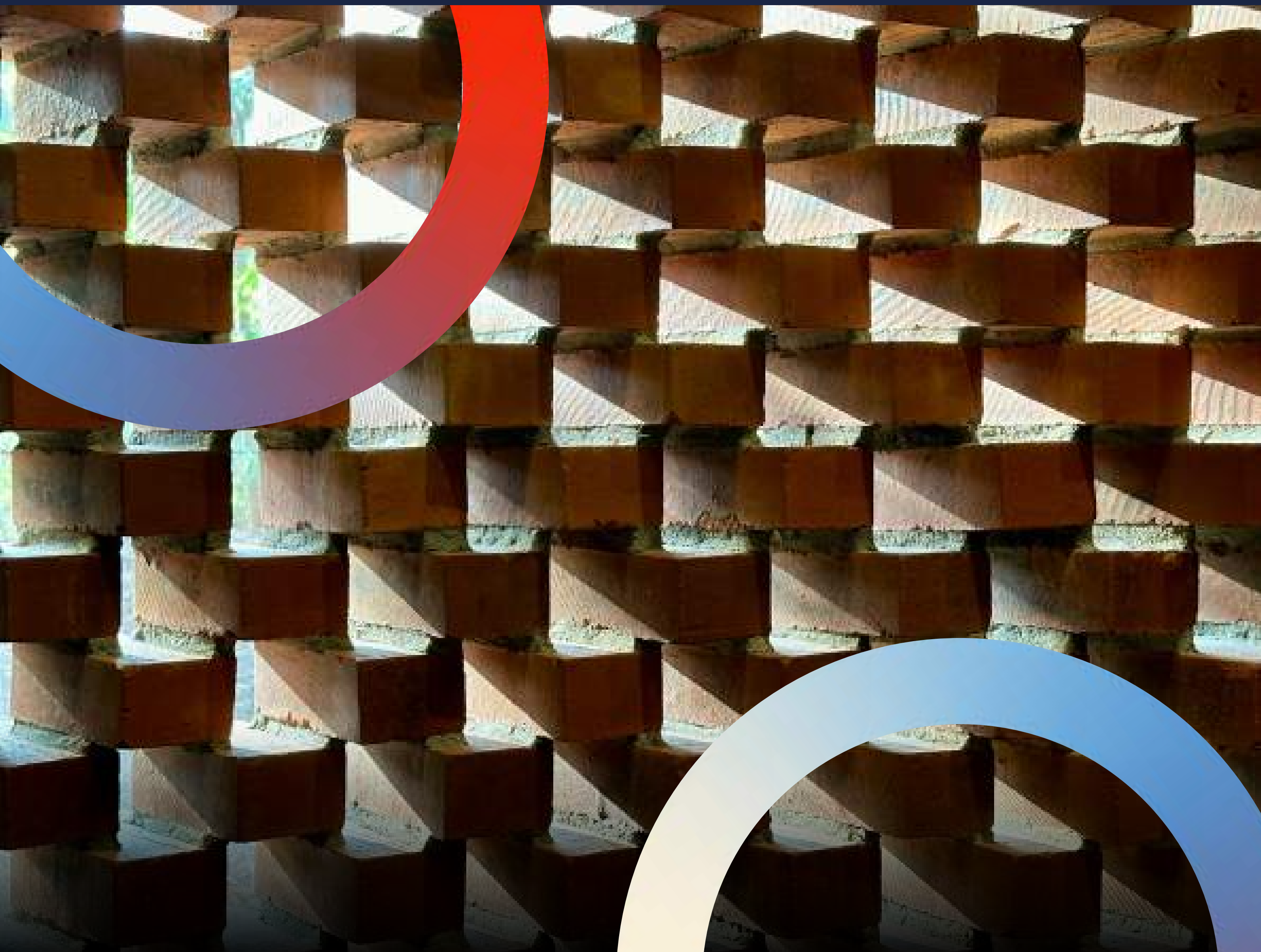
POLICY BRIEF

United Nations Climate Change
Technology Executive Committee

Deploying Established Climate Technologies and Solutions for Buildings



MIT Climate Policy Center

Global Alliance for Buildings and Construction

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Abbreviations and Acronyms

AIS	Colombian Earthquake Engineering Association
BASE	Basel Agency for Sustainable Energy
BINGO	Business and Industry Non-Governmental Organizations
BREEAM	Building Research Establishment Environmental Assessment Method
CBSW	Composite Bamboo Shear Walls
CMA	Conference of the Parties serving as the Meeting of the Parties to the Paris Agreement
CO_2	Carbon Dioxide
COP	Conference of the Parties (to the UNFCCC)
CTCN	Climate Technology Centre and Network
EIB	European Investment Bank
EDGE	Excellence in Design for Greater Efficiencies
EPC	Energy Performance Contracting
ESCO	Energy Service Company
ETS	Emissions Trading System
GHG	Greenhouse Gas
GlobalABC	Global Alliance for Buildings and Construction
HVAC	Heating, Ventilation, and Air Conditioning
IEA	International Energy Agency
IFC	International Finance Corporation
IPCC	Intergovernmental Panel on Climate Change
IRA	Inflation Reduction Act (United States)
ISO	International Organization for Standardization
LCA	Life Cycle Assessment
LDCs	Least Developed Countries
LEED	Leadership in Energy and Environmental Design
LTS	Long-Term Strategies

MEPS	Minimum Energy Performance Standards
MFIs	Microfinance Institutions
MIT	Massachusetts Institute of Technology
NAPs	National Adaptation Plans
NBS	Nature-Based Solutions
NDCs	Nationally Determined Contributions
NGOs	Non-Governmental Organizations
OECD	Organisation for Economic Co-operation and Development
PACE	Property Assessed Clean Energy
PAYS	Pay-As-You-Save
PPP	Public-Private Partnership
PV	Photovoltaic
R&D	Research and Development
RINGO	Research and Independent Non-Governmental Organizations
RLF	Revolving Loan Fund
SIDS	Small Island Developing States
SMEs	Small and Medium-sized Enterprises
TEC	Technology Executive Committee
UNDRR	United Nations Office for Disaster Risk Reduction
UNEP	United Nations Environment Programme
UNEP-CCC	UNEP Copenhagen Climate Centre
UNFCCC	United Nations Framework Convention on Climate Change
WGC	Women and Gender Constituency
WIPO	World Intellectual Property Organization
WorldGBC	World Green Building Council
YOUNGO	Children and Youth Constituency under the UNFCCC

Foreword

The buildings sector lies at the heart of the global transition toward a low-emission and climate-resilient future, and is indispensable to achieving global net-zero emissions by mid-century. Responsible for nearly 40 percent of global energy-related CO_2 emissions, buildings offer one of the most impactful opportunities to achieve the goals of the Paris Agreement. Enhancing the energy performance, resilience, and affordability of buildings through the deployment of established, market-ready climate technologies is central to delivering on national commitments under the Paris Agreement, including the implementation and updating of Nationally Determined Contributions (NDCs) and National Adaptation Plans (NAPs).

A diverse suite of proven, high-impact, and cost-effective climate technologies—ranging from advanced heat pumps and high-performance insulation to renewable energy integration, smart energy management systems, and nature-based solutions—can drastically reduce emissions and enhance resilience. Their impact is maximized when applied through integrated approaches that combine hardware, software, and organizational ("orgware") solutions. However, persistent barriers, including limited access to finance, inadequate policy frameworks, outdated building codes, and gaps in technical and institutional capacity, continue to constrain large-scale deployment.

The findings in this brief align closely with global efforts to double the rate of energy efficiency improvements and triple renewable energy capacity by 2030, targets endorsed by 133 countries at COP28. Buildings, as the largest energy users globally, must therefore be a central pillar of national and international climate strategies. Accelerating the uptake of renewable and efficient building technologies will not only contribute to achieving these global milestones but also enhance energy security, reduce operating costs, create green jobs, and improve quality of life.

Through collective and coordinated action, the global community can transform the buildings sector into a cornerstone of climate action—one that delivers tangible contributions to the Paris Agreement, drives the global energy transition, and supports inclusive and sustainable development for all. By scaling up established and emerging technologies, countries can turn ambition into implementation, ensuring that the path to a low-emission and climate-resilient future remains just, inclusive, and achievable.

This report, developed through a partnership between the UNFCCC Technology Executive Committee (TEC), the Global Alliance for Buildings and Construction (GlobalABC), and the Massachusetts Institute of Technology (MIT) Climate Policy Center, underscores that scaling up climate technologies in the buildings sector is essential to achieving global climate goals while meeting the accelerating pace of urbanization and growing housing demand.

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Executive Summary

Key Messages

The Technology Executive Committee (TEC) highlights the following key messages drawn from the findings in this policy brief, "Deploying Established Climate Technologies and Solutions for Buildings," prepared in collaboration with the Global Alliance for Buildings and Construction (GlobalABC) and the Massachusetts Institute of Technology Climate Policy Center:

— Buildings account for nearly 40% of global energy-related greenhouse gas emissions. Yet significant disparities exist among countries in access to proven climate technologies, with developing countries, especially Small Island Developing States (SIDS) and Least Developed Countries (LDCs), facing particular challenges due to resource constraints, inadequate policy frameworks, and limited technical capacity, therefore, scaling up established climate technologies in buildings is essential to achieving global climate goals while addressing rapid urbanisation.

— A wide array of high-impact, cost-effective, market-ready climate technologies have demonstrated effectiveness in reducing emissions and enhancing resilience across diverse climatic zones, and their impact is greatest when applied in an integrated manner. This means combining hardware solutions (advanced heat pumps, highly-energy efficient cooling systems with climate- and environmentally friendly refrigerants, high-performance insulation), software measures (energy management systems), and orgware approaches (green building codes, traditional knowledge). Solutions range from nature-based approaches like green roofs to advanced technologies like modular construction and renewable energy systems.

— Traditional building practices rely on low-specification materials and energy-intensive systems, missing opportunities to leverage cost-effective solutions. While the importance of sustainable buildings in climate strategies is recognised at the national level, there is a limited integration of specific climate technologies in national planning documents, such as Nationally Determined Contributions (NDCs), National Adaptation Plans (NAPs), and other national climate strategies. Therefore, the gap between recognition and implementation highlights the need for targeted technical assistance and capacity-building support.

— Access to affordable financing remains a critical barrier, particularly in developing countries. Innovative mechanisms—including green bonds, revolving loan funds, public-private partnerships, and pay-as-you-save models—have proven effective in reducing barriers and enabling adoption. Long-term financing mechanisms are key to overcoming high upfront costs and scaling integrated climate technology solutions.

— Community-based approaches integrating traditional knowledge with modern technologies demonstrate superior acceptance, particularly in developing countries, especially in SIDS and LDCs. Technologies utilising locally available materials, such as treated bamboo, rammed earth, and traditional passive cooling, leverage traditional knowledge while creating affordable solutions, and thereby address resource constraints while supporting local economies.

— Despite technology availability, adoption faces obstacles including outdated building codes, limited expertise, and insufficient stakeholder engagement. Successful deployment requires comprehensive enabling environments with robust regulatory frameworks and inclusive approaches prioritising gender equity and social considerations. Creating enabling environments through supportive policies and capacity-building is essential for overcoming persistent barriers to deployment.

Recommendations

To accelerate the deployment of climate technologies and solutions in the buildings sector, the TEC recommends that the COP and the CMA encourage Parties, international organisations and stakeholders, as relevant, to:

- Consider climate technologies for buildings when preparing and updating national climate policies, strategies and plans, where appropriate, prioritising the development and implementation of comprehensive green building codes.
- Mobilise scalable financing solutions by leveraging resources from climate funds, development banks, and innovative financial instruments, including green bonds, revolving loan funds, green public procurement programmes, national taxonomies integrating standard low- and net-zero-emission buildings, and public-private partnerships that reduce upfront cost barriers and support green building code compliance.
- Leverage international cooperation and technology transfer initiatives to strengthen institutional capacity for developing and implementing green building codes, facilitate knowledge sharing on best practices, and enable access of developing countries, especially in SIDS and LDCs, to cutting-edge climate technologies.
- Support the integration of traditional knowledge with modern climate technologies through updated green building codes that recognise locally available materials, technologies and climatic conditions, thereby creating affordable pathways that enhance community ownership and long-term sustainability.
- Build comprehensive enabling environments through robust green building codes with clear enforcement mechanisms, institutional coordination, and digital monitoring systems that ensure compliance while addressing regulatory gaps and streamlining implementation processes.
- Promote inclusive and equitable deployment through green building codes that prioritise affordability and social justice, ensuring that climate technology benefits reach marginalised communities through targeted subsidies, microfinance mechanisms, and community-based implementation models.


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Introduction

Buildings and infrastructure account for nearly 40% of global energy-related greenhouse gas emissions.[1] For developing countries, especially SIDS and LDCs, the urgency to transform these sectors is most apparent in their vulnerabilities to climate risks such as extreme heat, flooding, and resource scarcity. Addressing these challenges requires a dual focus on mitigation—reducing operational and embodied carbon—and adaptation—enhancing resilience to climate extremes.

The global transition to sustainable, low- and near-zero emissions economies requires a transformative change in how we design, construct, and operate buildings. Climate technologies—ranging from advanced insulation materials to renewable energy systems—offer a pathway to reduce operational and embodied carbon emissions while enhancing resilience to climate extremes. These solutions, however, must be scalable, cost-effective, and affordable in the regions that need them most.

Despite their potential, the adoption of climate technologies faces significant barriers. High upfront costs deter investments, especially in resource-constrained economies. Inadequate policy frameworks and non-existent or outdated building codes fail to incentivise or enforce sustainable practices. Furthermore, gaps in technical expertise and institutional capacity hinder the ability of local stakeholders to implement and maintain advanced solutions. Addressing these challenges requires coordinated action from governments, industry stakeholders, and development organisations, each playing a critical role in fostering enabling environments for climate technology deployment.

This policy brief outlines established climate technologies across diverse climatic zones, emphasising their importance for scalable deployment. Central to this effort is ensuring these technologies are affordable and accessible, particularly in target economies. By highlighting innovative materials, circular economy principles, and advanced solutions such as modular construction and heat pumps, this brief provides key policy recommendations to facilitate their widespread adoption.

This policy brief is intended for policymakers, industry stakeholders, and development organisations. Policymakers create incentives and ensure equity; industry stakeholders implement sustainable, cost-effective solutions; and development organisations provide expertise, funding, and capacity building to support decarbonization and resilience.

1

Established Climate Technologies and Solutions for Buildings

The deployment of climate technologies in buildings and infrastructure is essential for achieving global climate goals while meeting the growing demands of urbanisation and development. Climate technologies encompass a range of materials, systems, and practices that aim to reduce greenhouse gas emissions, enhance resilience, and support sustainable growth. This section delves into the definitions and classifications of these technologies and their applicability across climatic zones and economic contexts, as well as performance benchmarks and the most impactful, cost-effective solutions available today.

A Definition and Categories of Climate Technologies

Understanding Climate Technologies for Buildings

Climate technologies refer to materials, systems, and practices designed to mitigate greenhouse gas emissions or adapt to the impacts of climate change. The Intergovernmental Panel on Climate Change (IPCC) defines technology as "a piece of equipment, technique, practical knowledge, or skills for performing a particular activity."[2]

In the buildings sector, three components of technology are typically distinguished:

— **Hardware:** Tangible components, such as physical tools, equipment, or products. Examples include heat pumps, solar panels, green roofing materials, and advanced insulation.

— **Software:** Intangible components, including digital tools and processes that enable the use of climate technologies. Examples include energy management systems and building performance analytics.

— **Orgware:** Organisations, cultural institutions, or frameworks used in the adoption and diffusion of technology. Examples include green building codes and traditional knowledge.[3]

Climate Technology Classifications

Climate technologies can be further categorised by their potential impacts, primarily mitigation impacts, adaptation impacts, or both. Key typologies include:

— **Mitigation Technologies:** Solutions that directly reduce emissions, such as natural refrigerant heat pumps or on-site renewable energy systems.

— **Adaptation Technologies:** Technologies enhancing resilience to climate impacts, including early warning systems or flood-resistant construction materials.

— **Cross-cutting Technologies:** Approaches like nature-based solutions that provide mitigation and adaptation benefits, such as integrating green roofs to provide cooling and improve flood management, or advanced insulation materials to reduce energy use and improve thermal comfort.

These two categorisations provide a common nomenclature for applying climate technologies in ways that address both local and global challenges.

B Considering Climatic Zones and Levels of Economic Development

This section describes the diverse requirements and challenges of a sustainable building sector across different climatic zones and levels of economic development. The design, construction, and retrofitting interventions of all buildings must incorporate local climatic conditions and resources to ensure the utility, affordability, and sustainability of the structures. The climate technologies identified in this section are further described in Section 3.D. "High-Impact, Cost-Effective, Market-Ready Climate Technologies."

Climatic Zones

TROPICAL ZONES

Tropical regions, characterised by high temperatures, heavy rainfall, and humidity, demand designs that promote natural cooling, mitigate or withstand flooding, and resist moisture-related degradation.

Sustainable solutions in tropical climates include **green roofs** for natural cooling, **solar shading** devices to reduce heat exposure, and durable, moisture-resistant materials such as **treated bamboo and engineered timber**, which can enhance longevity and environmental performance. n residential areas, **elevated stilt homes** with **ventilated floors** are common, whereas commercial and institutional buildings often feature **wide eaves**, **cross-ventilation**, and **reflective roofing materials** to minimise heat gain.

ARID AND SEMI-ARID ZONES

In arid and semi-arid climates, the challenges for buildings include extreme temperatures, scarce water resources, and high solar radiation.

Sustainable buildings in these regions often rely on **passive design technologies** such as **evaporative cooling systems**, **wind towers**, and **cool roofs**, all of which address high cooling demands and enhance comfort while reducing energy consumption. Residential structures often utilise thick walls made from **local building materials** such as adobe or rammed earth, providing effective thermal insulation. Commercial buildings in these zones tend to use **lightweight**, **reflective building materials** to minimise heat absorption.

TEMPERATE ZONES

Temperate zones experience seasonal variations in temperature and precipitation, requiring buildings to respond to heating and cooling demands. Climate technologies that can effectively balance energy needs under different temperature and humidity conditions are well suited for buildings in temperate zones.

Residential, commercial, and industrial buildings can all typically benefit from **energy-efficient and/or clean energy HVAC systems**, **advanced insulation materials**, and **high-performance window treatments**.

COLD AND ALPINE ZONES

In cold and alpine regions marked by sub-zero temperatures, heavy snowfall, and limited solar exposure, sustainable buildings demand designs that provide thermal insulation and accommodate energy-efficient heating systems. Sustainable strategies in these zones include **energy efficient solutions** such as **compact structures**, the use of **triple-glazed windows**, **airtight building envelopes**, and **solar thermal heating**. Residential structures often feature **steep roofs** to shed snow efficiently, while commercial buildings rely on **high-efficiency heating systems** and **advanced thermal insulation** to produce and retain warmth.

Level of Economic Development

DEVELOPING COUNTRIES

In most developing countries, especially in SIDS and LDCs, the primary impediment to more sustainable buildings is resource constraints. Some climate technologies require significant economic capital upfront, even if they are demonstrated to be cost-effective in the long term. In addition to the high upfront costs, there are often limited financing options and lack of access to advanced materials and supply chains. Locally available materials can provide more affordable, cost-effective and sustainable alternatives. Leveraging traditional knowledge in the design, selection, and implementation of mitigation, adaptation, and cross-cutting solutions enhances the acceptance, affordability, and resilience of interventions in the buildings sector.

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Combining traditional knowledge, locally available materials, and circular economy construction practices can not only address immediate resource limitations and support community-driven solutions. They also reduce dependence on external supply chains and enhance local resilience to climate challenges.

In response, policymakers and communities should prioritise locally available materials and circular economy principles. They should also leverage the traditional knowledge present in communities to identify and deploy cost-effective, high-impact climate technologies. The challenges of resource scarcity are greatest in LDCs, making scalable, low-cost solutions such as solar energy, microgrids, and rainwater harvesting systems essential. SIDS are particularly vulnerable to sea-level rise and extreme weather events. Adaptive building infrastructure such as **elevated buildings** and **flood barriers** can increase community resilience to climate impacts.

Other common challenges in developing countries include the building demands of rapid urbanization, as well as insufficient access to clean energy in rural areas with low population density. Lightweight, **modular construction** design, using locally available materials, can be an effective solution to rapid urbanization challenges, while decentralised energy solutions, such as **microgrids**, can enhance access to electricity, and strengthen the resilience of rural communities to climate impacts.

By considering climatic zones, and levels of economic development, the design, construction, and use of buildings can be tailored to local needs, ensuring sustainability, affordability, and resilience. This approach is particularly critical in developing countries, especially in SIDS and LDCs, where resource constraints, and climate vulnerabilities demand innovative and adaptable solutions.

C Building Performance Objectives and Assessments

The transition to sustainable buildings requires clear performance objectives, supported by robust assessment tools and benchmarks. Key performance metrics include:

ENERGY INTENSITY

This metric measures the energy consumed per square metre (kWh/m²) and serves as a benchmark for operational efficiency. Lower values indicate features such as better insulation, and energy-efficient lighting and HVAC systems.

EMBODIED AND OPERATIONAL CARBON EMISSIONS

Embodied carbon emissions are generated during material production, construction, and end-of-life processes (i.e., reuse, recycling, or disposal). Operational carbon emissions result from energy use during a building's useful life. A comprehensive Life Cycle Assessment (LCA) is essential to understanding and minimizing both embodied and operational emissions for buildings, and their materials.

CLEAN ENERGY SHARE

This indicator refers to the proportion of energy derived from non-emitting sources, such as solar or wind, is a key aspect of sustainability. Policies that incentivise on-site renewable energy generation can significantly improve the clean energy share.

The utilisation of these metrics in regions with informal construction practices and monetary resource constraints remains low. Since data collection and transparency are critical for effective assessment, governments and development organisations must provide technical assistance and funding to develop standardised tools and methodologies suitable for these regions, as well as sustained operational support for building performance assessments.

Human behaviour plays a critical role in building performance, particularly in operational energy use. Engaging building users through awareness campaigns, behavioural nudges, and smart feedback systems can significantly enhance the effectiveness of climate technologies. Policies should support user-centred design, and digital tools that enable occupants to actively participate in energy-saving actions.

D High-Impact, Cost-Effective, Market-Ready Climate Technologies

This section briefly describes climate technologies and solutions in the buildings sector that are high-impact, cost-effective, and market-ready. These climate technologies represent practical solutions that are readily available, scalable, and economically viable. They cater to both mitigation and adaptation needs while offering synergies across various aspects of sustainable development.

Table 1. Opportunities and Challenges of Established Climate Technologies and Solutions for Buildings

Climate Technology / Solution		Economic Impacts	Technical Attributes	Societal Impacts
Energy Efficient Building Solutions (incl. heating and cooling)	Pros:	— Energy Savings: Reduces energy bills over time — Increases property value	— Improves thermal performance — Reduces load on HVAC systems	— Enhances indoor comfort — Reduces exposure to heat/cold
	Cons:	— Requires higher upfront investments. — ROI depends on usage and climate	— Requires skilled installation — Complex to retrofit existing buildings	— User behaviour affects performance — Low awareness limits effectiveness
Advanced Heat Pumps	Pros:	— Energy Cost Savings: High energy efficiency reduces operational costs over time	— High Efficiency: Provides both heating and cooling with greater efficiency than traditional systems — Climate Adaptability: Works effectively in colder climates	— Enhanced Comfort: Improves indoor comfort through consistent temperature control — Environmental Impact: Reduces carbon footprint, contributing to environmental sustainability
	Cons:	— Upfront Investment: Requires high initial investments for equipment and installation — Maintenance Costs: Needs regular maintenance to ensure optimal performance	— Electricity Dependency: Relies on a sable electricity supply, which may impact areas with unstable grids — Installation Complexity: Needs skilled installation and integration into existing systems	— Adoption Barriers: Upfront costs may deter some users — Awareness Needed: Needs user education on proper use to maximise benefits adoption
NatureBased Solutions	Pros:	— Keeps operating costs low — Offers multifunctional benefits	— Regulates urban temperature — Manages stormwater runoff	— Enhances public spaces and wellbeing — Promotes biodiversity
	Cons:	— Requires higher initial design and implementation costs — Makes cost-benefit harder to quantify	— Performance depends on seasonal and local climate	— Requires public engagement — Faces risk of potential misuse or vandalism
Traditional Knowledge Solutions	Pros:	— Reduces material cost — Boosts local economies	— Matches local climate — Demonstrates proven long-term viability	— Encourages community involvement and adoption
	Cons:	— Lacks strong financial backing — Difficult to scale up	— May be incompatible with codes — May be often undervalued	— Presents challenges in knowledge transfer — May be perceived as outdated

Climate Technology / Solution	Economic Impacts	Technical Attributes	Societal Impacts
Circular Economy Construction Practices	**Pros:** — Reduces material costs — Saves on waste disposal fees	**Pros:** — Lowes embodied carbon content — Facilitates reuse	**Pros:** — Promotes sustainability culture — Creates local jobs
	Cons: — Suffers from limited market for recycled components — Requires upfront investment in sorting/design	**Cons:** — Suffers from limited material standardization — Presents disassembly challenges	**Cons:** — Requires behavioural change — May be perceived as inferior
Modular and Prefabricated Construction	**Pros:** — Reduces labour and time costs — Minimises on-site waste	**Pros:** — Increases quality control — Enables faster deployment	**Pros:** — Provides useful solutions for emergency housing — Improves worker safety
	Cons: — Adds to transport costs — Requires upfront investment in facilities	**Cons:** — Offers limited design flexibility — Makes retrofitting harder	**Cons:** — Needs community acceptance
Low- and Near-Zero Emissions Cement, Concrete, and Steel Alternatives	**Low- and Near-Zero Emissions Cement & Concrete**		
	Pros: — Delivers long-term environmental savings — May benefit from markets incentives	**Pros:** — Offers high durability	**Pros:** — Supports green public projects — Improves climate-conscious branding
	Cons: — Higher material costs — Face supply chain limitations	**Cons:** — Requires validation and testing. — May be unfamiliar to contractors	**Cons:** — Suffers from low public awareness — Must overcome traditional preferences
	Low- and Near-Zero Emissions Steel		
	Pros: — Become cost-competitive over time with carbon pricing. — Supports circular economy through recycling market	**Pros:** — Maintains high durability and strength compared to traditional steel — Fits with recycling technologies	**Pros:** — Aligns with climate goals and can enhance “green branding” for infrastructure — Creates jobs in new clean steel industries
	Cons: — Involves higher production costs — Needs large capital investments for new facilities and retrofitting	**Cons:** — Requires further validation at scale — Faces supply chain constraints for green hydrogen and renewable energy inputs	**Cons:** — Faces limited public awareness — May be unfamiliar to contractors and regulators

Climate Technology / Solution	Economic Impacts	Technical Attributes	Societal Impacts
Renewable Energy Systems (Photovoltaic Systems, Wind Turbines, etc.)	**Pros:** — Cuts energy cost and decreases electricity bills over time	**Pros:** — Uses mature technologies and well-established systems with proven performance — Adapts to different scales: can be tailored from residential to commercial applications	**Pros:** — Encourages a shift towards renewable energy sources
	Cons: — Variable returns: Energy production can be inconsistent, affecting financial predictability. — Requires high upfront investments for equipment and installation	**Cons:** — Depends on weather: performance is influenced by climatic conditions — Requires space for installation, especially for wind turbines	**Cons:** — Raises aesthetic concerns: visual impact may be a concern for some communities — Wind turbines may generate noise, affecting nearby residents
Decentralised Renewable Microgrids	**Pros:** — Enhances energy independence: reduces reliance on centralised power grids — Enhances cost savings: potential for lower energy costs in the long term	**Pros:** — Enhances energy security and reliability, especially in remote areas — Offers flexibility: can integrate various renewable energy sources	**Pros:** — Encourages a shift towards renewable energy sources
	Cons: — Demands high initial capital for setup and infrastructure — May provide financial benefits depending on scale and usage	**Cons:** — Presents technical and management complexity - Needs ongoing technical support and maintenance to ensure performance	**Cons:** — Raises aesthetic concerns: visual impact may be a concern for some communities — Wind turbines may generate noise, affecting nearby residents

Energy-Efficient Building Solutions: Reducing energy use and long-term cost

Conventional buildings often use low-specification materials, such as uninsulated concrete blocks and single-glazed windows, which result in higher than necessary energy demand. Operational energy use in buildings currently represents about 30% of global final energy consumption and contributes to 26% of global energy-related emissions.[4] Reducing this energy demand can reduce operational emissions and costs.

The use of advanced building solutions, such as high-performance insulation, low-emissivity windows, and phase-change materials, significantly reduces energy consumption in buildings. These materials, such as smart glass and dynamic window technologies, improve the thermal envelope of buildings, minimising the need for active heating and cooling systems. For example, fibreglass insulation, which is cost-effective and widely available, has proven effective in reducing heat transfer and improving energy efficiency.

In arid and semi-arid regions, shading, natural ventilation, reflective roofing materials, and "cool coatings" have been widely adopted to reduce heat absorption. These technologies lower cooling demands and improve indoor comfort, particularly in regions with limited access to air conditioning.

Energy management systems, including AI-powered solutions, enhance building efficiency by optimising energy use through real-time monitoring and predictive analytics, reducing energy consumption and lowering costs. These systems can reduce total energy consumption by up to 30% in commercial buildings and 15% in residential buildings, making them a crucial tool in improving energy efficiency and lowering operational costs.[5]


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Advanced Heat Pumps: Improving heating and cooling efficiency

When used with energy-efficient building materials and solutions, advanced heat pumps can provide thermal comfort more efficiently than conventional systems. Buildings typically rely on gas boilers, electric resistance heaters, or conventional air conditioning units for space conditioning. These conventional systems contribute to approximately 10% of global energy-related CO_2 emissions, largely because they use fossil fuels and transfer heat less efficiently than advanced heat pumps.[6]

Advanced heat pumps use electricity to provide both heating and cooling by transferring heat between the indoors and outdoors. By 2050, heat pumps could provide over 90% of space and water heating needs in buildings, significantly reducing reliance on fossil fuels.[7] Unlike conventional heating systems that rely on fossil fuels, heat pumps can achieve efficiencies of up to 300%, depending on the design and climate conditions. Modern heat pump technologies, such as ground-source and air-source heat pumps, are increasingly recognised as key tools for decarbonising the building sector. Scaling up deployment to meet growing demand will require investment in training the installation and maintenance workforce.[8]

Heat pumps are particularly valuable in temperate and cold climates, where heating demands are significant. Countries in cold and alpine climatic zones, such as those in Scandinavia, have pioneered the adoption of these systems, supported by government incentives and strict building codes.[9] Their scalability and compatibility with renewable energy sources make them an essential component of sustainable building strategies.

Nature-Based Solutions: Designing climate-resilient cities

Conventional urban development often defaults to impermeable surfaces and mechanical cooling. Impermeable surfaces increase flood risks by limiting the absorption of water into the subsurface, and mechanical cooling increases urban heat island effects[10] by transferring heat from within buildings to the surrounding external environment. The urban heat island effect is exacerbated in urban areas with low amounts of vegetation. Without the cooling effects of shade and evapotranspiration provided by vegetation, urban areas can be up to 7°C warmer than surrounding areas due to heat absorption by roads and rooftops. This further increases indoor cooling demand and poses significant health risks.

Nature-Based Solutions (NBS), such as green roofs, offer a range of benefits that address both climate mitigation and adaptation challenges. Green roofs utilise vegetation on building rooftops to provide natural insulation that reduces energy demands for heating and cooling. They also play a critical role in managing stormwater runoff, reducing the risk of urban flooding and mitigating the urban heat island effect. Furthermore, green roofs enhance biodiversity by creating habitats for plants, birds, and insects in dense urban areas, while simultaneously improving air quality.

Cities like Singapore have successfully integrated green roofs into their urban planning frameworks, striking a balance between high-density development and environmental sustainability. Beyond green roofs, other NBS—such as permeable pavements and urban green spaces—offer similarly multifaceted benefits. These solutions reduce carbon footprints, increase resilience to extreme weather, and contribute to the aesthetic and social value of urban environments. NBS are highly cost-effective and represent a vital component of sustainable urban design, as they provide benefits for mitigation and adaptation.


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Circular Economy Construction Practices - Reducing building waste and emissions

Conventional building construction uses virgin materials with high carbon intensity and generates large amounts of waste, following a linear 'take-make-dispose' model. The construction sector generates an estimated one-third of the world's total waste, much of which comes from material inefficiencies in new builds and demolitions.[11]

Circular economy construction practices involve designing buildings and infrastructure to minimise waste and maximise the reuse of materials. This approach includes the use of recycled concrete, reclaimed timber, and modular components that can be easily disassembled and repurposed. Circular practices reduce embodied carbon and align with global sustainability goals.

For example, in the Netherlands, entire housing projects have been constructed using recycled materials sourced from decommissioned buildings.[12] Such initiatives reduce environmental impacts and demonstrate the economic feasibility of circular construction on a large scale.

Modular and Prefabricated Construction - Building faster with ready-to-assemble systems

Traditional site-built construction methods have longer timelines, higher material waste, and less consistent quality. Conventional construction can waste up to 30% of building materials, making the sector a major contributor to resource depletion and landfill waste.[13]

Modular construction involves assembling building components off-site in controlled environments, before transporting them to the construction site.

This method significantly reduces construction waste, accelerates project timelines, and lowers costs. Prefabricated materials are especially beneficial in regions experiencing rapid urbanization, where the demand for housing and infrastructure outpaces traditional construction methods.

Modular and prefabricated design also aligns with circular economy principles, as it enables the reuse and recycling of building components at the end of their life cycle. For example, prefabricated homes made from recycled steel and timber have been successfully implemented in post-disaster reconstruction efforts in the Philippines, following Typhoon Haiyan.[14] These structures provided quick, affordable, and durable shelter solutions for displaced communities, while reusing materials to reduce environmental impact.

Low- and Near-Zero Emissions Cement and Concrete Alternatives - Reducing the carbon footprint of concrete

The production of cement, a key ingredient in concrete, accounts for approximately 8% of global CO_2 emissions.[15] Low- and near-zero emissions alternatives, such as geopolymer cement, carbon-cured concrete, and blended cements with fly ash or slag, offer significant GHG emissions reductions, without compromising performance.

These materials have been successfully tested in large-scale infrastructure projects, such as highways and bridges, demonstrating their viability. Policymakers can accelerate adoption by mandating or incentivising low- and near-zero emissions materials in public procurement policies or building codes.

Renewable Energy Systems - Powering buildings with clean energy

Most buildings still draw power from fossil fuel-dominated electricity grids, particularly coal or gas-fired electricity generation. Electricity production from fossil fuels accounts for around 60% of global power generation, making buildings that rely solely on grid electricity a major secondary source of GHG emissions.[16]

The deployment of renewable energy technologies is one of the most effective ways to reduce emissions and improve energy resilience in the building sector. Solar photovoltaic (PV) systems and wind turbines are among the most scalable and cost-effective solutions, with solar PV seeing dramatic cost reductions over the past decade, making it increasingly accessible even in low-income regions.

On-site renewable energy generation is particularly valuable for reducing the operational carbon footprint of buildings. When paired with battery storage, solar PV can reduce grid dependency by up to 80% in well-insulated buildings, improving resilience to energy price volatility and grid instability.[17] In rural areas and climate-vulnerable communities, such as SIDS, decentralised renewable energy solutions offer a reliable and independent power source, mitigating energy poverty, and enhancing climate resilience.

Wind energy, though more dependent on local conditions, provides an additional renewable energy option for buildings in areas with suitable wind resources. These systems can be integrated into hybrid energy models, combining solar, wind, and battery storage for maximised efficiency and reliability.

Several countries have already demonstrated the success of distributed renewable energy systems. Bangladesh, for example, has deployed millions of solar home systems, providing electricity to underserved populations, while substantially lowering carbon emissions.[18] Policy interventions, such as feed-in tariffs, net metering, and financial incentives, can further accelerate the widespread adoption of renewable energy in the built environment, ensuring a sustainable, low- and near-zero emissions energy future for the sector.

Decentralised Renewable Microgrids - Delivering clean electricity in hard-to-reach areas

Communities in rural areas that are not connected to the electricity grid typically depend on diesel generators, which have high fuel costs and GHG emissions. Diesel generators emit over 2.5 kg of CO_2 per litre of fuel burned and are often the costliest and most polluting energy source for off-grid communities.[19]

Decentralised microgrids powered by renewable energy are increasingly recognised as a solution for enhancing energy resilience in underserved and disaster-prone regions. These systems integrate solar panels, wind turbines, and battery storage to provide reliable, off-grid power to buildings and communities. Barbados has demonstrated the value of renewable energy microgrids to enhance energy resilience, particularly in rural and underserved areas.[20]

By providing localised energy generation and storage, microgrids reduce vulnerability to disruptions in centralised power systems. They are particularly valuable for hospitals, schools, and other critical infrastructure in remote areas.

2

Creating an Enabling Environment for Climate Technology Deployment

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The successful deployment of climate technologies in buildings depends on enabling environments that address systemic barriers and create favourable conditions for adoption. This section highlights institutional measures proven to facilitate adoption of climate technologies. It outlines the capacity-building requirements for implementing these solutions (particularly in developing countries, and especially in SIDS and LDCs). It illustrates financial mechanisms that can bring climate technologies to scale, and it describes common challenges and risks to the deployment of climate technologies. All these measures must be tailored to the unique needs of developing countries, especially SIDS and LDCs, where vulnerabilities to climate change are most acute.

A Challenges and Risks to the Deployment of Climate Technology

Despite the availability of high-impact, cost-effective, market-ready climate technologies, several persistent barriers hinder their widespread adoption. These challenges fall into economic, regulatory, institutional, technical, and cultural categories.

REGULATORY AND POLICY GAPS
The absence of clear regulatory frameworks and incentives limits the deployment of climate technologies. In many regions, outdated building codes fail to incorporate modern energy efficiency standards or mandates for renewable energy integration. Additionally, bureaucratic inefficiencies and overlapping jurisdictions complicate project approvals and discourage innovation.

ECONOMIC BARRIERS
High upfront costs are among the most significant obstacles to adopting climate technologies. Renewable energy systems, advanced heat pumps, and modular construction materials often require substantial initial investments, which are prohibitive in resource-constrained regions. Limited access to financing, high interest rates, and uncertainties around returns on investment further exacerbate these challenges, particularly for small and medium enterprises (SMEs), and low-income households.

INSTITUTIONAL AND ORGANISATIONAL CAPACITY
Inadequate institutional capacity often results in poor coordination between government agencies, private sector stakeholders, and development organisations. Weak governance structures, limited technical expertise, and insufficient stakeholder engagement undermine efforts to deploy climate technologies at scale.

TECHNICAL CHALLENGES
A lack of relevant technical expertise in installing, operating, and maintaining climate technologies limits their deployment. For example, the adoption of advanced insulation materials or heat pumps requires specialised training for safely and effectively installing, operating, and maintaining these systems. In addition, poor-quality materials and unreliable supply chains further limit the deployment and effectiveness of climate technologies.

SOCIAL AND CULTURAL BARRIERS
Public awareness and acceptance of climate technologies vary widely. In some regions, the adoption of modern solutions may be in tension with traditional practices. Misconceptions about the costs, reliability, and benefits of technologies like solar panels or modular construction also create obstacles.

B Institutional Measures to Facilitate Climate Technology Deployment

Governments and institutions have a pivotal role in addressing systemic barriers by creating an enabling environment for climate technology deployment. Key measures include:

POLICY AND REGULATORY FRAMEWORKS

Policy interventions must focus on developing clear, enforceable regulatory frameworks that drive the adoption of sustainable practices, as seen in the commitments made by 70 countries in the Declaration de Chaillot.[21] **Green building codes and standards** are powerful tools for ensuring that new construction and renovation projects align with climate goals. Some effective components of green building codes include:

— **Energy Efficiency Standards:** Mandating minimum energy performance standards (MEPS) for new buildings can significantly reduce operational emissions. Retrofitting standards should also be introduced to improve the energy efficiency of existing building stock. Countries that have implemented strong MEPS have seen a 30–50% reduction in energy consumption per square metre in newly constructed buildings.[22]

— **Renewable Energy Integration:** Requiring new buildings to incorporate on-site renewable energy systems, such as solar panels or wind turbines, can accelerate the transition to clean energy.

— **Materials Mandates:** Governments can encourage the use of low- and near-zero emissions materials by mandating their use in public infrastructure projects.

— **Enforcement Mechanisms:** Robust enforcement and monitoring mechanisms are essential for ensuring compliance with regulations. Digital tools and performance tracking systems can streamline this process.

LONG-TERM PLANNING AND URBAN PLANNING

Strategic long-term planning, such as integrating Long-Term Strategies (LTS), is essential to align short-term actions with long-term climate goals. This approach helps avoid stranded assets, optimise investments, and keep policy measures adaptable amid evolving challenges. By embedding long-term planning into climate policies, governments can create frameworks that withstand uncertainties while maximising the effectiveness of investments. Urban planning policies allow climate technologies to be integrated into broader development strategies. These solutions address urban challenges like flooding, air pollution, and the urban heat island effect.

— **Zoning Regulations:** Urban zoning laws can prioritise green infrastructure by mandating the inclusion of green roofs and urban green spaces in high-density developments.

— **Stormwater Management Policies:** Encouraging the use of permeable pavements and natural retention systems mitigates flooding risks and improves water management in urban areas.

— **Resilient City Programmes:** National and municipal governments can fund and incentivise the implementation of climate technologies at the city scale, fostering resilience and sustainability.

PUBLIC-PRIVATE PARTNERSHIPS (PPPS)

PPPs can play a pivotal role in accelerating the deployment of climate technologies, particularly in emerging markets. Collaborative approaches that leverage the strengths of public and private sectors can accelerate technology deployment. Successful case studies demonstrate that blending public funds with private investments lowers capital risk, making projects more attractive to investors.

Governments can provide financial support and regulatory clarity. Private sector actors contribute state-of-the-art climate technologies and practices.

- **Joint Investments in Technology Development:** Governments can co-invest with private companies in research and development (R&D) to create next-generation building technologies. For instance, innovations in low- and near-zero emissions cement, or in modular construction, could benefit from such partnerships.
- **Private Sector Participation in Public Projects:** Engaging private companies in the design, financing, and execution of public building projects ensures access to cutting-edge technologies and practices.
- **Community-Based Models:** Partnering with local organisations and communities ensures that projects are contextually appropriate and socially inclusive.

KNOWLEDGE SHARING AND BEST PRACTICES

International cooperation is essential to facilitate the transfer of knowledge and technologies to regions with limited experience. Programmes that promote peer-to-peer learning and technical assistance, such as the UNFCCC Climate Technology Centre and Network (CTCN), can help local stakeholders adapt general solutions to their specific contexts.

INSTITUTIONAL COORDINATION AND STAKEHOLDER ENGAGEMENT

Streamlining coordination between agencies and engagement with diverse stakeholders—such as local governments, industry groups, and community organisations—ensures that policies and programmes are implemented effectively. Public consultations and participatory planning processes can increase transparency and build trust. They also improve building performance, which is highly dependent on human behaviour during construction and operation.

C Capacity Needs for Climate Technology Deployment

Capacity-building initiatives are essential for empowering local stakeholders to implement and maintain climate technologies. These efforts should focus on financial, technical, and institutional capacities:

FINANCIAL CAPACITY

Access to affordable financing is critical for scaling climate solutions. Access to financing is a key barrier to scaling up climate technologies. High upfront costs remain a major obstacle to adoption, particularly in the Global South, where capital constraints limit investment in efficiency improvements. Governments and financial institutions should develop targeted mechanisms, such as on-bill financing and energy efficiency mortgages, to lower cost barriers and accelerate adoption. Governments and development organisations should establish dedicated funding mechanisms, such as green bonds, climate finance facilities, and microfinance programmes. Capacity-building efforts should also include training for local financial institutions to assess and support climate-friendly projects. Additional incentive programs, such as subsidies, low- or no-interest loans, and tax credits, can reduce the financial burden on adopters of climate technologies.

TECHNICAL CAPACITY

Despite their proven benefits, many climate technologies face adoption challenges related to supply chain constraints, installation workforce shortages, and regulatory uncertainty. Training a new generation of skilled workers in heat pump installation, insulation retrofits, and smart energy management will be essential to scaling these solutions effectively. Investments in education and training programmes are necessary to develop a skilled workforce capable of deploying and maintaining advanced technologies. Vocational training centres, certification programmes, and university partnerships can address skill gaps. Additionally, access to technical resources, such as design tools and performance evaluation software, is essential for practitioners. Bilateral and multilateral technology transfer agreements can facilitate the flow of climate technologies to resource-constrained countries, ensuring that they have access to the tools needed for sustainable development.

INSTITUTIONAL CAPACITY

Strengthening institutions is crucial for enforcing regulations, managing programmes, and monitoring outcomes. Capacity-building efforts should include support for data collection and analysis, which are vital for evaluating the effectiveness of policies and technologies. Digital tools and platforms can enhance transparency and streamline decision-making processes.

AWARENESS AND OUTREACH

Public awareness campaigns are needed to promote the benefits of climate technologies and dispel misconceptions. Outreach efforts should target homeowners, businesses, and community leaders, emphasising the long-term cost savings, improvements in climate resilience, and the environmental benefits associated with adopting these solutions.

D Financing Mechanisms and Instruments for Scaling Climate Technologies

The widespread adoption of climate technologies in the building sector requires innovative and accessible financing mechanisms to overcome high upfront costs, address market risks, and unlock private sector investment. Governments, development banks, and private investors must work together to establish scalable financial solutions that support both new construction and retrofits. The following mechanisms are key to accelerating the deployment of climate-friendly building technologies globally.

GREEN BONDS AND CLIMATE FINANCE

Green bonds and other climate finance instruments provide long-term capital for sustainable building projects, including energy-efficient retrofits, renewable energy integration, and advanced building materials. These instruments attract institutional investors, such as pension funds and insurance companies, by offering stable, low-risk returns on environmentally beneficial projects. For instance, the European Investment Bank (EIB) has issued green bonds to finance zero-carbon building initiatives across Europe.[23]

REVOLVING LOAN FUNDS (RLFS) AND BLENDED FINANCE

Revolving loan funds (RLFs) provide low-interest, long-term loans for energy efficiency upgrades and renewable energy integration, with repaid funds reinvested to support additional projects. Blended finance models combine public and private capital, using concessional funds to de-risk investments and encourage private sector participation. For example: Uzbekistan's energy efficiency retrofitting initiative uses a government-backed de-risking facility together with concessional loans to accelerate building decarbonisation.[24] International funds, such as the Green Climate Fund, should prioritise building and infrastructure projects in vulnerable regions. Simplifying application processes can ensure that more countries benefit from these resources.

PUBLIC-PRIVATE PARTNERSHIPS (PPPS) AND ENERGY PERFORMANCE CONTRACTING (EPC)

Public-private partnerships (PPPs) allow governments and private companies to co-finance climate-friendly building technologies while ensuring cost-sharing and risk mitigation. Energy Performance Contracting (EPC) enables energy service companies (ESCOs) to fund efficiency upgrades and recover costs through energy savings, making upgrades financially feasible without upfront investment. For example, ESCO-led retrofit projects in Germany have improved building efficiency without requiring property owners to secure additional financing.[25]

TAX INCENTIVES, GRANTS, AND SUBSIDIES

Governments can accelerate adoption by offering tax credits, grants, and direct subsidies for climate-friendly building technologies, reducing capital costs for developers and homeowners. Likewise, property-assessed clean energy (PACE) programmes allow property owners to finance energy efficiency improvements through long-term, low-interest repayments attached to property taxes. For instance, the U.S. Inflation Reduction Act (IRA) provided billions in tax incentives for heat pumps, solar PV systems, and energy efficiency upgrades.[26]

CARBON PRICING AND MARKET-BASED INCENTIVES

Carbon taxes and emissions trading systems (ETS) create financial incentives for low- and near-zero emissions construction and retrofits, encouraging developers to adopt energy-efficient technologies. Green certification incentives (such as LEED, BREEAM, and EDGE) provide financial rewards for buildings that meet high sustainability standards. For example, the EU Emissions Trading System (ETS) incentivises low- and near-zero emissions building materials, such as geopolymer cement and carbon-cured concrete.[27]

MICROFINANCE AND PAY-AS-YOU-SAVE (PAYS) MODELS

Microfinance institutions (MFIs) help low-income households access financing for solar panels, energy-efficient stoves, and insulation. Pay-As-You-Save (PAYS) models allow households to install clean energy solutions with no upfront cost, repaying through energy savings over time. An example of successful use of a PAYS model is the financing of rooftop solar and battery systems by off-grid solar companies in Africa.[28]

E Social and Equity Considerations in Climate Technology Deployment

When deploying climate technologies in buildings, policymakers, industry stakeholders, and development organisations must ensure equitable access to sustainable, energy-efficient, and climate-resilient solutions. For many climate technologies, even ones proven to be cost-effective over time, deployment in residential buildings has been limited by higher up-front costs. Without policies that target low-income households, the transition to low- and near-zero emissions buildings will be slower, more expensive overall, and risks deepening existing social and economic disparities. This can leave behind marginalised communities and developing countries, especially SIDS and LDCs.

For climate technology deployment to be effective, community engagement must be a priority. Top-down approaches risk leaving behind those most affected, leading to lower adoption rates. Inclusive decision-making, participatory planning, and education initiatives can build public trust and ensure that solutions are tailored to local needs.

Women and children in low-income communities are particularly vulnerable to the negative impacts of inefficient buildings, including indoor air pollution, energy poverty, and unsafe housing. Without deliberate interventions, climate-friendly upgrades may primarily benefit wealthier households, reinforcing inequalities. To promote inclusive adoption, governments and industry leaders must prioritise affordability by providing targeted support for social housing, underserved communities, and women-led businesses. Additionally, gender-responsive policies should ensure that women participate in decision-making for technology deployment and building upgrades. Expanding training and employment opportunities for women in green construction and energy management can further promote gender equity within the workforce.

By prioritising inclusivity, affordability, and community engagement, climate technology deployment can drive a just transition that benefits all, ensuring no one is left behind in the shift to sustainable, resilient buildings.


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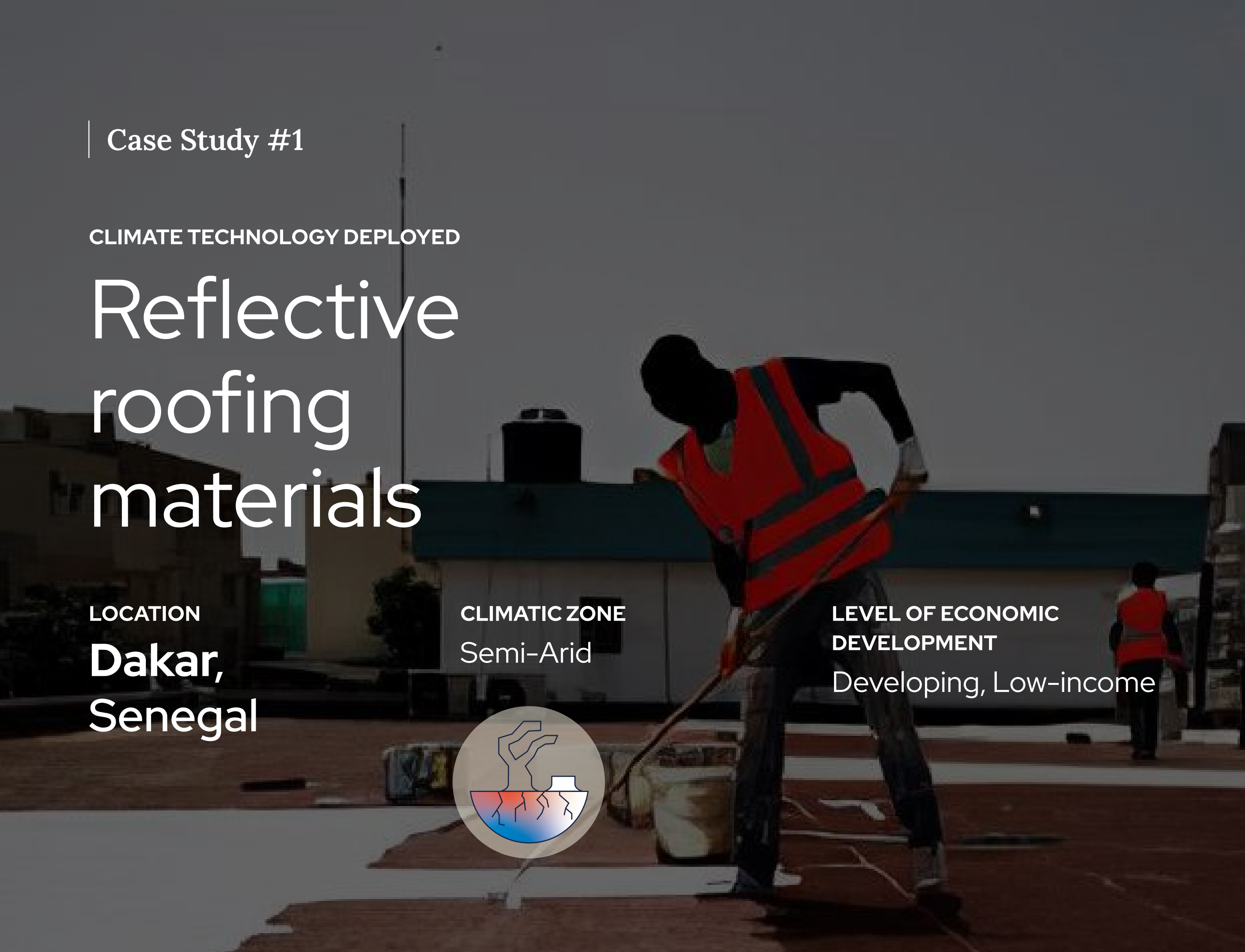


Case Study #1

CLIMATE TECHNOLOGY DEPLOYED

Reflective roofing materials

LOCATION

Dakar, Senegal

CLIMATIC ZONE

Semi-Arid

LEVEL OF ECONOMIC DEVELOPMENT

Developing, Low-income

BRIEF DESCRIPTION AND RELATIVE STRENGTHS OF THE CLIMATE TECHNOLOGY	— Reflective coatings were applied to rooftops in Dakar. — Deployment of this technology did not require additional training for the local workforce.
IMPACTS OF CLIMATE TECHNOLOGY DEPLOYMENT	— Reduces indoor air temperatures and improves thermal comfort — Reduces energy consumption — Reduces heat-related health risks
TECHNOLOGY ENABLING ENVIRONMENT	— Government investment in demonstration projects on public buildings — Public awareness campaign — Local materials — Combined financial support from local government and international climate funds

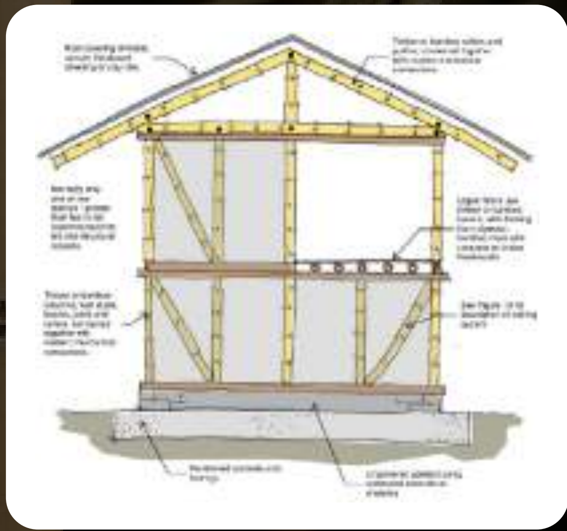
ADDITIONAL INFORMATION

Solar Impulse Foundation Blueprint for a Solutions Deployment Platform

Case Study #2

CLIMATE TECHNOLOGY DEPLOYED

Composite bamboo shear walls (CBSW)



LOCATION

Colombia

CLIMATIC ZONE

Temperate to Tropical

LEVEL OF ECONOMIC DEVELOPMENT

Developing/emerging, upper-middle income

BRIEF DESCRIPTION AND RELATIVE STRENGTHS OF THE CLIMATE TECHNOLOGY	— Homes were built using CBSW to be affordable, resilient to hazards, and low-emissions.
IMPACTS OF CLIMATE TECHNOLOGY DEPLOYMENT	— CBSW has 55% less embodied carbon compared to conventional masonry structures — CBSW structures can withstand strong winds and earthquakes
TECHNOLOGY ENABLING ENVIRONMENT	— The Colombian Earthquake Engineering Association (AIS) studied the resilience of CBSW, which was later incorporated into Colombian building code NSR-98 — CBSW was later codified into ISO 22156 in 2004 — Locally available materials
ADDITIONAL INFORMATION	Kaminski, Sebastian & López, Luis & Trujillo, David & Zea Escamilla, Edwin & Correa-Giraldo, Verónica & Correal-Daza, Juan. (2023). Composite bamboo shear walls - A shear wall system for affordable and sustainable housing in tropical developing countries.

Case Study #3

CLIMATE TECHNOLOGY DEPLOYED

Advanced Heat Pumps

LOCATION

New York, USA

CLIMATIC ZONE

Temperate

LEVEL OF ECONOMIC DEVELOPMENT

Developed, High Income

BRIEF DESCRIPTION AND RELATIVE STRENGTHS OF THE CLIMATE TECHNOLOGY	— Window-mounted heat pumps were installed in 72 residential units in a multi-family housing complex.
IMPACTS OF CLIMATE TECHNOLOGY DEPLOYMENT	— Increases indoor air temperatures and improves thermal comfort — Reduces energy consumption by more than 80% compared to natural gas heat steam — Reduces cold-related health risks
TECHNOLOGY ENABLING ENVIRONMENT	— Government investment in demonstration projects on public buildings — Combined financial support from local and state government agencies
ADDITIONAL INFORMATION	https://www.gradientcomfort.com/blogs/news/how-gradient-is-transforming-public-housing-with-innovative-window-heat-pumps

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United Nations Climate Change
Technology Executive Committee

MIT Climate Policy Center

Global Alliance for Buildings and Construction

UN environment programme | copenhagen climate centre

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