] In 2022, Hong Kong expanded its Green Bond Framework to include climate adaptation and resilience activities as eligible use-of-proceeds categories. Proceeds have since supported key infrastructural upgrades such as the numerical weather prediction systems powered by high-performance computing, improving forecasting accuracy in response to increasingly frequent extreme weather events driven by extreme temperatures.[45]

Sustainability-linked bonds (SLBs) are another emerging financing instrument. Unlike traditional green bonds, SLBs are tied to the issuer's performance against measurable sustainability targets, such as Nationally Determined Contributions, National Adaptation Plans, or decarbonization commitments. Issuers benefit from lower bond servicing costs when they meet these targets, reducing their overall cost of capital. Investors also gain a straightforward way to manage long-term climate-related risks, providing a simpler alternative to complex hedging strategies.[46]

Despite this momentum, the use of GSS and SLB structures for heat adaptation in Asia remains limited. Many economies still lack coherent sustainability taxonomies and interoperable reporting frameworks, constraining issuers' ability to label, measure, and scale heat-resilience assets.[47] This gap limits the effectiveness of these instruments to channel capital toward critical heat-resilience initiatives.

Market Creation

A final barrier to scaling private investment in heat resilience is the absence of a mature, investable market for adaptation solutions. Unlike mitigation technologies, which benefit from established supply chains, clear standards, and predictable revenue models, heat-resilience solutions in Asia remain fragmented and underdeveloped. Weak demand signals, limited technical literacy, uncertainty over performance, and the lack of a bankable project pipeline all suppress both supply and demand. Without a clearer market structure and commercially viable business models, private investors face difficulties in pricing risk, assessing returns, and deploying capital at scale.

Building a functional heat-resilience market, therefore, requires models that convert early-stage or capital-intensive technologies into predictable revenue streams and bankable assets. Two approaches, PPPs and cooling-as-a-service (CaaS), illustrate how market-enabling structures can catalyze private investment by reducing upfront costs, sharing project risk, and providing long-term contractual certainty.

PPPs are increasingly being used to address infrastructure and market gaps that governments cannot fill alone. PPPs provide the enabling policy and regulatory environments and concession structures needed for private actors to enter emerging markets such as district cooling, passive-cooling retrofits, and urban heat-resilient infrastructure. By sharing risks, securing demand through long-term offtake agreements, and standardizing procurement, PPPs help to convert early-stage cooling and adaptation projects into viable investment propositions.

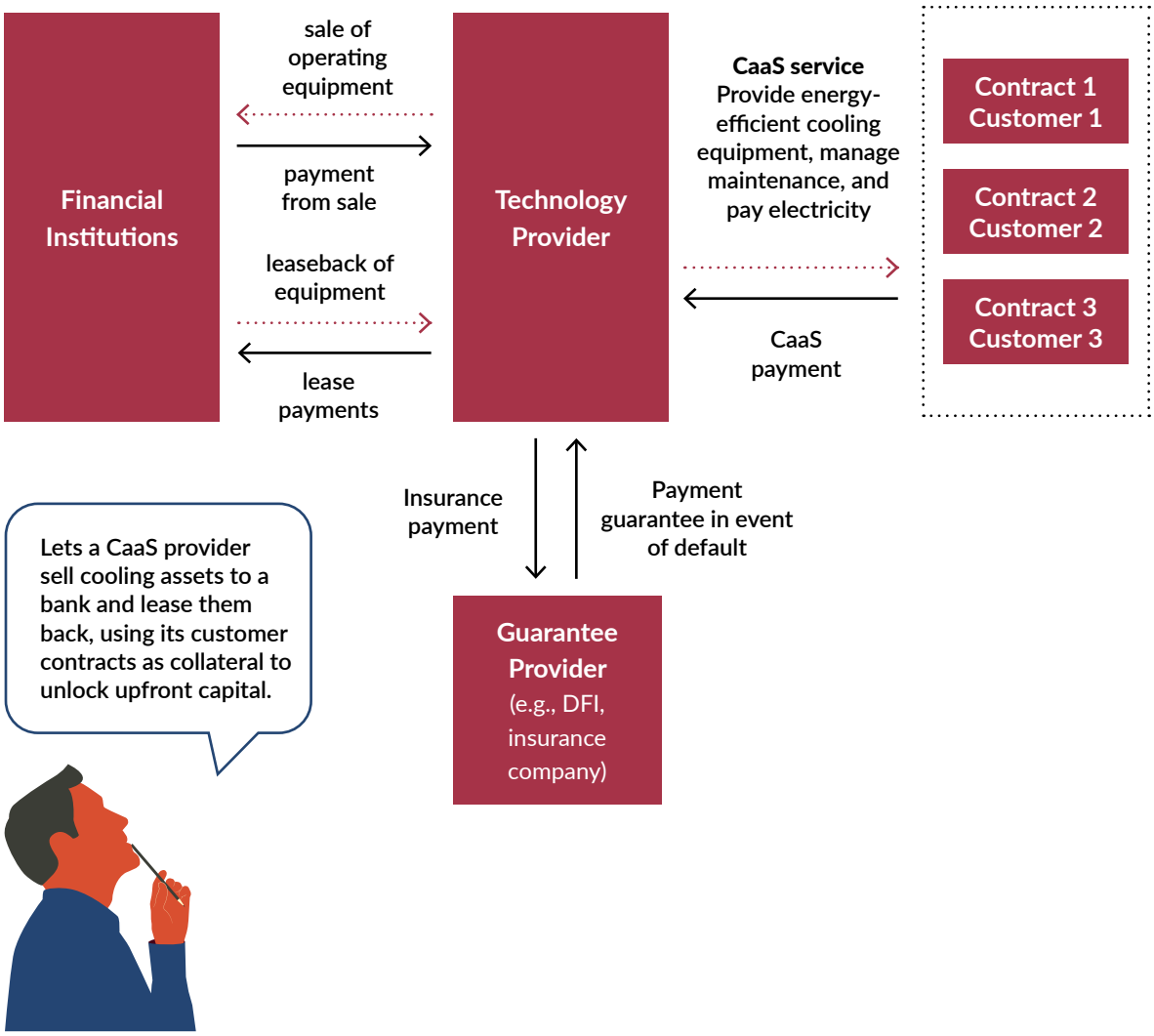
Example 5: International Finance Corporation and United Arab Emirates Tabreed

A leading example is the joint district energy investment platform established by the International Finance Corporation (IFC) and the United Arab Emirates national central cooling company, Tabreed, which works with national and municipal governments across India and Southeast Asia to develop investment-ready district cooling, trigeneration, and CaaS projects.[48] The platform aligns regulatory processes, provides technical assistance, de-risks initial project development, and creates a pipeline of commercially structured assets that can attract private capital. By consolidating demand and establishing performance standards, the partnership demonstrates how targeted institutional innovation and coordination can accelerate the formation of cooling markets capable of supporting large-scale investment.

Complementing PPPs, CaaS offers a market-creation mechanism that shifts cooling from a capital expense to an operating expense. Under the CaaS model, service providers finance, install, own, and maintain high-efficiency cooling systems, while end-users pay only for the cooling they consume. This model lowers upfront capital barriers, transfers performance risk to the provider, and aligns incentives around system efficiency and long-term reliability. Because providers are rewarded for delivering cooling services rather than selling equipment, they have direct incentives to invest in higher-performance technologies.

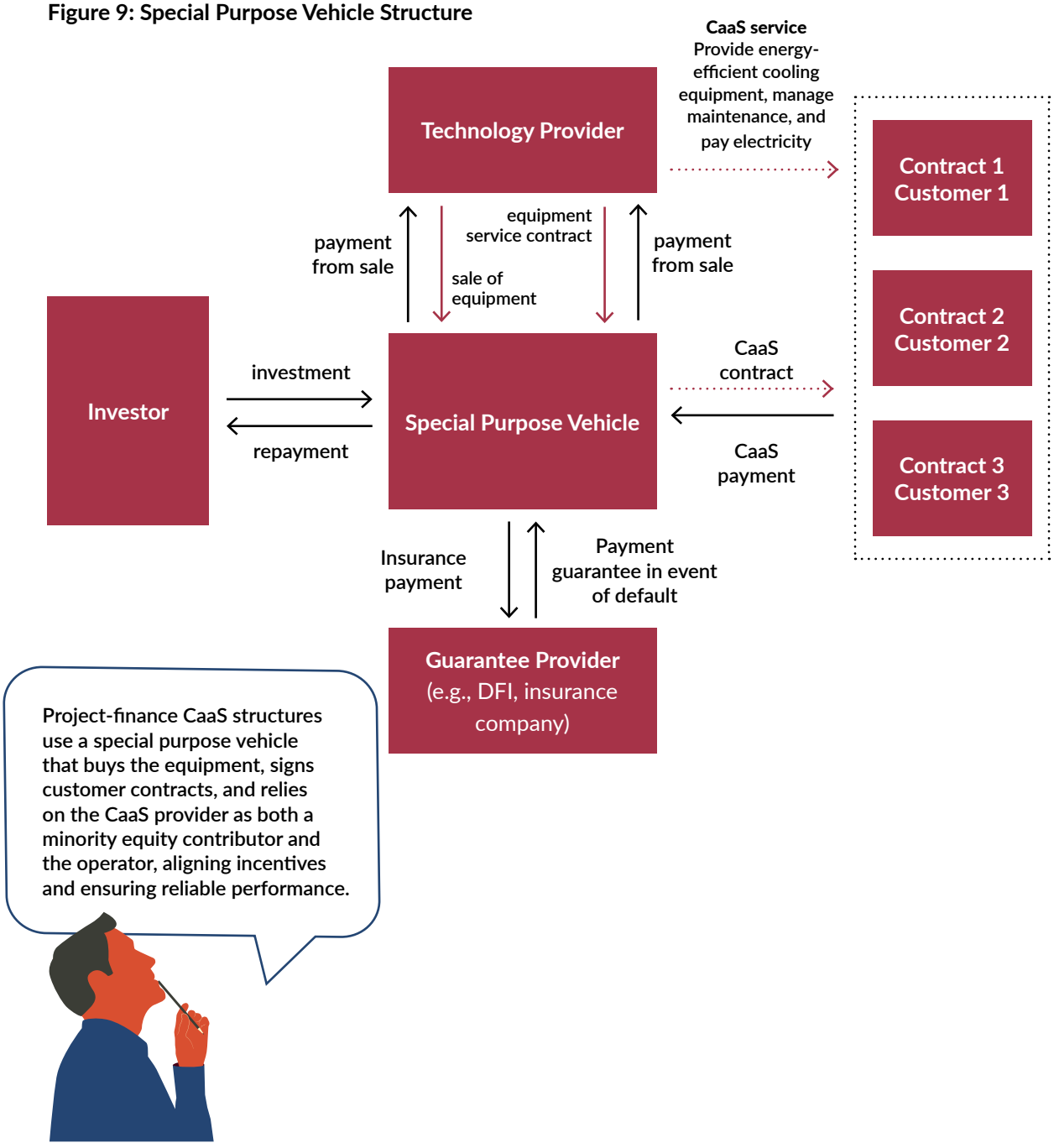
CaaS contracts also create predictable revenue streams, improving bankability for lenders and enabling aggregation into investable portfolios over time. CLASP's research focusing on India, Indonesia, and Nigeria demonstrates how CaaS can facilitate the adoption of high-efficiency cooling systems across commercial buildings, SMEs, and public facilities.[49] Figures 8 and 9 illustrate different financial models used to implement CaaS.

Figure 8: Sale and Leaseback Structure



Source: Adapted from Basel Agency for Sustainable Energy (BASE) (2024)

Figure 9: Special Purpose Vehicle Structure



Source: Adapted from Basel Agency for Sustainable Energy (BASE) (2024)

Together, PPPs and service-based models like CaaS illustrate how deliberate market-creation strategies can attract private capital by transforming fragmented, high-risk adaptation needs into investable, scalable opportunities. As heat exposure intensifies across Asia, expanding these models will be crucial for building a functional marketplace that can mobilize private investment in heat resilience at scale.

Key Enablers for Scaling Heat-Resilience Finance in Asia

Scaling private investment in heat resilience and sustainable cooling requires more than just a clear business case, innovative financing solutions, and business models. Roundtable participants unanimously agreed that success depends on an enabling ecosystem, anchored by strong regulatory and policy frameworks that build investor confidence and signal long-term market opportunity. It depends on building the systems, institutions, and incentives that make heat-resilience investments attractive, predictable, investable, and scalable across Asia. This section examines these enabling conditions in depth, distilling what has made them work in Asia and what support is required to scale or replicate them.

Strengthening Policy and Regulatory Enablers

Governments play a foundational role in shaping bankability, investment confidence, and long-term demand for heat-resilience solutions. As one roundtable participant noted, without political commitment, scaling even the most promising climate-resilience efforts will remain difficult.

As established above, extreme heat poses a significant horizontal risk that disproportionately harms vulnerable groups. This asymmetry necessitates that governments adopt integrated, multisectoral heat action plans (HAPs) that span short-, medium-, and long-term time frames.

Yet in Asia, the response remains uneven. Although some countries, such as India, have made significant progress, with more than 140 cities and 23 states developing HAPs,[50] many other countries lack dedicated strategies. As of 2022, only about 11 percent of Southeast Asian countries have a formal heat-health plan.[51] Even in countries with HAPs, vulnerable populations may be overlooked, as observed in some Indian HAPs that insufficiently cover outdoor workers and informal settlements.[52]

This fragmented landscape is more than a policy gap; it is an investment disincentive. The success of large climate investments often depends on aligned, parallel measures: durable regulation, infrastructure, and public mandates. When these measures are absent, private capital remains tentative.

Policy design deeply influences commercial risk. As adapted from broader climate finance analysis, the potential for public finance to mobilize private finance varies significantly across sectors, technologies, and geographies. In nascent or frontier markets, the underlying risk is often too high: Returns can appear too low relative to uncertainties.[53] Meanwhile, policies such as carbon pricing, regulatory reforms, subsidies, or public innovation investment have dramatically reshaped market dynamics elsewhere, making green investments more competitive than business-as-usual.[54] However, in many heat-resilience domains (e.g., distributed cooling, urban adaptation, or worker safety), the value proposition continues to emerge, and policy support lags behind.

To change this situation, governments need to lean in on several key levers:

1. National and subnational heat action plans that integrate climate, health, and disaster risk strategies and create clear mandates, institutional accountability, and predictable funding.[55]

2. Upgrades to building codes and appliance standards, including mandates for passive cooling, energy efficiency, and labeling, which help to stimulate consistent demand for cooling technologies.

3. Urban planning reform to incentivize nature-based cooling, reflective surfaces, shaded corridors, and district-scale cooling systems that reduce heat exposure while offering long-term value to real estate and public assets.

4. Utility and tariff reform that rewards demand-side efficiency, encourages distributed cooling solutions, and flattens peak electricity loads, making cooling investments more economically viable.

Examples from the region help to illustrate proactive policy. Singapore's Mercury Taskforce, established in 2023 and composed of 37 public agencies from the environment, health, and defense ministries, is a whole-of-government model specifically designed for extreme heat governance. The task force's 2025 HAP includes early warning advisories, expanded wet bulb globe temperature monitoring, mandatory sectoral guidelines, and a network of public cooling centers, as well as provisions for home-based learning and school activity suspensions during high heat.[56]

At the regional and global levels, platforms such as the Global Heat Health Information Network have helped governments access technical guidance, early warning best practices, and evidence-based policy frameworks to build institutional capacity and align national plans with international standards.[57] By advancing these policy reforms, governments can reduce investor risk, generate sustained demand for resilience infrastructure, and attract private capital to scalable heat-adaptation markets.

DFIs and MDBs as Mobilizers of Private Capital

DFIs and multilateral development banks (MDBs) also play a central role in catalyzing the mobilization of private capital in building Asia's heat resilience. With explicit mandates for climate action, the ability to deploy concessional resources, and deep experience in emerging markets, DFIs are structurally positioned to take early risks, create markets, and crowd in institutional investors at scale. As one roundtable participant stressed, "There is plenty of liquidity—the challenge is channeling capital toward the right projects and outcomes."

Around the world, shareholders and policymakers are calling for DFIs and MDBs to prioritize private capital mobilization as a core strategy. The G20 Independent Review of MDB Capital Adequacy Frameworks and the G20 Independent Expert Group both urge MDBs to use their balance sheets more ambitiously, expand risk-sharing instruments, and embed mobilization targets within institutional strategies.[58] The Organisation for Economic Co-operation and Development (OECD)

similarly underscores the need to strengthen DFI capabilities and partnerships to unlock private financing, particularly in underinvested sectors such as agriculture, forestry, and climate adaptation.[59]

Drawing on the roundtable discussions, we identified four strategic roles that DFIs and MDBs can play to empower the adaptation and cooling finance ecosystem:

Channeling Capital and De-risking New Markets

First, DFIs are uniquely positioned to shape nascent markets and demonstrate viable models that commercial investors can follow. By anchoring first-loss risk, deploying blended-finance structures, and demonstrating viable financial models, they crowd in commercial capital that would not otherwise enter, particularly in emerging sectors in new cooling and adaptation technologies. Additional tools such as securitization, risk transfer platforms, and co-lending structures enable DFIs and MDBs to recycle capital, expand balance sheet capacity, and mobilize larger volumes of institutional investment. Guarantee programs, structured funds, and junior equity positions are also effective in creating senior tranches suitable for institutional investors.

In leading by example, DFIs and MDBs act as catalysts for mobilization, anchoring early-stage risk and crowding in private capital through blended-finance structures and technical assistance. Here, DFIs and MDBs can shape enabling environments that anchor long-term private-sector participation. For instance, IFC's investments in district cooling (Tabreed), temperature-controlled supply chains, and India's green affordable housing (using EDGE-aligned standards) illustrate how catalytic capital can seed scalable private-sector models.

Building Capacity and Creating Investable Pipelines

Cooling and heat resilience, once viewed as niche or ancillary investment opportunities, are now emerging as investable asset classes with clear mitigation and adaptation co-benefits. Although these market segments are gaining momentum, they remain underfinanced because heat resilience remains poorly understood across many financial institutions. DFIs and MDBs possess the relevant knowledge and expertise and can fill this gap by providing technical assistance, advisory support, and pilot financing to help local banks and utilities adopt cooling standards; support SMEs and municipalities in designing investable resilience projects; and strengthen data, disclosure, and heat-risk assessment frameworks.

Recent analysis from IFC and UNEP's Cool Coalition reinforces the scale of this opportunity. The sustainable cooling market in developing economies is expected to reach at least US$600 billion annually by 2050, with potential system-wide savings of US$8 trillion from improved efficiency and passive-cooling measures. IFC and UNEP are now collaborating with governments and financial institutions to de-risk early investment and expand pipelines aligned with these opportunities.[60]

At the innovation frontier, ADB Ventures, ADB's private-sector innovation arm, offers a pathway to scale emerging technologies, such as advanced building materials, passive-cooling architecture, reflective coatings, and heat-health wearables. These early-stage investments are crucial for mitigating risks in markets because they provide private actors with proof-of-concept models

that show commercial viability. Therefore, DFIs and MDBs, with their mandates, balance sheets, and partnerships, are uniquely positioned to lead by example in translating pilot projects into commercially investable portfolios.

Advancing Policy and Regulatory Reform

DFIs and MDBs serve as a bridge between government and private finance, enabling them to shape policies and regulations that support long-term private-sector participation in heat-resilience financing. By collaborating with national authorities, regulators, and industry partners, DFIs and MDBs align local incentives with global adaptation standards, accelerate approval for district cooling and energy-efficient building projects, and advance climate-resilience taxonomies and disclosure frameworks.

These efforts directly address a barrier repeatedly underscored during the roundtable—investors need clarity on what constitutes an adaptation investment, as well as confidence in how proceeds will be used and how impact will be measured. As harmonized standards gradually take hold, institutional investors are becoming more willing to allocate capital to adaptation-linked assets.

Convening Partnerships to Demonstrate Scalable Models

Finally, cutting across all these functions is the unique convening power of DFIs and MDBs. Few institutions can bring together national ministries, United Nations agencies, municipal authorities, global asset managers, and technology providers at the same table. Their ability to coordinate across sectors and jurisdictions enables them to broker large-scale partnerships and facilitate the technical exchanges needed for market creation.

By leveraging global networks and technical expertise, DFIs and MDBs are often well positioned to anchor complex demonstration projects that involve both public and private stakeholders. Demonstration projects lower perceived risk, broaden investor visibility into new markets, and create opportunities for domestic financial institutions to participate. These initiatives include PPPs for district cooling and smart-city resilience, blended-finance platforms supporting cold-chain logistics, and regional programs that integrate heat resilience into infrastructure pipelines. IFC and ADB have consistently acted as early movers in this space, using catalytic capital and technical expertise to signal project viability and attract further financing.

Insurers as Critical Enablers of Heat-Resilience Finance

Insurers and reinsurers play a uniquely catalytic role in mobilizing capital for heat resilience because they sit at the intersection of risk analytics, product innovation, and long-term investment capital. Their vast repositories of climate and catastrophe risk datasets—encompassing climate hazards, health outcomes, mortality, workforce productivity, and economic disruption—enable them to quantify heat-related risks with a level of precision that other market actors cannot match. This wealth of risk intelligence is essential for structuring and financing adaptation and cooling solutions at scale.

Across markets, insurers enable investment by:

- quantifying heat-related risks to improve project structuring, pricing, and due diligence;
- developing risk transfer solutions such as parametric heat covers, business interruption insurance, crop and livestock protection, and micro-insurance that make community cooling, workplace adaptation, and resilient urban infrastructure more investable;
- partnering with DFIs and governments to design guarantees, co-insurance, and risk-sharing mechanisms that de-risk city resilience projects and blended structures;
- driving corporate awareness of heat risk in key sectors, including manufacturing, retail, agriculture, and tourism, enabling companies to invest proactively in employee safety, resilient operations, and cooling upgrades; and
- reducing uncertainty in early-stage markets, expanding the investing universe for adaptation, cooling, and climate–health resilience solutions.

As highlighted in the *Playbook on the Insurance Sector's Roles in Blended Finance at the Climate-Health Nexus*, a research brief by Convergence Blended Finance and GAIP,[61] insurers can act simultaneously as risk advisors, (re)insurers, and institutional investors—each role providing distinct leverage in blended-finance transactions that enable heat-resilience investment.

As suggested herein, by engaging earlier in the project cycle, insurers and reinsurers help governments and project sponsors understand the true economic cost of extreme heat, design interventions that reflect real risk profiles, and build financial structures that can attract institutional investors. This upstream role, including quantifying losses, shaping incentives, and improving project quality, is often the missing link in moving heat-resilience initiatives from concept to investments.

Insurers also offer tools that make adaptation more financially viable. An expert at the roundtable explains that parametric insurance usually comes into play when traditional insurance is not effective. Parametric heat-health policies, portfolio-level protection for cities, and reinsurance-backed risk pools can stabilize public budgets, reduce volatility for investors, and accelerate payouts when heat events strike. These mechanisms unlock blended-finance structures that mobilize private capital at scale, especially in emerging Asian markets, where the potential costs of climate risks are rising faster than local government budgets can keep pace.

Crucially, the insurance sector's participation signals confidence. When insurers price, share, and invest in heat-related risks, the broader market will likely follow suit. Their involvement expands the pipeline of viable resilience projects, lowers the cost of capital, and supports the development of new products for vulnerable communities.

Data, Technology, and Measurement Enablers

Across Asia, gaps in heat-stress monitoring, fragmented climate–health data, and limited local government capacity constrain both public-sector planning and private investment. Therefore, robust data systems and interoperable technologies are needed to form the foundation of scalable heat resilience. Strengthening these systems will reduce risk, improve targeting, and create the transparency required by investors. This data-driven, systems-level approach to integrating climate and health information aligns with findings from UNEP and IFC that successful mobilization of private finance at scale relies on improved data on cooling demand, capital costs, and performance.[62]

Integrated climate–health information platforms are becoming equally indispensable. Linking environmental data with clinical indicators, community health records, and heat alerts enables more precise targeting of at-risk populations and supports rapid public-health intervention. Digital tools that translate weather and climate data into actionable guidance, such as worker safety protocols, school-suspension thresholds, or public advisories, extend the reach and impact of these systems. This builds on the Milken Institute's multiyear work on Early Warning Systems for Future Pandemics, which demonstrated how interoperable data platforms can strengthen emergency preparedness by improving the speed, accuracy, and coordination of risk detection and response.

Better data reduce uncertainty, clarify financial and social returns, and support the development of replicable heat-resilience financing models. As suggested by a roundtable participant, DFIs, insurers, and development partners can cocreate regional heat-risk data hubs to support project developers, investors, and governments. Further investments in geospatial analytics, municipal data systems, and interoperable digital platforms can help local governments identify priority risks and develop bankable heat-resilience projects that can attract DFI and private-sector participation. For policymakers, DFIs and MDBs, and investors, improved visibility into heat exposure and its rippling impacts will transform heat resilience from an emerging challenge into a scalable, investable opportunity across Asia.

Conclusion

Asia's heat challenge is no longer a distant climate concern—it is a present and accelerating threat reshaping health, productivity, infrastructure, and long-term economic competitiveness. Yet, as this paper has shown, the same forces threatening Asia's resiliency also present a powerful opportunity: Heat resilience is emerging not only as a public good but also as a viable and increasingly urgent investment frontier. Unlocking this opportunity will require identifying how private capital can play a role in heat resilience, and building the financial, policy, and technological foundations for a mature resilience ecosystem.

Our selected list of financing strategies, which have been or can be used in the heat-resilience space, demonstrates clear proof of concept: Resilience can be quantified, priced, and financed in ways that deliver both societal protection and commercial returns. Real progress toward an environment where these financing strategies can succeed depends on enabling conditions such as coherent national strategies, supportive regulatory frameworks, DFI leadership to de-risk early markets, insurance-sector innovation to quantify and transfer risk, and robust data systems to underpin investor confidence. These elements are the structural backbone of a functioning resilience market.

With its unique exposure, demographic pressures, and expanding urban centers, Asia has more to lose from inaction, and more to gain from pioneering solutions than anywhere else. If governments, financiers, and industry leaders move decisively, Asia can transform heat resilience from an underfunded necessity into a dynamic engine of adaptation, innovation, and sustainable growth. As such, resilience is not merely a defensive response to rising temperatures but a strategic investment in Asia's long-term prosperity. The opportunity now is to act boldly, collaboratively, and at scale, while we are in the hot seat.

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