

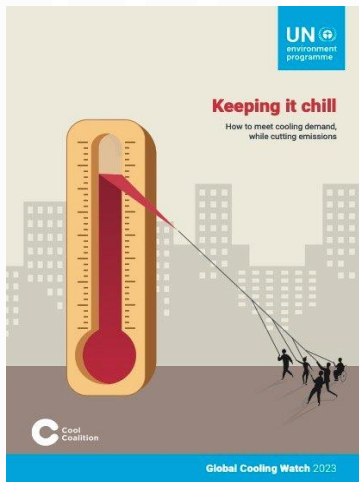
Regional Roadmap for Passive Cooling in ASEAN: An Inclusive Heat Resilience Approach

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Presentation by:
Rio Jon Piter Silitonga
ASEAN Centre for Energy

Why Passive Cooling Strategies (PCS)?

- **Heatwaves are growing hotter, longer, and more frequent. Cities are warming at twice the global average**, driven by rapid urbanisation, dense infrastructure, heat-retaining materials, and the loss of green spaces. By 2080 up to 1.1 billion urban residents in South and Southeast Asia could experience extreme heat for over 30 days annually.
- **Everyone is at risk, but not equally.** Vulnerable groups — including women, children, the elderly, and those living in poverty — are disproportionately affected with gender deepening existing inequalities.
- As extreme heat intensifies, rising demand for cooling drives up electricity use and greenhouse gas emissions—creating a vicious cycle.
- **Cooling is no longer a luxury — it is a necessity.** And passive cooling solutions are key to provide thermal comfort, who can't afford ACs



UNEP Global Cooling Watch Report finds that the **'triple strategy'** can **cut 2050 cooling-related emissions by over 60%:**

1. **passive cooling strategies** (nature, climate sensitive urban design, reflective surfaces and smart buildings),
2. **energy efficiency**
3. **phasedown of climate-warming gases**

saving around 3.8 billion tons of CO₂e and provide universal access to cooling.

UN Secretary-General's Call to Action on Extreme Heat (2024)



“**Extreme heat** is having an extreme impact on people and planet. The world must rise to the challenge of rising temperatures.”

ANTÓNIO GUTERRES, United Nations Secretary-General (25 July 2024)

PCS at the Centre of the Global Cooling Agenda

Global Cooling Pledge (COP28)

Introduced at COP28 by the Cool Coalition and COP28 UAE Presidency, the **Global Cooling Pledge** involves 72 government signatories and over 60 non-state supporters. The Pledge commitments create a **roadmap** for countries to work together to **reduce global cooling-related emissions by 68% by 2050** with significant progress and **expansion of access** to sustainable cooling by 2030. **Passive Cooling** is one of the three critical areas to address.

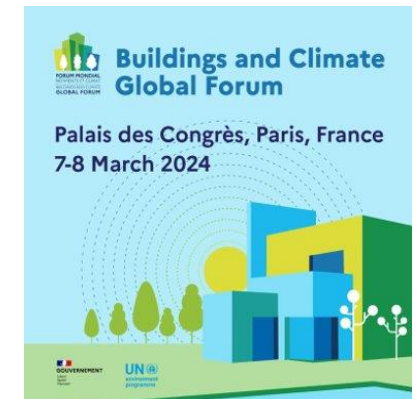


Buildings Breakthrough (COP28)

Co-led by France and Morocco, coordinated by GlobalABC, the Buildings Breakthrough was officially launched at COP28, whose target is “**Near-zero emission and resilient buildings are the new normal by 2030**”. To date, 29 countries + European Commission and 32 international organisations and their initiatives have announced their support. **Passive cooling** is one of the key measures to achieve the aforementioned target.

Declaration de Chaillot, March 2024

As the outcome of the Buildings and Climate Global Forum co-organised by France and UNEP, with the support of the GlobalABC, the **Declaration de Chaillot** has been endowed by 60+ countries, where **passive strategy** is delineated as a crucial measure to achieve net zero energy buildings, thus meeting the Paris Agreement.

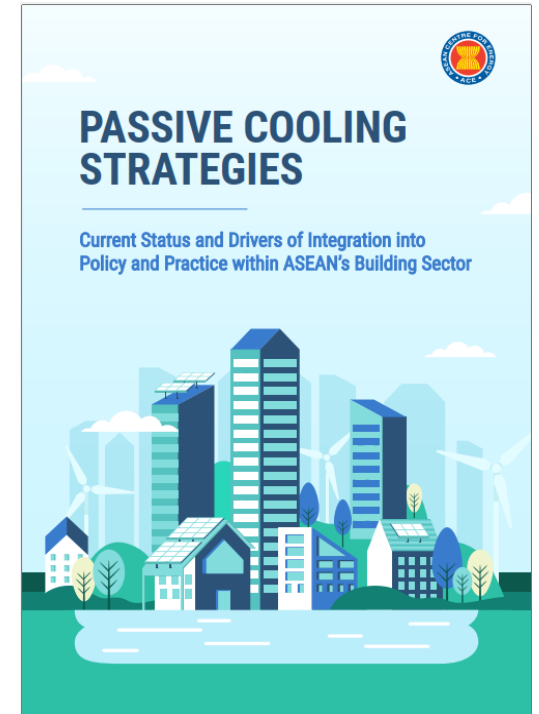


Regional Roadmap Vision: An Inclusive Heat Resilience Approach

The regional roadmap will mainly build on ACE–UN ESCAP’s research on Passive Cooling Strategies (PCS) in ASEAN, which found that **PCS are underutilised despite their significant potential to reduce energy consumption** and greenhouse gas emissions from cooling appliances such as air conditioners.

ACE & UNEP Cool Coalition with ESCAP & UN Women are developing **the Regional Roadmap for Passive Cooling in the ASEAN to protect the urban population (including the poor & vulnerable communities) from extreme heat** through the deployment of passive cooling strategies in urban built space in the ASEAN region *to promote climate-friendly cooling while maximising social, economic and environmental benefits.*

The regional roadmap will support the UN Secretary General's Call for Action on Extreme Heat, the Roadmap for Energy-Efficient Buildings and Construction in ASEAN, Global Cooling Pledge and **the objectives of the ASEAN Plan of Action for Energy Cooperation (APAEC)** to reduce energy intensity by 32% from the 2005 level.



(Source: ASEAN Centre for Energy, 2024)

Passive Cooling: Impact and Investment Potential

25M

CO₂ Reduction

Million tonnes of annual emissions reduction potential by 2040 across ASEAN region

20-50%

Energy Savings

Reduction in cooling energy consumption through passive cooling implementation

\$31.5B

Investment Need

Total investment requirement (2024-2035) representing 0.8-1.3% of regional construction spending

Cost-Benefit Analysis

Passive cooling systems show compelling lifecycle economics with payback periods of 3-12 years depending on technology type. Cool roofs offer the fastest returns at 3-5 years, while comprehensive building envelope optimization pays back in 5-10 years.

Key Features of the Roadmap

Strategic Framework

- **Framework policy guidelines** to establish a country-specific customised approach to deliver passive cooling strategies through policy, governance and technology solutions.
- **Guidelines on inclusive capacity building** on passive cooling strategies that involve women and marginalised communities.
- **Guidance on equality in accessing employment** opportunities for women and other marginalised communities in the passive cooling sectors.

Expected Outcome

- Awareness of **socio-economic inequalities associated with heat stress.**
- Awareness of **the importance of passive cooling strategies to tackle extreme heat.**
- Widespread **recognition of passive cooling solutions,** climate-friendly technologies and sustainable materials in buildings.

Recommendations

- Recommendations on the integration of **passive cooling in EE building policy and regulation and incentives mechanism**
- Recommendations on **scaling private sector,** manufacturing and innovation for passive cooling in the region.
- Recommendations on **gender and environment data collection** for implementing passive cooling strategy.
- Recommendation to advance **EE financing mechanism of passive cooling,** with consideration of gender equality and human rights

Activities and Output



Output 1:
Research on passive cooling strategies and relevant stakeholders.

Activities:

- Review literature on passive cooling strategies.
- Analyse existing policies, finance mechanisms, and social indicators
- Identify key stakeholders and their role in roadmap implementation and governance.



Output 2:
Stakeholder engagement on passive cooling.

Activities:

- Establish the **ASEAN passive cooling strategy working group**
- Conduct stakeholder consultation workshops to validate research findings.
- Introduce gender-responsive finance towards passive cooling strategies.
- Disseminate surveys to collect sex, age, and disability disaggregated data, and establish barriers to financing and adoption of passive cooling.



Output 3:
Regional Roadmap on passive cooling in ASEAN

Activities:

- Draft a roadmap in consultation with experts and consider the best environmental and social practices, recommendations, as well as the ASEAN sustainability and human rights objectives.
- Review and incorporate feedback.
- Launch the passive cooling strategy roadmap.

Roadmap Development Approach

01

Desktop Research

Comprehensive analysis of climate projections, building typologies, policy frameworks, and existing passive cooling technologies across ASEAN member states.

02

Stakeholder Engagement

Regional workshops with government officials, private sector, urban planners, architects, and community representatives to identify implementation barriers and opportunities.

03

Policy Mapping

Multi-criteria assessment of national building codes, regulatory frameworks, and financing mechanisms across all ASEAN countries.

04

Community Surveys

Extensive questionnaire surveys with building users, designers, developers, and policymakers to understand awareness, barriers, and implementation readiness.

Preliminary Findings: Climate and Vulnerability

Temperature Projections

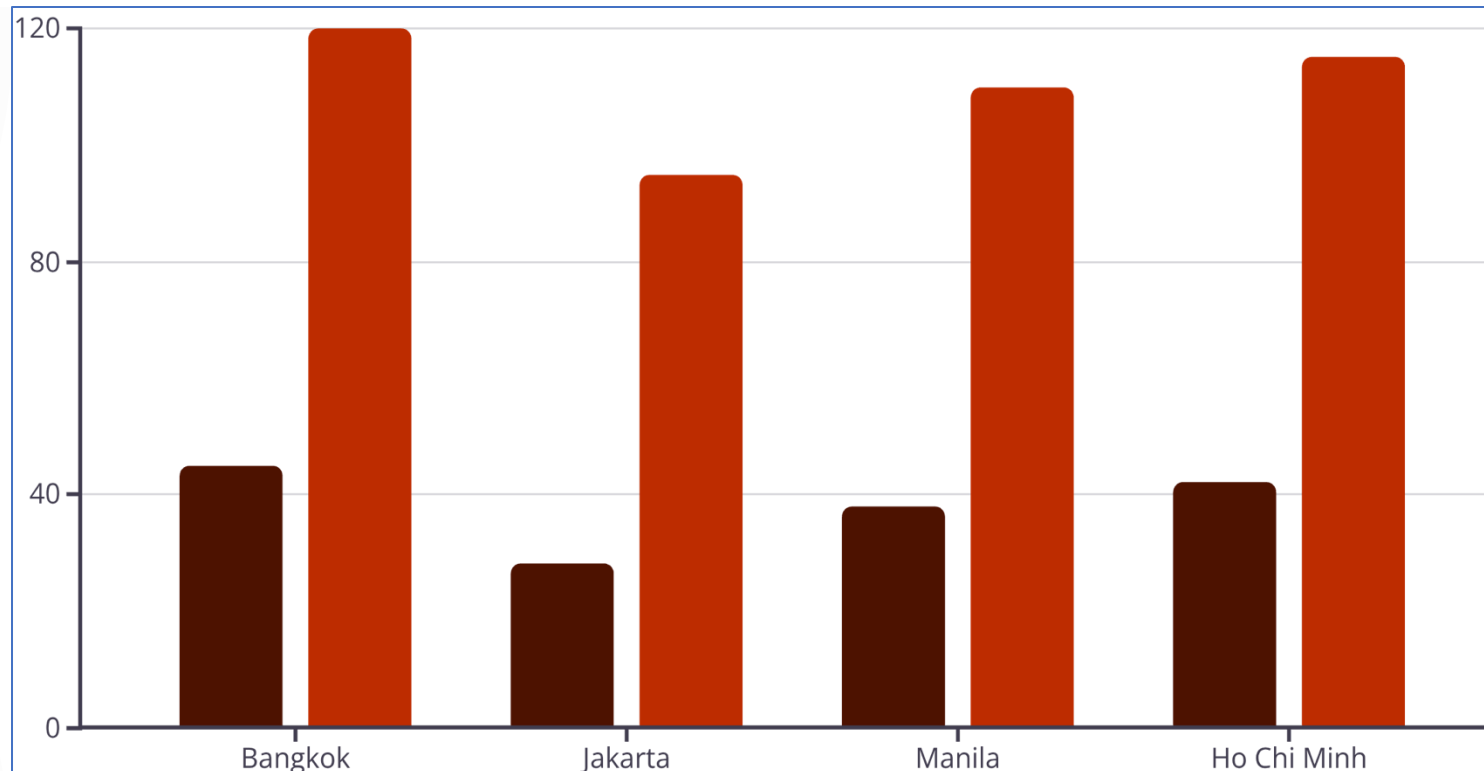
Regional temperatures projected to rise 1.5-2.5°C by 2050. Bangkok could reach 38.1°C average maximum, with 120 days above 35°C annually.

Vulnerable Populations

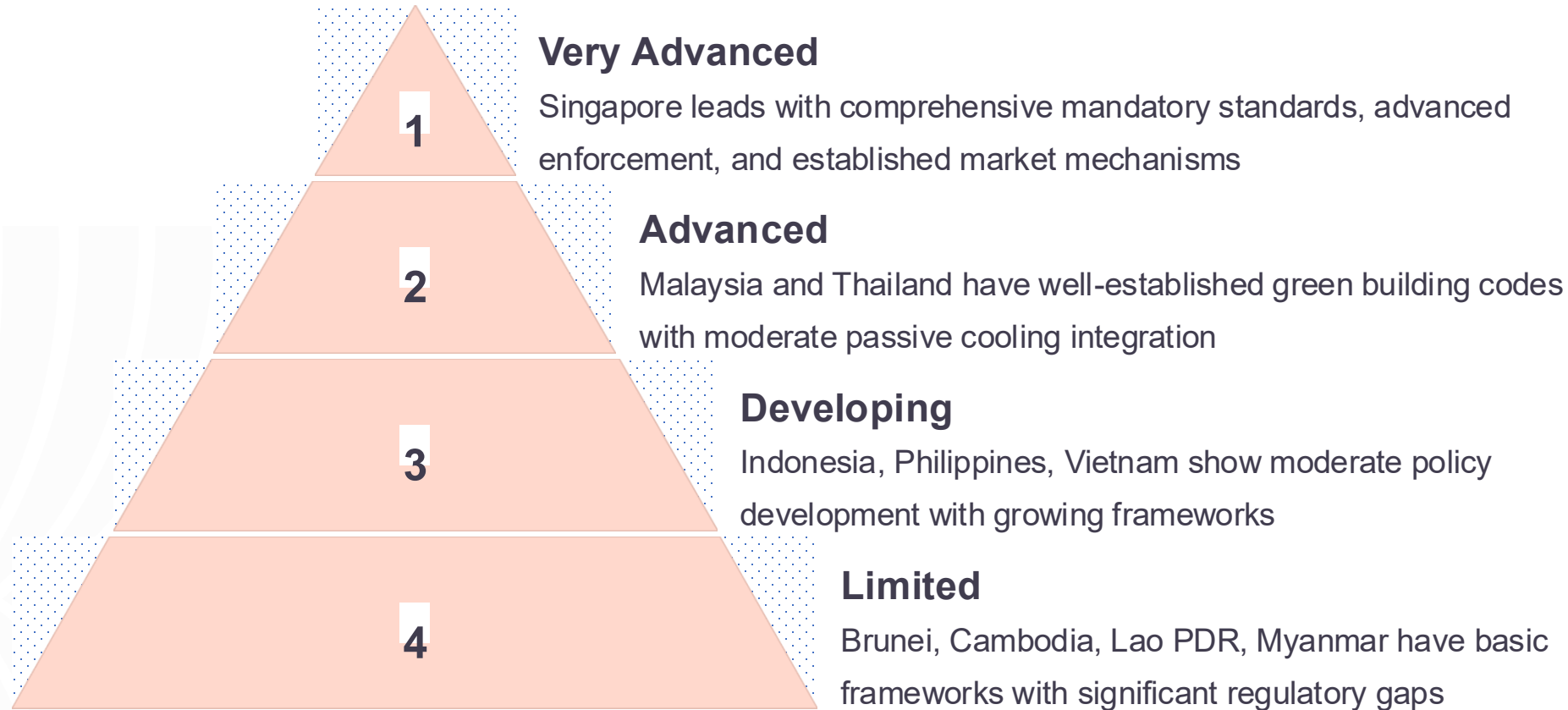
88 million slum residents, 145 million agricultural workers, and 156 million low-income households face disproportionate heat exposure risks.

Urban Heat Islands

Major cities experience 3-7°C temperature differentials, with nighttime differences reaching 8-10°C, preventing adequate cooling recovery.



ASEAN Policy Landscape Analysis on Passive Cooling Strategies



Policy analysis reveals significant variation across ASEAN member states, with advanced countries leading in comprehensive standards while others face regulatory gaps and weak enforcement mechanisms.

Key Passive Cooling Strategies



Natural Ventilation

Cross-ventilation and stack effect to move air through buildings without mechanical assistance. Strategic window placement and building orientation optimize airflow rates.



Solar Shading

Overhangs, louvers, and vegetation-based shading block direct solar radiation. East and west facades require vertical elements while south-facing surfaces benefit from horizontal overhangs.



Thermal Mass

Materials like concrete and masonry absorb heat during day and release it at night. Phase change materials provide advanced thermal storage at specific temperatures.



Insulation

Reduces heat transfer through building envelopes. Reflective insulation materials combine low emissivity with thermal resistance for tropical applications.

Passive Cooling Adoption Survey in ASEAN

ASEAN Passive Cooling Adoption Survey Structure

Survey Purpose

Understand heat impacts, cooling practices, and opportunities for affordable passive cooling solutions across ASEAN

Demographics

- Location & climate
- Age & gender
- Living conditions
- Heat experience

Current Practices

- Cooling methods
- Thermal comfort
- Electricity costs
- Passive strategies

Barriers & Drivers

- Financial limitations
- Technical challenges
- Awareness levels
- Support needed

Implementation

- Interest in adoption
- Financing options
- Future engagement
- Expected benefits

Building Occupants

- Thermal comfort
- Health impacts
- Cooling costs
- Vulnerable groups

Building Designers

- Material availability
- Design strategies
- Energy assessment
- Climate adaptation

Developers/investors

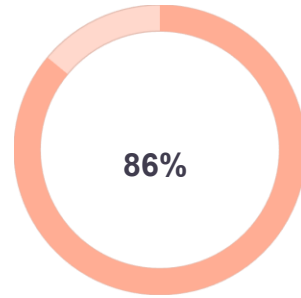
- Applied strategies
- Marketing approach
- Budget considerations
- Financing needs

Policymakers

- Existing policies
- Incentive programs
- Implementation barriers
- Community resources

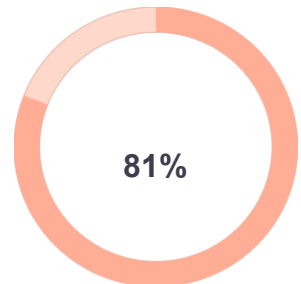
Target: 50 respondents per ASEAN country Focus on vulnerable communities (elderly, disabled, rural) Supported by academic

Survey Insights: Awareness and Barriers



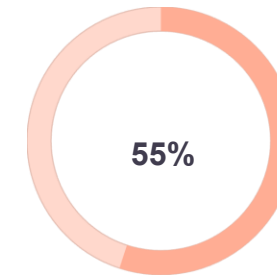
Experience Extreme Heat

Of respondents report exposure to extreme heat, with 30.7% facing it "often" or "every day"



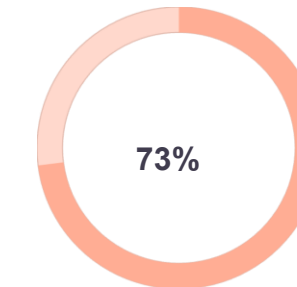
High Costs Barrier

Cite high initial installation costs as primary obstacle to passive cooling adoption



Not Prepared

Fall into "Not very Prepared" or "Not Prepared" categories for extreme heat events



Strong Interest

Express interest in implementing passive cooling solutions in the future

Survey findings reveal widespread heat exposure but significant preparedness gaps. While interest in passive cooling is high across all stakeholder groups, financial barriers and knowledge gaps remain primary obstacles to implementation.

Policy Package Recommendations



Regulatory Framework

Integrate passive cooling requirements into national building codes, establish mandatory energy performance standards, and harmonize technical specifications across ASEAN member states.



Financial Incentives

Implement tax credits, subsidies, and preferential lending for passive cooling projects. Develop green bonds and blended finance mechanisms targeting vulnerable communities.



Capacity Building

Establish regional training centers, professional certification programs, and knowledge-sharing platforms. Target 1000+ certified professionals within 3 years.



Regional Cooperation

Create ASEAN Passive Cooling Alliance, facilitate technology transfer, and develop joint research programs addressing common climate challenges.

Implementation Roadmap and Next Steps

Phase 1: Foundation (2025-2027)

Develop regional standards, establish training programs, launch pilot demonstrations, and create policy frameworks in each member state.

1

2

Phase 3: Mainstream (2030-2035)

Integrate requirements in all building codes, achieve 40% market penetration, establish regional center of excellence for tropical passive cooling.

3

Phase 2: Acceleration (2027-2030)

Introduce mandatory performance standards, launch large-scale financing programs, achieve 15% market penetration in new construction.

Investment Requirements

Total investment of USD 31.5-50.5 billion (2024-2035) represents 0.8-1.3% of projected regional construction spending, demonstrating economic feasibility with appropriate support.

Expected Outcomes

Energy savings of 20-50%, CO₂ reductions up to 25 million tonnes by 2040, improved health outcomes, and enhanced regional climate resilience.

Monitoring and Evaluation Framework



Policy Implementation

Track percentage of recommended policies adopted by each ASEAN Member State and integration into building codes



Finance & Investment

Assess value of climate finance mobilized for passive cooling projects and green investment growth



Impact & Outcomes

Measure energy savings, emissions reductions, and improved thermal comfort for vulnerable populations



Capacity Building

Monitor number of training programs, certified professionals, and awareness campaigns conducted annually



Technology Innovation

Count successful pilot projects, technology demonstrations, and innovation breakthroughs achieved



Regional Cooperation

Track transnational partnerships, joint projects, and regional platforms established for collaboration

The roadmap provides a clear pathway for ASEAN to establish passive cooling as an essential climate adaptation strategy that balances energy efficiency, social equity, and environmental sustainability while protecting communities from increasing heat extremes.



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Thank You