How to Cool Down in a World Heating Up

ENERGY EFFICIENCY POLICIES TO ADDRESS RISING COOLING DEMAND

Anoushka, Sophie KALISTA, Adenieke LEWIS-GIBBS, Evelyn MANG, Francesca PASTORELLI

Sciences Po Paris

April 2026

How to Cool Down in a World Heating Up

ENERGY EFFICIENCY POLICIES TO ADDRESS RISING COOLING DEMAND

Anoushka, Sophie KALISTA, Adenieke LEWIS-GIBBS,

Evelyn MANG, Francesca PASTORELLI

Abstract

Rising cooling demand driven by higher temperatures and incomes threatens to strain electricity grids and accelerate climate change, making effective, scalable policies urgently needed to ensure grid stability, equitable cooling access, public health protection, and emissions reductions. While passive cooling measures in buildings and behavioural changes should be prioritised, the demand for air conditioner units continues to increase. The scope of this paper will focus on policies targeting the energy efficiency of air conditioner plugged-in units in residential, commercial, and public spaces. To identify best-practice policies, a database of 88 policies spanning 26 countries and 3 multilateral coalitions was collected and the following case studies were selected: Green Cooling Action Plan (China), Coolease (Rwanda), Cool Biz (Japan), and regional initiatives (ASEAN and SADC). The case studies cover several policy instruments, including regulatory, information, and incentive-based policies in different regions, to identify how different policy levers address barriers to energy-efficient cooling. Our findings suggest that strong policies targeting energy efficiency for cooling involve comprehensive policy packages, strong stakeholder engagement, financial mechanisms tailored to local contexts, and public leadership to set norms.

Table of Contents

Glossary

AC - Air conditioner

ASEAN - Association of Southeast Asian Nations

Central AC - Central air conditioner:

Central air conditioners circulate cool air through a system of supply and return ducts.[1]

CSPF - Cooling Seasonal Performance Factor:

Measures the energy efficiency of an AC unit over an entire cooling season, accounting for real operating conditions such as varying temperatures and partial loads. The higher the measure, the more efficient the appliance is.

EAC - East African Community

GWP - Global Warming Potential:

A metric to convey the amount of heat that a greenhouse gas traps in the atmosphere compared to CO_2, which is used as the baseline of 1, taking into account the amount of time the gas remains in the atmosphere. A higher GWP is associated with more warming.[2]

HFCs - Hydrofluorocarbons:

A group of powerful synthetic gases with high GWPs, sometimes having hundreds to thousands of times the GWP of CO_2, that are often used for cooling and refrigeration.[3]

IEA - International Energy Agency

MEPS - Minimum Energy Performance Standards:

A regulatory instrument that sets a minimum efficiency threshold for appliances or other energy-consuming equipment to overcome barriers to improved efficiency.[4]

RAC - Room air conditioner:

[1] U.S. Department of Energy, 2026a
[2] European Commission, n.d
[3] Climate & Clean Air Coalition, n.d.
[4] International Energy Agency, 2025a

Room air conditioners cool individual rooms rather than the entire home, making them less expensive than central units and less efficient.[5]

RSEER - Rwanda Seasonal Energy Efficiency Ratio:

Measures the efficiency of air conditioning units by comparing its cooling output to its energy consumption, defined using CSPF with a distribution of Rwanda's outdoor temperature

SADC - Southern African Development Community

[5] U.S. Department of Energy, 2026b

1. Cooling demand in a warming world: Challenges, scope, and methodology

Global increases in temperatures and incomes due to the acceleration of climate change and economic development are projected to contribute to rising energy demand for sectors such as space cooling.[6] Increasingly frequent and extreme heat events threaten human health and lead to fatal outcomes, making space cooling increasingly necessary for wellbeing.[7] According to the Wet-Bulb Globe Temperature Index, high levels of humidity can amplify this risk to human health.[8] Implementing solutions to provide efficient cooling is paramount to managing energy demand, preventing electricity grid failures, and protecting human health globally. Due to the expected expansion in access to space cooling products, all pathways to limit energy demand for cooling, including energy efficiency measures, must be explored, with the intention of implementing best practices.

1.1 Key challenges in cooling: From feedback loops to blackouts

The rise in demand for cooling services is an example of a climate change-induced feedback loop, where the effects of climate change result in activities that further contribute to it.[9] The International Energy Agency (IEA) estimates that under current policy settings, energy demand for space cooling is expected to rise by an annual rate of 3.7% until 2035,[10] with 80% of the projected electricity demand for cooling by 2050 expected to come from emerging and developing economies.[11] Currently, around 15% of the population living in regions with high temperatures own an air conditioner (AC), although this figure is expected to rise, especially in countries with growing incomes.[12]

The increasing risks of grid overloads and blackouts during periods of peak energy demand present additional challenges associated with rising cooling demand, further necessitating the implementation of energy efficiency measures. Increased temperatures simultaneously increase cooling demand and

[6] Howarth et al., 2023
[7] Ebi et al., 2021
[8] Further details available in Annex 1
[9] Shakouri, 2019
[10] International Energy Agency, 2025c
[11] International Energy Agency, 2025b
[12] International Energy Agency, 2025b

reduce grid capacities, intensifying risks for electricity grids.[13] Once demand approaches grid capacity limits, the probability of cascading failure increases rapidly.[14]

1.2 Addressing rising AC demand with policy tools: What the literature tells us

The projected demand for cooling and related challenges has been addressed in academic and institutional literature. The IEA's *The Future of Cooling* report (2018) projected that energy demand from ACs will more than triple by 2050, establishing the scale of the problem. Biardeau et al. (2020) further establish a correlation between rising heat exposure and adoption of ACs, a pattern that is especially pronounced in Global South countries, particularly those in Africa, the Middle East, South Asia, and Southeast Asia.

Regarding product efficiency, literature by authors such as Shah et al. (2015) identifies a gap between the most efficient ACs and those that dominate the market, offering opportunities for improvement in cooling energy efficiency. Dreyfus et al. (2020) suggest using multiple policy tools, such as MEPS, labelling programmes, clear policy trajectories, and regional cooperation frameworks, in tandem to build an effective energy efficiency for cooling policy package that addresses the issue along multiple avenues. Through a field experiment analysing the impact of disclosing information on environmental impact to consumers, Delmas and Lessem (2014) offer evidence that a motivation to adhere to social norms combined with information on environmental impact can shift consumers' behaviour regarding energy consumption.

1.3 Improving energy efficiency for ACs: Establishing a scope

To assess how energy efficiency can be leveraged to address rising cooling demand, this policy brief will focus on energy-efficient AC plugged-in units in residential, commercial, and public spaces. The plugged-in units include room air conditioners (RACs), among other types of ACs, such as multi-connected AC units (heat pumps), which provide heating on top of cooling. Addressing the rising demand for cooling requires reforms across the value chain, including passive cooling measures, which avoid energy demand, to be prioritised. These measures include designing urban spaces to avoid trapping heat, incorporating passive cooling design principles in buildings, and retrofitting existing buildings.[15] After such measures on the cooling chain have been addressed, the remaining needs for air cooling can be addressed through energy efficiency measures. This policy brief will focus specifically on policies that target AC's efficiency and the efficient use of ACs.

[13] Guddanti et al., 2025
[14] Guddanti et al., 2025
[15] Abdelaziz et al., 2025

1.4 Cooling policies across efficiency, affordability, social acceptability, and governance coordination: A methodological approach

To gather a comprehensive overview of global energy efficiency cooling policies, the methodology for this policy paper used a qualitative approach to research relevant policies in different regions and identify best practices. In a spreadsheet, we input information on each policy name, type of policy, policy instrument, country, status, year implemented, and description. A detailed overview and breakdown of this methodology and findings are provided in Annex 1. Overall, information about 88 policies spanning 26 countries and three multilateral coalitions was collected. To narrow down our case studies, we selected examples that, taken together, represent a complementary policy mix targeting a range of avenues for energy efficiency policies in the realm of cooling.

Figure 1 *Overview of key EE policy barriers.*

Cooling demand is shaped by a range of factors, including technical efficiency, affordability and access, social acceptability, and regional governance coordination, as displayed in Figure 1. The following case studies of the Green Cooling Action Plan (China), Coolease (Rwanda), Cool Biz (Japan), and regional initiatives across South-East Asia and Southern Africa were selected to compare how different policy levers can address a variety of barriers to AC energy efficiency cooling practices. The selected examples also include regulatory, information, and incentive-based policies to cover a range of policy designs, with geographic diversity and impact of policies serving as additional criteria in our selection process, as shown in Figure 2.

The development of this policy brief also involved interviews with experts across the AC industrial sector, intergovernmental agencies, and non-profit organisations, which can be found in Annex 1. These interviews provided insights into different sectors' perspectives on our topic and helped guide the focus and scope of this policy brief.

Policy case study	Policy tool type	Barrier addressed
Green Cooling Action Plan (China)	Regulatory	Technical efficiency
R-COOL GO and Coolease (Rwanda)	Incentive	Affordability and access
Cool Biz (Japan)	Information	Social acceptability

Regional initiatives (ASEAN, EAC, SADC)	Mixed (regulatory and information)	Regional coordination

Figure 2 *Comparison of policy case studies along tool types and levers.*

2. Findings

2.1 China: Green Cooling Action Plan (GCAP)

2.1.1 GCAP: Focusing on minimum energy performance standards

Minimum energy performance standards (MEPS) improve the baseline performance of AC units before they can be sold on the market, while filtering out inefficient products to reduce energy consumption. In China, rising incomes and a warming climate are driving rapid growth in cooling demand. During a summer heatwave in 2021 in China, electricity demand hit record highs, with room air conditioners accounting for about 30% of peak load in some cities, forcing power cuts to industry and businesses to prioritise residential use.[16] Hence, the urgency in addressing cooling demand in China.

The Green Cooling Action Plan (GCAP) in China was announced in 2019 with the aim to phase out Hydrofluorocarbons (HFCs) and improve energy efficiency standards of air conditioners through the implementation of the Kigali amendment and the Montreal Protocol.[17] The targets of GCAP state that by 2030, the energy efficiency of major cooling products should increase by 25% and the market share of green and efficient cooling products should increase by 40%.[18]

One of the key policies within the GCAP was the upgrade of the MEPS for room air conditioners (RACs) and multi-connected air-conditioning units, which are the two dominant air-conditioning products for the residential and commercial sectors in China. Fixed-speed ACs operate at full capacity regardless of cooling demand, making them less energy efficient than variable-speed models, which adjust their output to match needs. However, more efficient, variable-speed units most often come at a higher upfront cost. The RAC MEPS in 2019 first unified the energy efficiency criteria for both fixed-speed and variable-speed ACs, elevating the MEPS by 13%.[19] China's revised MEPS stands out as one

[16] Zeng, 2023.
[17] Institute For Governance & Sustainable Development, 2019.
[18] Yi, 2022.
[19] Zeng, 2023.

of the most successful AC policies, applying uniform standards across both AC types to accelerate the market shift toward variable-speed units.[20]

Beyond its world-leading MEPS, the GCAP takes a comprehensive approach to driving energy-efficient RAC adoption. Complementary measures include energy efficiency and refrigerant Global Warming Potential (GWP) labelling, R&D funding, consumer subsidies to replace low-efficiency units, combats fraudulent labelling and leverages media to promote efficient usage and expose non-compliant products.[21].

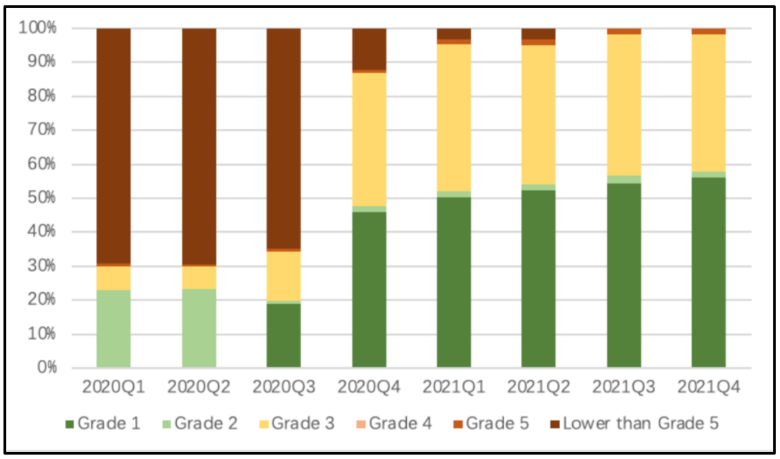


Figure 3 *Energy Efficiency Transformation of RACs in China from 2020 to 2021 (Label Grade 1: Highest energy efficiency, Grade 5: lowest energy efficiency)*[22]

2.1.2 A world-leading MEPS: The successful transition to energy-efficient AC units

The AC energy efficiency policy in China was domestically successful, and the MEPS is known for being one of the world's most impactful energy efficiency standards for RACs. The revision of the RAC energy efficiency standard (MEPS and energy label), implemented in 2020, led to an overall energy-efficiency improvement of 40.5% for multi-connected AC units compared to 2008 figures, expecting to save over 278 billion kWh by 2030.[23] The policy also significantly increased the market share of Grade 1 appliances, the highest energy efficiency level, from approximately 24% in 2020 to 56% by the end of 2021.[24]

[20] Yi, 2022.
[21] Institute for Governance and Sustainable Development, 2019.
[22] Zeng, 2023.
[23] Yi, 2022.
[24] Zeng, 2023.

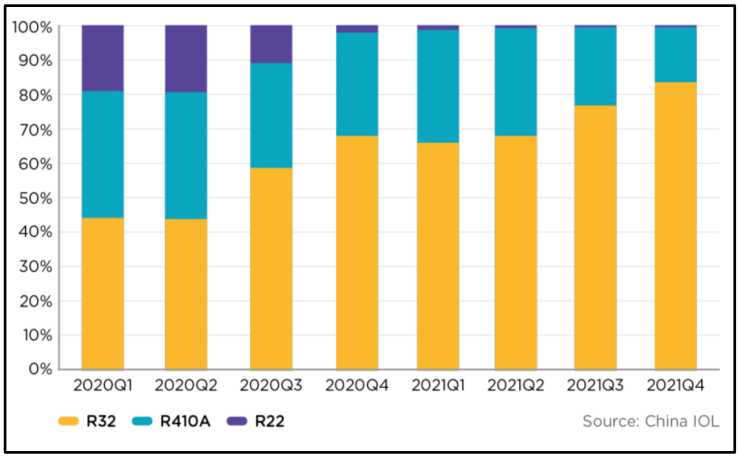


Figure 4 *China Domestic Sales % of RAC by refrigerant type*[25]

Additionally, the new MEPS accelerated a shift to greener refrigerants: R32 (GWP 675) rose from 45% to 83.1% market share by 2021, enabling R290 (GWP 3), while high-GWP refrigerants like R410A fell to 16.9% and R22 was phased out. A CLASP analysis finds that China's MEPS policy was so effective that, if adopted by all developing countries, it could prevent 2,322 Mt of CO_2 emissions by 2030.[26]

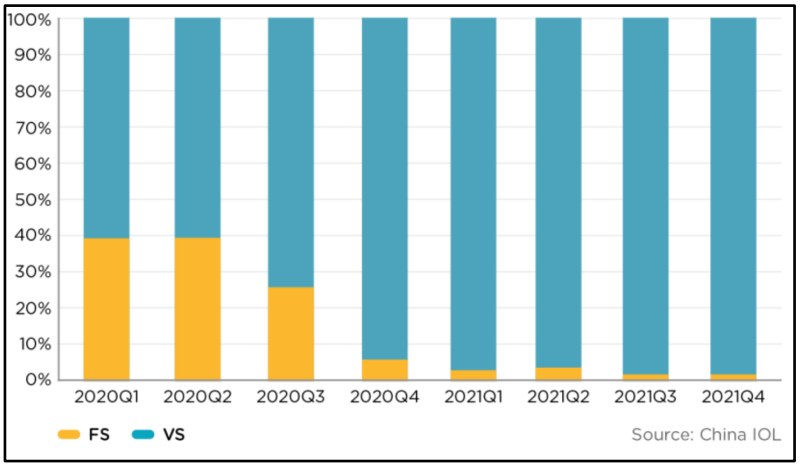


Figure 5 *China Domestic sales % by fixed/variable frequency ACs*[27]

Furthermore, Figure 5 shows that variable-speed ACs represented 40% of sales in Q1 2020 and achieved over 95% of sales in Q4 2021. China has the potential to lead the global transition to higher energy-efficient RACs as it produces approximately 70% of the world's RACs (137 million in 2017), with an export share of 25%-37% in 2017.[28] Ambitious MEPSs do not harm industry—they raise the baseline, preserve competition, and drive innovation that can boost profitability. Additionally, gradual implementation and notifying manufacturers early in the policy-making process makes MEPS more effective.

[25] Yi, 2022.
[26] Yi, 2022.
[27] Yi, 2022.
[28] Phadke, et al., 2020.

2.2 Rwanda Cooling Initiative (R-COOL): Incentive-based cooling finance

2.2.1 The Rwandan Cooling Initiative and energy efficiency landscape

Efficiency standards alone cannot prevent consumers from backtracking to cheaper, harmful air conditioning appliances, marking the importance of a financial mechanism tied to a list of approved products as an effective tool to neutralise that price advantage. Rwanda's case illustrates the case of financing as a complementary policy instrument and the conditions under which such tools can succeed or fail.

Rwanda dramatically expanded access to electricity from 6% in 2009 to over 75% by March, 2024.[29] Cooling demand for households, agricultural, and vaccine cold chains is expected to rise substantially as the population and economy grow hand in hand amidst a warming climate with average maximum temperatures estimated to increase by 1.3°-1.9° C in 2050.[30] An active market for second-hand air conditioners further undercuts the uptake of efficient appliances based on prices.[31] Rwanda has responded to this challenge with proportionate policy measures through its National Cooling Strategy under the Rwandan Cooling Initiative.

Rwanda's MEPS for air conditioners are implemented in two waves aligned with East African Standard 1213 using the Cooling Seasonal Performance Factor (CSPF) – an international seasonal efficiency standard– as the primary metric.[32] Phase I sets a minimum CSPF threshold of 4.50, 4.20 and 3.80 and phase II tightens the CSPF to 6.10, 5.10 and 4.50 across three cooling capacity bands (≤4.5kW, ≤9.5kW, ≤ 16 kW) in phases of 2 years and 5 years from the date of implementation, respectively, marking one of the most ambitious regulatory trajectories in Africa.[33] A complementary labelling scheme uses the Rwanda Seasonal Efficiency Ratio (RSEER) that recalibrates the CSPF to Rwanda's seasonal temperature and classifies products from Grades A through D to help consumers make informed choices.[34] Refrigerant GWP is capped at 750 for split ACs and 150 for self-contained units, with 0 ozone-depleting potential required across all types.[35]

[29] Singh et al., 2024
[30] Rwanda Environment Management Authority, 2022
[31] Minguez et al., 2023
[32] United4Efficiency, 2026
[33] Government of Rwanda, n.d.
[34] International Institute of Refrigeration, 2021
[35] Rwanda Environment Management Authority, 2022

Enforcement runs through IREMBO, the Government of Rwanda's e-governance platform that connects government entities spanning consumer protection, environmental management, and utilities and revenue regulation via a Product Registration System that links border clearance to compliance status, impeding the entry of non-compliant goods into the country.[36] This regulatory architecture helps address a critical dimension of Rwanda's cooling challenge, i.e., the import of inefficient, high-GWP refrigerant RACs from developed markets.[37] According to a study, 35% of RACs across ten of Africa's largest AC markets do not meet the MEPS in their country of origin, with many widely traded models containing obsolete refrigerants such as R-22 and R-410A.[38]

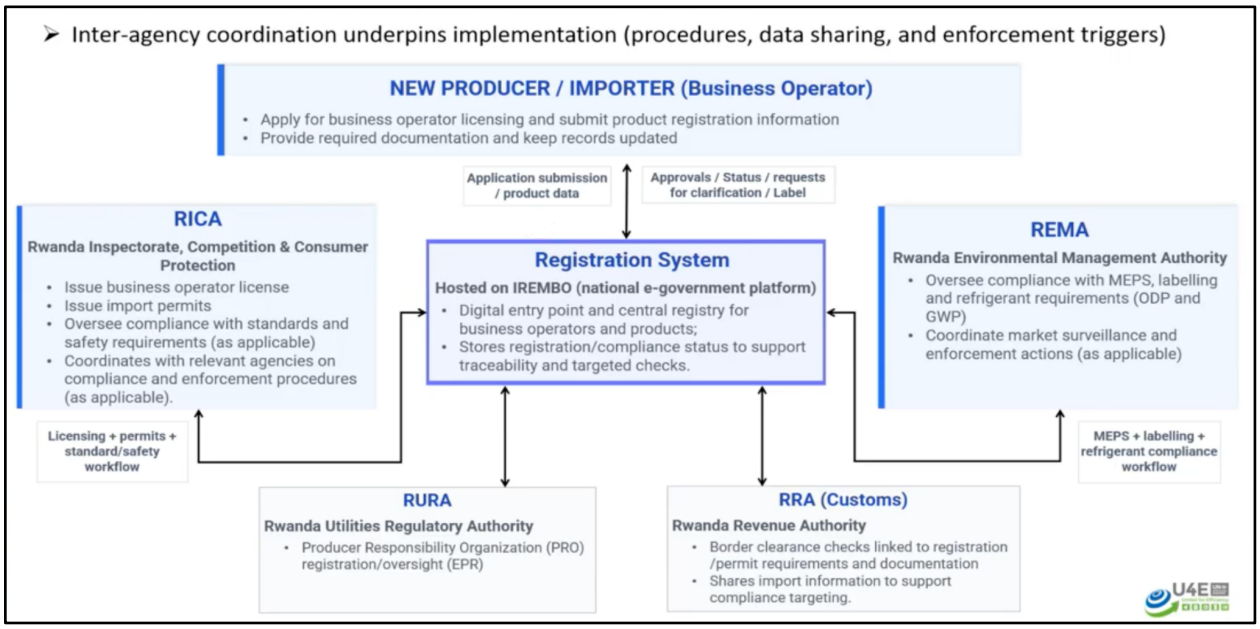


Figure 7 *Rwanda's Institutional Coordination for Enforcement of Efficiency Standards (United4Efficiency)*[39]

To tackle efficiency in cooling appliances, the Rwanda Cooling Initiative (R-COOL) was launched in 2018. It centres around four integrated components: market assessment, a National Cooling Strategy, a financial mechanism and a capacity building programme.[40] R-COOL's financial mechanism was designed as two supporting instruments to aptly address the affordability barrier in the uptake of efficient air conditioning in different sectors.

[36] Chrisostomo, 2026
[37] CLASP & IGSD, 2020
[38] CLASP & IGSD, 2020
[39] United for Efficiency, 2026
[40] United4Efficiency, 2021

2.2.2 Coolease & R-COOL GO: Differentiated Instruments for a Fragmented Market

Coolease, launched in 2019, enabled commercial enterprises to access efficient cooling technology without upfront investment through a leasing agreement. The purchased system serves as collateral, with the technology provider obligated to provide ongoing maintenance to preserve the integrity of the appliance, which simultaneously addresses the poor equipment servicing that leads to refrigerant leakage in many developing countries.[41] A Green Growth Guarantee Fund covers a portion of the default losses in an attempt to reduce lender risk.[42] Eligibility is conditional on a positive list of MEPS-compliant, low-GWP products, linking regulation to financial access.[43]

R-COOL GO, launched in 2022, allows salaried employees to purchase qualifying appliances through low-interest loans with repayments from salary deductions.[44] It reduces default risk for lenders and provides favourable rates in a market where consumer loan interest rates are usually above 20%.[45] The employee repays the loan over a period up to 36 months and can receive a rebate voucher for a 15% discount in exchange for old, operable cooling appliances.[46] On-bill financing was initially considered but discarded in exchange of on-wage financing due to the high proportion of rental properties wherein electricity meters are registered under the landlords' names, complicating billing modality.[47] This design decision reflects the context-specific adaptation of the initiative.

R-COOL GO set cumulative targets of 2,995 certified appliances sold by 2025, with ~1500 old units replaced, 945.2 million Rwandan Francs mobilised in financing and annual energy savings of 371,000 kWh, the fulfilment of which cannot be verified given the lack of monitoring, reporting and enforcement data.[48]

Year	2022	2023	2024	2025
Refrigerators and ACs sold (number of units)	230	752	1644	2,995
Old appliances replaced (number of units)	115	376	822	1498
Finance mobilized (million RWF)	72.5	237.5	518.8	945.2
Energy savings (kWh/year)	28,000	93,000	204,000	371,000

Figure 8 *R-COOL's projected cumulative impact between 2022 and 2025 as forecasted on SE4ALL*[49]

[41] BASE, 2020
[42] Rwanda Ministry of Environment, 2019
[43] BASE, 2020
[44] Rwanda Environment Management Authority, 2022
[45] SEforALL, 2022
[46] Minguez et al., 2023
[47] CLASP & IGSD, 2020
[48] SEforALL, 2022
[49] SEforALL, 2022

2.3 Shifting cooling standards and social norms: Japan's Cool Biz campaign

In October 2022, months into the growing energy crisis, the governor of Tokyo Prefecture donned a turtleneck and urged millions of residents to follow suit to stay warm during the winter season and reduce energy consumption, but setting their thermostats at slightly cooler levels.[50] This was not the first time Japanese leadership used dress to nudge behaviour in the direction of efficient energy use. Small adjustments in behaviour have proven to lead to immediate reductions in buildings' energy use, giving behavioural change a significant role to play in reducing demand for cooling.

Patterns of resource consumption reflect "immensely malleable" routines and normalised habits[51] that are shaped by various social, environmental, political, and technical factors, and can nudge citizens to accept more dramatic policy changes. For example, higher preset temperatures on new AC units have been shown to nudge consumers towards less cool temperatures. By adjusting the options available to individuals, policy can create "choice environments"[52] that encourage sustainable and efficient behaviour. This can be achieved by removing inefficient options from markets, labelling and lowering the costs of preferred cooling units, and raising the manufacturer's default temperature on new air conditioners. Earlier efforts to encourage higher set-points saw limited uptake, emphasising that behaviour-only approaches must be embedded in wider systems.

2.3.1 Cool Biz challenges overcooling in offices

Japan's Ministry of Environment had long encouraged businesses and the general public to set office air conditioners to 28° C during the summer months (May to September), aiming to gradually change expectations for cool indoor air-conditioning temperatures.[53] In 2005, the Cool Biz dress code campaign appeared, hinging on twelve behaviour mechanisms[54], encouraging office-goers to wear "cool and comfortable" clothes to work[55] to adapt to the higher set-points and the air conditioners' limited operating hours.[56] The aim was dual: both to adapt citizens to a warmer reality and to reduce energy use to counter the greenhouse gas emissions that cause climate change. In the aftermath of the devastating 2011 Tōhoku earthquake and tsunami, and the subsequent loss of the Fukushima Daiichi nuclear power station, the government followed up with "Super Cool Biz" (Figure 9), pushing for a further casual office dress, an earlier start month,[57] and five key actions, including at-home efforts.[58] The Super Cool

[50] The Guardian, 2022
[51] Shove, 2003
[52] Hoggett et al., 2025
[53] Lakeridou et al., 2014
[54] See Annex 1.1
[55] Ministry of the Environment, Japan, 2005 https://www.env.go.jp/en/press/2005/1028a.html
[56] Haneda et al., 2009
[57] Lakeridou et al., 2014
[58] Nakashima, 2013

Biz reboot incurred a further 11.8% reduction in household electricity use in July and August, compared to the year before.[59] To achieve this success, the program built motivation over time, implemented feedback, appealed to social norms, obtained commitments and disseminated the desired action through mass media.[60] The Japanese government reports having achieved 1.56 million tons of carbon emission reductions through the Super Cool Biz campaign relaunch in 2011.[61]

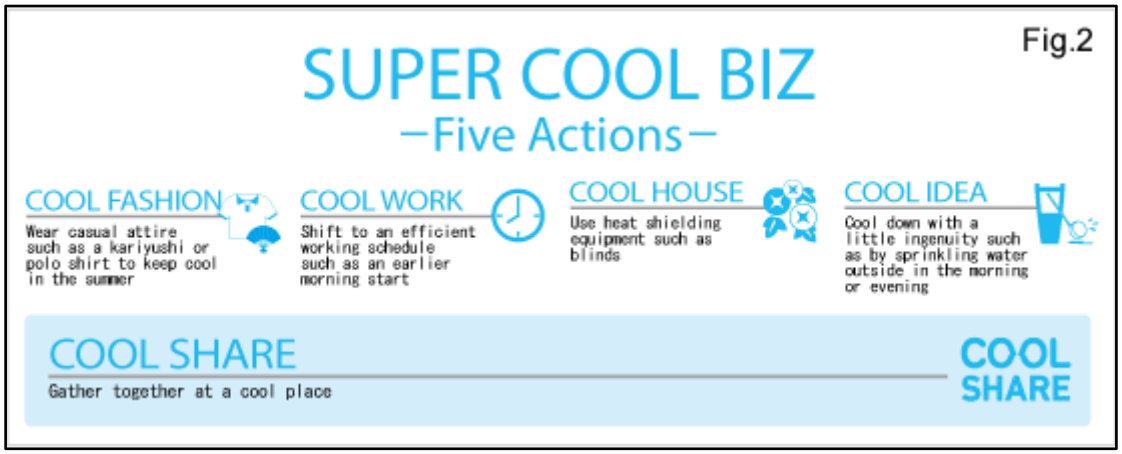


Figure 9. *Five core actions make up the Super Cool Biz approach.*

In 2025, the Tottori Prefecture commenced its Cool Biz period a month earlier[62] and in April 2026, the Shizuoka Prefecture announced it would implement a year-round Cool Biz dress code, to keep thermostats at efficient set-points.[63] These two actions, a decade after the campaign was first launched, exemplify the policy's effectiveness in permanently reducing cooling demand in Japanese office buildings.

2.4 Regional cooperation in Southeast Asia and Southern Africa

Best practices and effective energy efficiency policies rarely stand alone but are instead embedded in a wider set of policies, often acquiring a regional dimension. This section of the report will examine two examples of regional harmonisation of MEPS, concerning the ASEAN and SADC, respectively.

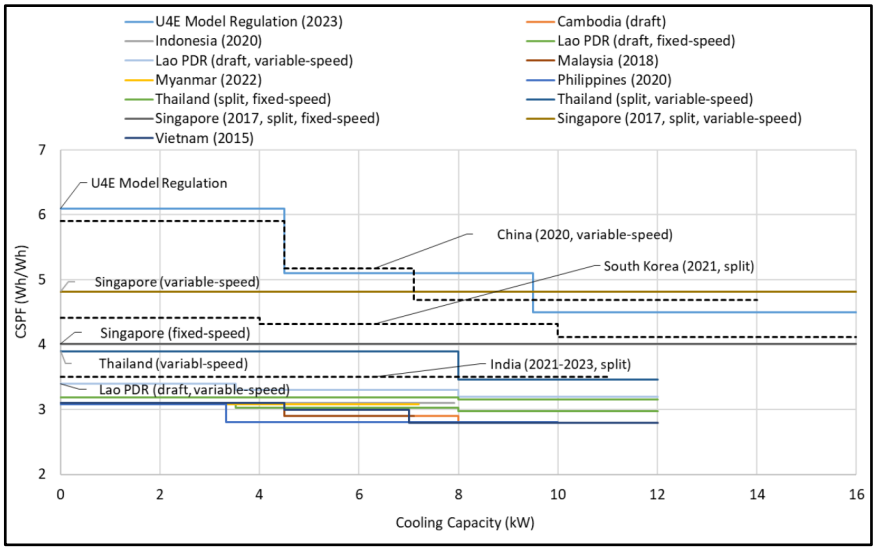
2.4.1 ASEAN SHINE (Standards Harmonization Initiative for Energy Efficiency) program

ASEAN SHINE is an initiative developed under the Energy Efficiency and Conservation (EEC) program, one of the key thematic components of the ASEAN Plan of Action for Energy Cooperation

[59] Tools of change
[60] Tools of Change website
[61] Nakashima, 2013
[62] Nippon.com, 2026
[63] News on Japan, 2026.

(APAEC).[64] The project was established in 2012, with 80% of its initial budget funded by a €1.7 million grant under the European Union's SWITCH-Asia program,[65] and officially launched in 2013 as a public-private implementation framework for energy-efficient air conditioners.[66] The main goal of the SHINE program is to promote and implement a common set of MEPS and test methods for ACs, as well as common tiers and efficiency categories to be used in each ASEAN country's comparative label for these appliances.[67]

Figure 10 *MEPS for ACs in ASEAN economies compared with the U4E Model Regulation and selected countries*[68]



In particular, ASEAN countries initially agreed to set a common minimum CSPF of 3.08 to be reached by 2020 for both fixed and variable-speed ACs below a cooling capacity (CC) of 3.52 kW.[69] This minimum requirement was then raised to 6.09, to be achieved by 2025.

Figure 11 *Savings opportunity of energy-efficient room ACs in 2040 for ASEAN countries*[70]

[64] Shi et al., 2013
[65] European Union SWITCH-Asia Programme, 2026
[66] Regional Center for Renewable Energy and Energy Efficiency, 2025
[67] Park et al., 2021
[68] Park et al., 2021
[69] Park et al., 2021.
[70] Park et al., 2021

Country	Electricity Savings [TWh]	CO_2 Savings [Million tonnes]	Financial Savings [Billion US$]
Brunei Darussalam	0.3	0.2	0.02
Cambodia	1.0	0.8	0.22
Indonesia	57.4	40.8	5.74
Lao PDR	0.4	0.2	0.03
Malaysia	13.1	8.4	1.01
Myanmar	2.0	0.6	0.07
Philippines	21.1	17.8	3.84
Singapore	3.0	1.5	0.56
Thailand	18.1	10.4	2.10
Viet Nam	27.9	19.8	2.20
Total	**144**	**101**	**16**

Such common standards are expected to deliver substantial energy savings by 2040: estimates from 2020 suggest a potential of 144 TWh, equivalent to 101 million tonnes of CO_2 emissions and around $16 billion in electricity cost savings.[71]

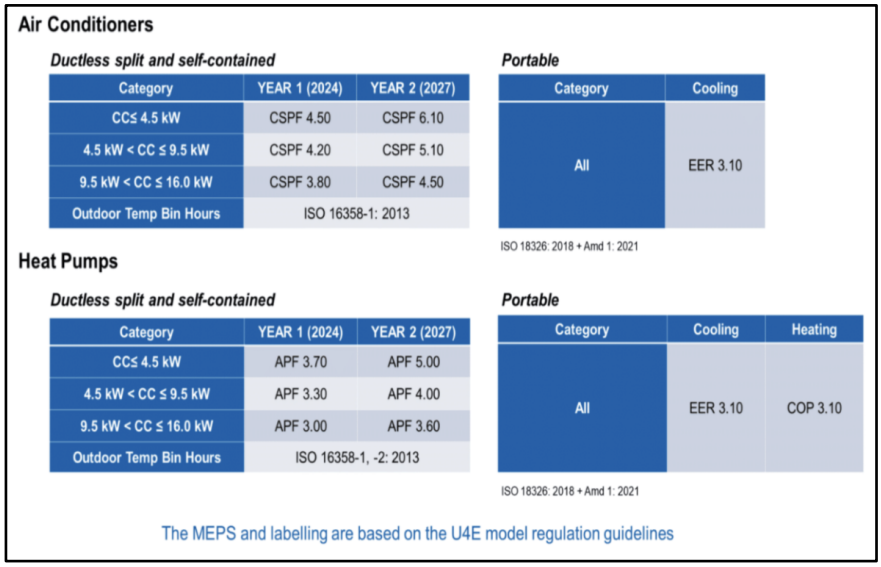
In terms of current progress, recent assessments suggest that at the ASEAN level more than 75% of the most common AC models with a capacity of up to 4.5 kW meet the previous MEPS threshold of 3.08, indicating a slow but steady overall improvement.[72]

2.4.2 Regional harmonisation of MEPS within the SADC

This harmonising initiative was recently implemented as part of the broader Regional Harmonization of Energy-Efficient and Climate-Friendly Cooling in East and Southern Africa project, which also encompasses other regulatory measures such as labelling.[73]

The program, concerning specifically room ACs and residential refrigerators, started in 2021 and, after the SADC's standards body (SADCSTAN) officially approved the common MEPS in November 2023, was finally implemented nationally in February 2024, for all 16 SADC member states.[74]

[71] Park et al., 2021
[72] Silitonga et al., 2024
[73] United for Efficiency, 2024
[74] Regional Center for Renewable Energy and Energy Efficiency, 2025



Air Conditioners

Ductless split and self-contained

Category	YEAR 1 (2024)	YEAR 2 (2027)
CC≤ 4.5 kW	CSPF 4.50	CSPF 6.10
4.5 kW < CC ≤ 9.5 kW	CSPF 4.20	CSPF 5.10
9.5 kW < CC ≤ 16.0 kW	CSPF 3.80	CSPF 4.50
Outdoor Temp Bin Hours	ISO 16358-1: 2013	

Portable

Category	Cooling
All	EER 3.10

ISO 18326: 2018 + Amd 1: 2021

Heat Pumps

Ductless split and self-contained

Category	YEAR 1 (2024)	YEAR 2 (2027)
CC≤ 4.5 kW	APF 3.70	APF 5.00
4.5 kW < CC ≤ 9.5 kW	APF 3.30	APF 4.00
9.5 kW < CC ≤ 16.0 kW	APF 3.00	APF 3.60
Outdoor Temp Bin Hours	ISO 16358-1, -2: 2013	

Portable

Category	Cooling	Heating
All	EER 3.10	COP 3.10

ISO 18326: 2018 + Amd 1: 2021

The MEPS and labelling are based on the U4E model regulation guidelines

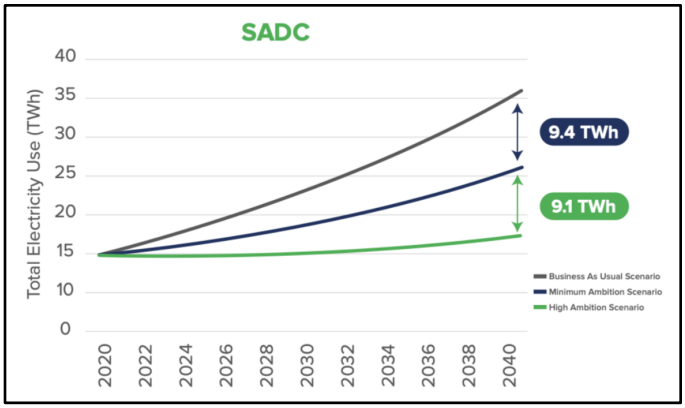
Figure 12 *MEPS requirements for ACs*[75]

For ACs, the policy applies to all new electrical ductless split and self-contained models, as well as to air-to-air reversible heat pumps and portable AC units with a cooling output of 16kW or lower, and considers the CSPF, the Annual Performance Factor (APF) and the Energy Efficiency Ratio (EER) as main indicators.[76]

Category	2024	2027
Refrigerators	1.00	1.25
Refrigerator-Freezers	1.00	1.25
Freezers	1.00	1.25

Figure 13 *MEPS requirements for refrigerating appliances (R)*[77]

The harmonised MEPS for refrigerators, on the other hand, is directed at all vapour compression models with a rated volume between 10 and 1500 litres.[78]



According to official U4E estimates, the harmonisation initiative is expected to generate electricity savings of nearly 8 TWh per year, reduce CO2 emissions by 6.5 million tonnes by 2040, and deliver annual savings of $840 million for energy consumers.[79]

[75] United for Efficiency, 2024
[76] United for Efficiency, 2024
[77] United for Efficiency, 2024; **R**: in this context, R is an efficiency index defined as the ratio between the maximum allowable annual energy consumption (kWh/y) and the actual consumption (kWh/y) of the appliance. The higher the R index, the more efficient the unit is.
[78] United for Efficiency, 2024
[79] United for Efficiency, 2024

Figure 14 *Savings potential for energy-efficient ACs and refrigerators in SADC region* [80]

3. Discussion

3.1 Complementarity of policy instruments

Complementing standard policies with financial instruments, as shown in R-COOL GO, strengthens overall policy effectiveness by addressing affordability constraints that standards alone cannot resolve. The second-hand market for inefficient ACs in Rwanda created price gaps as a structural barrier to energy efficiency that tools like MEPS cannot address on its own, necessitating additional policy instruments to improve effectiveness and reach.

As seen in the SHINE initiative, the main intended benefit, beyond its energy-saving potential, is the removal of technical trade barriers for air conditioners, allowing manufacturers to test their products only once for the entire region and to comply with a common set of MEPS.

Moreover, regional coordination initiatives can significantly scale the impact of energy efficiency policies. By aligning standards, both initiatives in ASEAN and SADC reduce market fragmentation, facilitate technology diffusion, and unlock substantial energy and cost savings across multiple countries simultaneously. However, their effectiveness ultimately depends not only on the design of common standards, but also on the capacity of member states to implement, enforce, and monitor them effectively.

3.2 Implementation conditions determine policy effectiveness

The conditions of policy effectiveness depend on its design and implementation conditions, such as stakeholder engagement, institutional support, enforcement and monitoring capacity, and alignment with local contexts.

In China, the MEPS gained international recognition, providing a strong roadmap to other economies in addressing cooling demand. This success was largely achieved by engaging with the AC industry through an expert working group, as well as several technical studies conducted by the China National

[80] Regional Center for Renewable Energy and Energy Efficiency, 2025.; **BAU scenario**: 1% annual improvement of energy efficiency; **MA scenario**: U4E Model Regulation Guidelines; **HA scenario**: U4E Model Regulation Guidelines Top-tier performance.

Institute of Standardisation (CNIS), local institutes, and an international NGO.[81] The expert group engaged with manufacturers such as Daikin, Gree, Haier, and Hitachi to develop the standards, receive inputs from the industry, and promote the benefits of implementing the high-quality MEPS through policymaker involvement.[82] Engaging industry experts is crucial when updating MEPS, as manufacturers need sufficient time to develop compliant products. An interviewed Daikin representative highlighted that several African countries have struggled to implement effective MEPS due to limited industry involvement in the policy-making process, leaving manufacturers with little time to adapt. China's inclusive engagement approach serves as a strong model for countries developing or revising their AC MEPS.

Furthermore, adapting policies to local market contexts can also improve their reach. Together, Coolease & R-COOL GO aimed to address the full affordability spectrum of a cooling market segmented by income, tenure and employment.

A similar logic of context-sensitive design underlies regional frameworks such as the SADC's. The SADC implementation strategy unfolds in two phases: first, a 2024-2027 period, then a second, more stringent and ambitious period from 2027 onwards.[83] This phased approach ensures more consistent monitoring of the project's progress and highlights the complex process of engaging and coordinating with relevant national and regional stakeholders that took place during the preliminary implementation stage,[84]demonstrating SADC's repeated efforts to coordinate the interests of its member states as much as possible in pursuit of common standards.

3.3 Behaviour as a determinant of demand

Japan's Cool Biz and Super Cool Biz campaigns successfully influenced behaviour, improved climate prospects, and even boosted the Japanese economy.[85] High adoption of Cool Biz in Japan due to organisational support, cultural cohesion, and genuine faith in its ability to transform workplace style norms.[86] By 2013, 45% of Japanese businessmen were forgoing both neckties and business suits and jackets altogether; this number rose to 60.5% in government office districts,[87] leaving a minority of 'non-compliant' office workers. In the same year, 80% of companies were telling their employees to

[81] Zeng, 2023.
[82] Zeng, 2023.
[83] United for Efficiency, 2024
[84] United for Efficiency, 2024
[85] See Annex 2.2
[86] Aliagha and Cin, 2013
[87] Aliagha and Cin, 2013

regulate air conditioning levels and wear lighter clothing[88] and that "care for the environment" was entrenched in business conduct.[89] To sustain acceptance, senior management must be visibly committed to the dress code change.[90] Public institutions and offices can also lead by example by enacting higher temperature set-points and kickstarting the change of temperature standards.

Additionally, the need for AC is partly an "artificial desire" arising from standards,[91] so it can be understood that if enough buildings are maintained at 28°C, it has become a new social norm – deviations from that set-point are now interpreted as uncomfortable or unusual.[92] Cool Biz has successfully reduced demand, and trains citizens to seek other body-cooling tactics, and transforms the acceptability of less cold indoor temperatures.

3.4 Constraints and limits of policy transferability

The transferability of cooling policies is limited by variations in institutional capacity, market structure, behavioural norms, and the availability of implementation data.

Institutional constraints

China's success with the GCAP relied heavily on strong state capacity, making similar implementation difficult in contexts with weaker administrative and enforcement capacity. Additionally, the risk of inefficient AC unit dumping into less regulated markets remains a concern, while China's "Same Line Policy" helps address this by aligning export and domestic standards.[93]

In contrast, the SADC's critical issues stem from a resource deficit for monitoring, evaluation, and the technical implementation of the new standards across member states.[94] This explains the widespread regulatory gaps observed among these countries prior to harmonisation[95], and also results in a situation where, even with MEPS in place, only 20% of the countries involved currently exhibit high levels of compliance.[96] Moreover, this fundamental lack of capacity makes it difficult to collect reliable data on the current state of implementation and the overall effectiveness of the project.

[88] Aliagha and Cin, 2013
[89] Aliagha and Cin, 2013
[90] Lakeridou et al., 2014
[91] Lakeridou et al., 2014
[92] Lakeridou et al., 2014
[93] Sun, et al., 2022.
[94] Regional Center for Renewable Energy and Energy Efficiency, 2025; Natural Resources Defense Council, 2025
[95] Park et al., 2021
[96] Natural Resources Defense Council, 2025

Market constraints

Significant retooling costs faced by ASEAN AC manufacturers to adapt production to new high-efficiency standards, ranging from $1 to $4 million per facility. Progressive increases in revenues can be expected after these initial investments, due to higher market prices of efficient AC units.[97] These high upfront costs paired with delayed returns, create another implementation barrier. Furthermore, national markets exhibit uneven levels of readiness for progressively stricter MEPS, with some, such as Indonesia, showing greater short-term sensitivity. This variation in market readiness highlights the importance of a phased approach to tightening standards, based on gradual and progressive adjustments.[98]

Socio-cultural constraints

While addressing a financial constraint, R-COOL GO's adoption of on-wage financing introduced a social constraint: 62% of Rwanda's population is self-employed (primarily involved in agriculture), meaning that the mechanism excludes a majority of the population.[99] This design flaw is not unique to Rwanda; it is indicative of a broader challenge for cooling finance in economies where formal employment is limited, highlighting the need for context-specific policy design.

Early Japanese studies criticised the 28°C set-point, highlighting the long wait time for office spaces to cool down and actual room temperatures being a few degrees higher, especially in areas with heat-emitting appliances. In 2009, 70% of workers were thermally dissatisfied in July and August, Japan's warmest months.[100]

Cool Biz has been imitated in culturally similar countries such as South Korea[101], but also in Spain, and some institutions in the United Kingdom and the United States,[102] showing promise for export to other countries. In Malaysia, for example, a survey found that office workers would be receptive to a more casual dress code under certain conditions.[103] Ultimately, each country has its own climate, building stock, social norms and workplace culture which determines how air conditioners are viewed and used,[104] tempering the success of the initiative.

[97] Silitonga et al., 2024
[98] Silitonga et al., 2024
[99] CLASP & IGSD, 2020
[100] Haneda et al., 2009
[101] See Annex 2.3
[102] Aliagha and Cin, 2013
[103] See Annex 2.4
[104] Lakeridou et al., 2014

Data constraints

Insufficient data highlights a key barrier to durable change as seen in Coolease & R-COOL GO and the SADC. Furthermore, while Japan reports estimated emissions reductions and high public uptake for Cool Biz, a gap in robust causal and building-level data remains. Without data on key performance indicators such as uptake rates, energy efficiency improvements, and affordability outcomes, each programme lacks the ability to adapt their policies based on observed strengths and weaknesses. Three independent experts in intergovernmental organisations cited the absence of robust implementation data for Coolease & R-COOL GO as a fundamental barrier to assessing programme effectiveness.

3.5 Policy recommendations

1. **Target behaviour early on to facilitate policy uptake.** Policymakers must address the behaviour side of cooling use first, or air-conditioning systems may become the "go-to solution" globally, locking in a high impact cooling pathway.[105] Behaviour follows a one-way trajectory: once norms are established, they are difficult to reverse.[106] Early intervention on standards can reshape expectations that are locked in for decades ahead. Behavioural policies such as the Cool Biz campaign demonstrate that demand can be reduced through shifts in social norms and everyday practices. Similar approaches address gaps left by technological and regulatory measures, offering immediate, low-cost efficiency gains and supporting the effectiveness of broader policy packages.
2. **Early stakeholder engagement is not a procedural step, but a precondition for ambitious and enforceable energy efficiency policy.** Engaging with the AC industry early in the policy-making process ensures that AC manufacturers have time to adapt the upgraded energy efficiency standards to the AC units.
3. **Implementing a policy package rather than a single policy instrument is essential to fill in the policy gaps and to ensure the effectiveness of a policy.** In the case of ACs, energy-efficient ACs can have higher upfront costs, and providing subsidies can increase affordability and access. Social acceptability can be increased through education campaigns on how energy-efficient ACs can reduce electricity bills, the risks of grid overloads and power outages through inefficient ones, and how to read labels.
4. **Financial mechanisms tailored to local contexts.** For countries confronting cooling poverty alongside rapid electrification, Rwanda's policy architecture offers replicable sequencing: building a regulatory foundation, using it to define financial eligibility criteria, then deploying differentiated instruments across commercial and residential segments to increase the

[105] Hoggett et al., 2025
[106] Shove, 2003

penetration of compliant ACs in the market. Rwanda's approach is particularly instructive for economies where the upfront cost premium of efficient appliances, rather than their unavailability, is the binding constraint on market transformation.

5. **Leverage the public sector and leadership to set social norms.** Behavioural science has shown that individuals in an office are more likely to adopt a desired behaviour if they observe executive leadership taking part. Similarly, the public sector can play a key role in leading the way in adopting new norms, as employees are already receptive to new policies.[107]
6. **Strengthen capacity building at both national and regional levels**, particularly in technical implementation, compliance verification, and data collection systems. This should be accompanied by targeted efforts to support market development, ensuring that local industries and consumers can adapt to progressively stricter efficiency requirements. Finally, improving monitoring frameworks and data availability remains essential to track progress, identify gaps, and ensure that the expected benefits of harmonisation are fully realised over time.

4. Conclusion

No single policy instrument can address increased energy efficiency in light of cooling demand. Any solution to the efficiency problem will require a multi-dimensional approach, targeting technical efficiency, access to efficient options, adjusted social norms and regional coordination. This report shows some of the best available policies available for each dimension: raising the baseline for quality, efficient ACs in China, facilitating the financing of energy efficient units for Rwandan business owners, shifting the social acceptability of energy efficient behaviour, and coordinating efforts regionally to maximise geographical reach. As each piece of the puzzle is incorporated into a policy, the more comprehensive – and likely to be successful – it is.

Cooling is not just an energy issue; it is a public health necessity, a development issue, and a climate change multiplier. Given the current climate crisis, developed economies should reduce their demand for emerging economies to expand cooling access without implementing unsustainable energy pathways. The demand for AC units continues to increase due to rising incomes and temperatures. Policies are needed to find solutions to improve the energy efficiency of these appliances and their use. For the policies to be impactful, each step of the policy-making process must be ambitious by engaging with multiple stakeholders, providing a comprehensive policy package to have maximum efficacy.

[107] Lakeridou et al., 2014

References

Abdelaziz, O., Gluckman, R., Hamilton, I., Khosla, R., & Riahi, L. (2025). *Global cooling watch 2025: The free degrees. How sustainable, passive-first cooling can save lives, money and food*. United Nations Environment Programme. https://ora.ox.ac.uk/objects/uuid:3cd1841d-1aa8-4d9f-aa07-440e96e1f689

Aliaga, G. U., & Cin, N. Y. (2013). Perceptions of Malaysian Office Workers on the Adoption of the Japanese Cool Biz Concept of Energy Conservation. *Journal of Asian and African Studies*, *48*(4), 427–446. https://doi.org/10.1177/0021909613493603

BASE. (2020, March 5). *R-COOL with Coolease in Rwanda | BASE*. BASE. https://energy-base.org/projects/r-cool-with-coolease-in-rwanda/

Biardeau, L. T., Davis, L. W., Gertler, P., & Wolfram, C. (2020). Heat exposure and global air conditioning. *Nature Sustainability, 3*(1), 1–4. https://doi.org/10.1038/s41893-019-0441-9

Chrisostomo, C. L. (2026, March 4). *Rwanda Boosts Cooling Compliance with PRS Training and Regional Webinar - United for Efficiency*. United for Efficiency. https://united4efficiency.org/rwanda-boosts-cooling-compliance-with-prs-training-and-regional-webinar/

CLASP, & IGSD. (2020). Environmentally Harmful Dumping of Inefficient and Obsolete Air Conditioners in Africa CLASP. In *CLASP*. https://www.clasp.ngo/research/all/environmentally-harmful-dumping-of-inefficient-and-obsolete-air-conditioners-in-africa/?success=1

Climate & Clean Air Coalition. (n.d.). *Hydrofluorocarbons (HFCs)*. https://www.ccacoalition.org/short-lived-climate-pollutants/hydrofluorocarbons-hfcs

Cool biz. (2025, August 6). NamuWiki. https://en.namu.wiki/w/%EC%BF%A8%20%EB%B9%84%EC%A6%88

Costa, H., et al. (2024). *The heat is on: Heat stress, productivity and adaptation among firms.* OECD Economics Department Working Papers, No. 1828. OECD Publishing. https://doi.org/10.1787/19d94638-en

Delmas, M. A., & Lessem, N. (2014). Saving power to conserve your reputation? The effectiveness of private versus public information. *Journal of Environmental Economics and Management, 67*(3), 353–370. https://doi.org/10.1016/j.jeem.2013.12.009

DEMAND. (n.d.). *PATHWAYS OF CHANGE: COOL BIZ AND THE RECONDITIONING OF OFFICE ENERGY DEMAND*. Retrieved March 30, 2026, from https://www.demand.ac.uk/wp-content/uploads/2018/04/demand-insight-17-V3.pdf

Díaz Lobato, S., & Mayoralas Alises, S. (2026). Breathing in the dark: Lessons from the April 2025 blackout for electricity-dependent respiratory patients. *Open Respiratory Archives*, *8*(2). https://doi.org/10.1016/j.opresp.2026.100607

Dressing for the Anthropocene: Mitigating climate change through cooler clothing. (n.d.). Retrieved April 15, 2026, from https://www.eceee.org/library/conference_proceedings/eceee_Summer_Studies/2019/2-whats-next-in-energy-policy/dressing-for-the-anthropocene-mitigating-climate-change-through-cooler-clothing/

Dreyfus, G., Borgford-Parnell, N., Christensen, J., Fahey, D. W., Motherway, B., Peters, T., Picolotti, R., Shah, N., & Xu, Y. (2020). *Assessment of climate and development benefits of efficient and climate-friendly cooling*. https://igsd.org/wp-content/uploads/2020/03/Assessment-Final-FINAL-20207.pdf

Ebi, K., Capon, A., Berry, P., et al. (2021). Hot weather and heat extremes: Health risks. *The Lancet, 398*, 698–708. https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)01208-3/fulltext

European Commission. (n.d.). Global warming potential. Knowledge for Policy. https://knowledge4policy.ec.europa.eu/glossary-item/global-warming-potential_en

European Union SWITCH-Asia Programme. (2026). *ASEAN SHINE*. SWITCH-Asia. https://www.switch-asia.eu/project/asean-shine/

France-Presse, A. (2022, November 19). Tokyo residents urged to wear turtlenecks to save on energy bills. *The Guardian*. https://www.theguardian.com/world/2022/nov/19/tokyo-residents-urged-to-wear-turtlenecks-to-save-on-energy-bills

Gerszon Mahler, D., Holla, A., & Serajuddin, U. (2024, January 23). Time to stop referring to the "developing world." *World Bank Blogs - Data Blog*. https://blogs.worldbank.org/en/opendata/time-stop-referring-developing-world#:~:text=In%20the%20World%20Bank%2C%20this,84%25%20of%20the%20world's%20population

Goenka, A., Madan, P., George, G., & Kumar, S. (2025). *Regional centers of excellence for sustainable cooling: A strategic guide for developing countries*. Natural Resources Defense Council.

Government of Rwanda. (n.d.). *Government of Rwanda NATIONAL COOLING STRATEGY Rwanda National Cooling Strategy Background*. Retrieved April 21, 2026, from https://ozone.unep.org/system/files/documents/National%20Cooling%20Strategy%20%28Rwanda%29.pdf

Guddanti, K. P., Chen, L., Weng, Y., & Yu, Y. (2025). Vulnerability of power distribution networks to local temperature changes induced by global climate change. *Nature Communications, 16*, 5116. https://doi.org/10.1038/s41467-025-59749-4

Haneda, M., Nishihara, N., NAKAMURA, S., UCHIDA, S., & Tanabe, S. (2009). A field measurement of thermal environment in COOL BIZ office and the evaluation on productivity by a questionnaire survey. *Journal of Environmental Engineering (Transactions of Aij)*, *74*, 389–396. https://doi.org/10.3130/aije.74.389

Herald, K. (2012, June 29). *Dress code spawns efficiency*. The Korea Herald. https://www.koreaherald.com/article/10365683

Hoggett, R., King, L., Lowes, R., Demski, C., & Ugalde-Loo, C. E. (2025). People centric policy is needed to create a clean cooling pathway for UK homes. *Environmental Science & Policy*, *167*, 104045. https://doi.org/10.1016/j.envsci.2025.104045

Howarth, N., Camarasa, C., Lane, K., & Martin, A. R. (2023, July 21). *Keeping cool in a hotter world is using more energy, making efficiency more important than ever*. International Energy Agency. https://www.iea.org/commentaries/keeping-cool-in-a-hotter-world-is-using-more-energy-making-efficiency-more-important-than-ever

Institute For Governance & Sustainable Development. (2019, June 13). *China's Green and High-Efficiency Cooling Action Plan: A Model for Cooling-Efficiency Ambition*. https://www.igsd.org/chinas-green-and-high-efficiency-cooling-action-plan-a-model-for-cooling-efficiency-ambition/

International Energy Agency. (2018). *The Future of Cooling*. IEA. https://www.iea.org/reports/the-future-of-cooling

International Energy Agency. (2019). *Residential behaviour changes lead to a reduction in heating and cooling energy use by 2030*. International Energy Agency. https://www.iea.org/reports/residential-behaviour-changes-lead-to-a-reduction-in-heating-and-cooling-energy-use-by-2030

International Energy Agency. (2025a). *Minimum Energy Performance Standards*. IEA. https://iea.blob.core.windows.net/assets/ddba54b4-f5af-47e4-8e92-d31a64e41b3f/Appliance-MinimumEnergyPerformanceStandards-IEAEnergyEfficiencyPolicyToolkit2025.pdf

International Energy Agency. (2025b, July 28). *Staying cool without overheating the energy system*. IEA. https://www.iea.org/commentaries/staying-cool-without-overheating-the-energy-system

International Energy Agency. (2025c). *World Energy Outlook 2025*. IEA. https://www.iea.org/reports/world-energy-outlook-2025

International Institute of Refrigeration. (2021). *Market assessment and updates of Rwanda's national... | 2021/03/29*. Iifiir.org. https://iifiir.org/en/news/market-assessment-and-updates-of-rwanda-s-national-cooling-strategy

Khosla, R., Renaldi, R., Mazzone, A., McElroy, C., & Palafox-Alcantar, G. (2022). Sustainable Cooling in a Warming World: Technologies, Cultures, and Circularity. *Annual Review of Environment and Resources*, *47*(Volume 47, 2022), 449–478. https://doi.org/10.1146/annurev-environ-120420-085027

Lakeridou, M., Ucci, M., & Marmot, A. (2014). Imposing limits on summer set-points in UK air-conditioned offices: A survey of facility managers. *Energy Policy*, *75*, 354–368. https://doi.org/10.1016/j.enpol.2014.09.021

Maller, C. J., & Strengers, Y. (2011). Housing, heat stress and health in a changing climate: Promoting the adaptive capacity of vulnerable households, a suggested way forward. *Health Promotion International*, *26*(4), 492–498. https://doi.org/10.1093/heapro/dar003

Minguez, V., Pillet, A., Hammami, S., & Valero, A. (2023). Using Finance to Accelerate Adoption of More Energy Efficient and Climate Friendly Appliances. In *BASE*. https://energy-base.org/news/finance-to-accelerate-the-adoption-of-energy-efficient-appliances-insights-from-ghana-senegal-and-rwanda/

Ministry of Environment, Forest and Climate Change. (2023). *India's Journey Towards Sustainable Cooling* (pp. 1–82). Government of India. https://www.undp.org/sites/g/files/zskgke326/files/2024-01/indias_journey_towards_sustainable_cooling_0.pdf

Ministry of the Environment, Japan, 2005 https://www.env.go.jp/en/press/2005/1028a.html

Morley, J. (2022, September 26). Clothing: The First Layer of Personal Comfort. *Buildings & Cities*. https://www.buildingsandcities.org/insights/commentaries/clothing-personal-comfort.html

Nakashima, Y. (2013). What are COOL BIZ and WARM BIZ? *Japan Environment Quarterly*, *3*. https://www.env.go.jp/en/focus/jeq/issue/vol03/feature.html

Park, W. Y., Shah, N., Letschert, V., & Blake, P. (2021). *Harmonizing energy-efficiency standards for room air conditioners in Southeast Asia*. Lawrence Berkeley National Laboratory & United Nations Environment Programme.

Park, W. Y., Shah, N., Blake, P., & Edl, M. (2021). *Technical note on quality and performance metrics of cooling products for East African Community (EAC) and Southern African Development Community (SADC).* Lawrence Berkeley National Laboratory. https://eta.lbl.gov/publications/technical-note-quality-and

Phadke, A., Shah, N., Lin, J., Park, W. Y., Zhang, Y., Zaelke, D., Ding, C., & Karali, N. (2020). Chinese policy leadership would cool global air conditioning impacts: Looking East. *Energy Research & Social Science*, *66*, 1–10. https://doi.org/10.1016/j.erss.2020.101570

Porras-Salazar, J. A., Schiavon, S., Wargocki, P., Cheung, T., & Tham, K. W. (2021). Meta-analysis of 35 studies examining the effect of indoor temperature on office work performance. *Building and Environment*, *203*, 108037. https://doi.org/10.1016/j.buildenv.2021.108037

Regional Center for Renewable Energy and Energy Efficiency (RCREEE). (2025). *Regional MEPS harmonization and certification: Lessons learned from international experiences*. RCREEE.

Rwanda Environment Management Authority. (2022, November 30). *Rwanda Cooling Initiative: Enabling Deployment of Energy-Efficient and Climate-Friendly Cooling*. Green Climate Fund. https://www.greenclimate.fund/document/rwanda-cooling-initiative-enabling-deployment-energy-efficient-and-climate-friendly-cooling

Rwanda Ministry of Environment. (2019, June 18). *Rwanda launches Coolease scheme to promote adoption of energy efficient and climate friendly cooling solutions*. Ministry of Environment. https://www.environment.gov.rw/news-detail/rwanda-launches-coolease-scheme-to-promote-adoption-of-energy-efficient-and-climate-friendly-cooling-solutions-1

Scorching heat prompts Korean offices to embrace shorts—The Korea Times. (2025, July 31). https://www.koreatimes.co.kr/southkorea/society/20250731/scorching-heat-prompts-korean-offices-to-embrace-shorts

SEforALL. (2022, May 13). *Chilling Prospects 2022: Unlocking financing for energy efficient cooling in Rwanda*. Sustainable Energy for All | SEforALL. https://www.seforall.org/data-stories/unlocking-financing-for-energy-efficient-cooling-in-rwanda

Seoul Metropolitan Government (2012, May 24) *Seoul City Allows Officials to Wear Shorts and Sandals.* https://english.seoul.go.kr/seoul-city-allows-officials-to-wear-shorts-and-sandals/

Shah, N., Wei, M., Letschert, V., & Phadke, A. (2015). *Benefits of leapfrogging to superefficiency and low global warming potential refrigerants in room air conditioning*. UC Berkeley. https://escholarship.org/uc/item/584131r9

Shakouri G., H. (2019). The share of cooling electricity in global warming: Estimation of the loop gain for the positive feedback. *Energy, 179*, 747–761.; Colelli, F. P., Emmerling, J., Marangoni, G., Mistry, M. N., & De Cian, E. (2022). Increased energy use for adaptation significantly impacts mitigation pathways. *Nature Communications*, *13*(1), 4964. https://doi.org/10.1038/s41467-022-32471-1

Shi, X., & Malik, C. (2013). Assessment of ASEAN energy cooperation within the ASEAN Economic Community. *ERIA Discussion Paper Series*, (37), 1-71.

Shizuoka Prefecture to Adopt Year-Round Cool Biz. (n.d.). Retrieved April 21, 2026, from https://newsonjapan.com/article/145604.php

Shove, E. (2003). Converging Conventions of Comfort, Cleanliness and Convenience. *Journal of Consumer Policy*, *26*(4), 395–418. https://doi.org/10.1023/A:1026362829781

Silitonga, R. J. P., Vu, T. A., Supendi, S. B., & Katon, M. A. F. (2024). Assessing the impact of ASEAN's harmonised minimum efficiency performance standards on AC manufacturers. *IOP Conference Series: Earth and Environmental Science, 1395*(1).

Singh, A., Ulaankhuu, U., & Masood, O. (2024). *Rwanda can scale-up energy efficiency while accelerating energy access*. World Bank Blogs. https://blogs.worldbank.org/en/africacan/rwanda-can-scale-up-energy-efficiency-while-accelerating-energy-access-afe-0524

Some Local Govts in Japan Start Power-Saving Campaign Early. (2026, April 17). Nippon.Com. https://www.nippon.com/en/news/yjj2026041600710/

Sun, X., Yan, H., Wang, S., & Ferris, T. (2022). An opportunity that should not be missed: Applying Chinese policy that promotes efficient air conditioning to countries that need it. *Sustainable Development Law & Policy*, *21*(2). https://digitalcommons.wcl.american.edu/sdlp/vol21/iss2/3

United for Efficiency. (2024). *Harmonized regional MEPS for cooling products approved for SADC region*. https://united4efficiency.org/harmonized-regional-meps-for-cooling-products-approved-for-sadc-region/

United4Efficiency. (2026, March 2). *U4E Webinar on Rwanda's Approach to MEPS and Energy Labelling for Cooling Products*. YouTube. https://www.youtube.com/watch?v=RDfppljUYDg

United4Efficiency. (2021, January). *Rwanda Cooling Initiative (R-COOL)*. United for Efficiency. https://united4efficiency.org/wp-content/uploads/2021/03/R-COOL-Flyer-20210309.pdf

U.S. Department of Energy. (2026a, April 17). *Central air conditioning*. Energy.Gov. https://www.energy.gov/energysaver/central-air-conditioning

U.S. Department of Energy. (2026b, April 17). *Room air conditioners*. Energy.Gov. https://www.energy.gov/energysaver/room-air-conditioners

Yang, G., Shipworth, M., & Lotti, L. (2025). From AC to me: Harnessing social norms to encourage personal cooling in Chinese offices. *Behavioural Public Policy*, 1–27. Cambridge Core. https://doi.org/10.1017/bpp.2025.3

Yi, J. (2022, June 22). *Chilling Prospects 2022: China's progress towards sustainable cooling* Sustainable Energy for All. https://www.seforall.org/data-stories/chinas-progress-towards-sustainable-cooling

Zeng, L. (2023). *Revolutionizing Cooling and Climate: China's Pioneering AC Efficiency Standards*. CLASP. https://www.clasp.ngo/report/net-zero-heroes/case-studies/revolutionizing-cooling-and-climate-chinas-pioneering-ac-efficiency-standards/

26 Degrees in Air-conditioned Rooms. (2007, June 4). http://www.china.org.cn/english/government/212801.htm

Annex 1: Challenges, scope, and methodology

1.1 Wet-Bulb Globe Temperature

The Wet-Bulb Globe Temperature, which measures a combination of temperature, humidity, wind, and radiative forcing heat transfer, is a measure of heat stress threatening human health, which is projected to rise disproportionately in northern India, China, northern Australia, Africa, Central America and Southeast Asia[108]. Air conditioners' effects of cooling and dehumidifying at the same time are likely to become even more in demand as both temperatures and humidity rise in the future, adding to the urgency to identify and implement energy-efficient solutions for cooling.

1.2 Energy Efficiency Cooling Policy Database

The methodology of this policy brief involved creating a database with standardised categories of information on a selection of policies regarding energy efficiency for cooling.

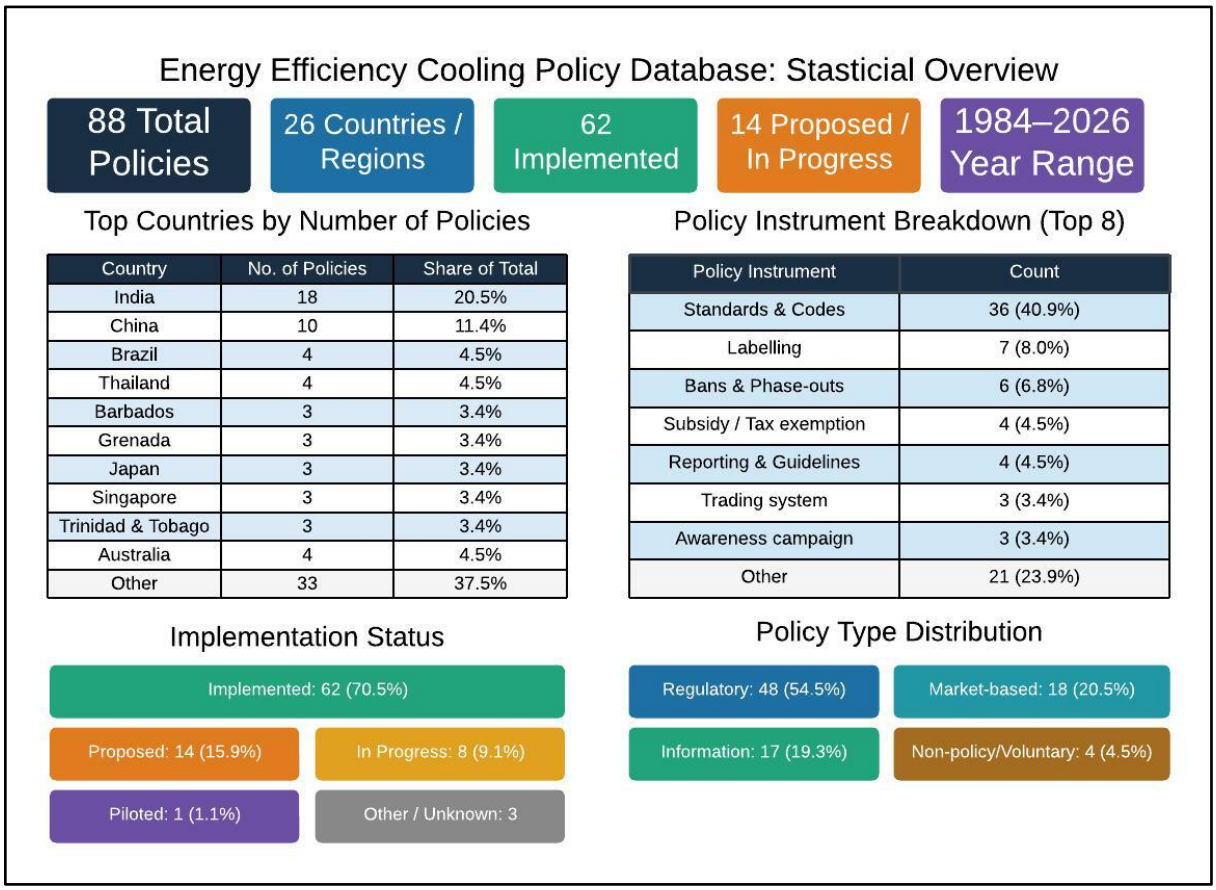


Figure 1.1 *Energy efficiency cooling policies: Categories.*

[108] Newth and Gunasekera, 2018

A statistical overview of the database reveals key findings from our methodological approach, including a breakdown of countries most surveyed, most commonly found policy tools, the overall breakdown of implementation status, and the types of policy reviewed.

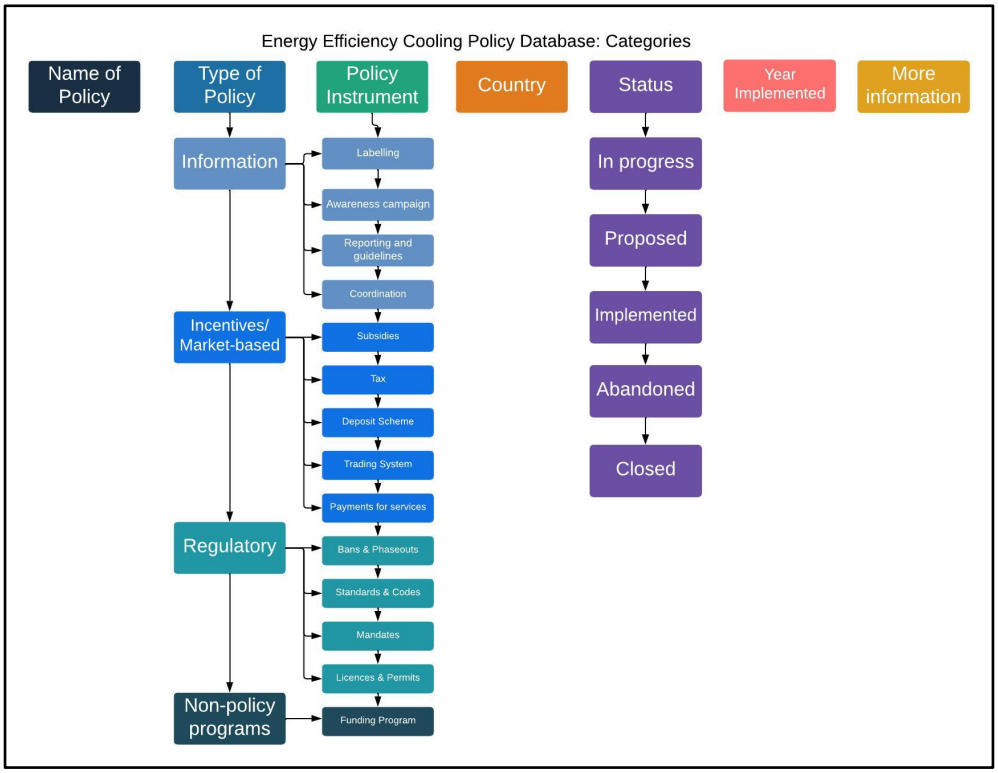


Figure 1.2 *Energy Efficiency Cooling Policy Database: Statistical Overview.*

The flowchart above shows the categories and subcategories in the policy database. Each policy entered was categorised appropriately along this framework.

1.3 Expert Consultations

Through our outreach efforts to consult with expert sources, we held interviews with experts from the following organisations:

1. Daikin - 1 expert
2. UNIDO - 1 expert
3. Energy Efficiency for Sustainable Livelihoods in Africa - 2 experts
4. Natural Resources Defence Council India - 1 expert

Annex 2: Cool Biz

Annex 2.1. The Cool Biz approach hinged on twelve behavioural mechanisms[109]:

1. Maintain a pre-determined office temperature
2. Turn off computer when not in use
3. Only use air conditioner when needed
4. Introduce eco-lighting and heat-isolators
5. Dress in lighter clothing
6. Use sunshade
7. Working earlier in the morning
8. Use handheld fans
9. No business suits or neckties
10. Adjust food intake to maintain a cooler body temperature
11. Using electric standing fans
12. Use alternative cooling equipment

2.2 The Cool Biz Economy

Cool Biz had a series of knock-on economic effects too, contributing 100 billion yen to Japan's GDP in 2005 by opening a market for clothing and personal cooling devices worth 190.1 billion yen by 2007.[110]

2.3 Applicability in culturally similar societies: South Korea

Recent workplace initiatives in South Korea illustrate the growing use of behavioural interventions to reduce cooling demand while reshaping organisational norms, just like Japan.

First, in 2012, the Seoul Metropolitan Government officially formalised seasonal "Cool Biz" and "Super Cool Biz" periods in 2012. Then, Seoul's Gangdong District Office relaxed its dress code for non-public-facing through September, seeking to balance employee health and well-being with energy efficiency[111][112]. In 2025, the Incheon International Airport introduced their campaign, allowing less formal clothing starting mid-July through late August. They incentivised this campaign with free drinks and rewards for those who wore shorts to work. The Korea Electrical Safety Corporation also launched

[109] Aliagha and Ng Yin Cin, 2013
[110] Aliagha and Cin, 2013
[111] *The Korea Herald*, 2012
[112] Seoul Metropolitan Government, 2012

a campaign that ran through September and was open to all employees and outlined some guidelines to ensure a minimum of formality in the office. In the private sector, jeans and t-shirts have become normalised, with "most outfits" allowed at POSCO. For companies embracing the change, it was a joint effort to "soften hierarchical boundaries, foster intergenerational dialogue and promote a more open and inclusive corporate culture."[113]

Overall, such initiatives demonstrate how behavioural and organisational changes can complement energy efficiency goals, while also highlighting the need to balance flexibility, cultural expectations, and institutional constraints in their implementation.

2.4 Applicability in culturally heterogeneous societies: Malaysia

In Malaysia, office buildings consume far more energy than residential, leading to high energy consumption and making the commercial sector the second largest energy consumer in Malaysia (32% of all energy consumption).[114] Similarly to Japan, formal dress codes including suits and ties, as well as religious views on modest dressing create demand for temperature around 20°C, embedding social expectations into real use. A study surveying Malaysian office works found that behaviour can be influenced by climate awareness, altruism, social expectations and office culture, and corporate responsibility. The survey found that the Cool Biz concept would be broadly accepted among Malaysia office workers if temperatures are set around 24°C, along with adopting personal cooling devices, turning off lights and equipment not in-use. In general, younger workers (18 to 25 years old) were more receptive to the change, indicating room for the younger generation to reset social norms for future generations[115]. In the Malaysian context, adoption would entail wearing short sleeves, opting for no tie and incorporating batik clothing – a traditional Malaysian patterned cotton or linen fabric. However, there were significant differences between how different ethnic groups (Malay, Chinese, Indian) responded, implying that demographic factors play a crucial role in the campaign dynamics and hinting at possible limitations.

[113] *The Korea Times*, 2025
[114] Aliagha and Cin, 2013
[115] Aliagha and Cin, 2013

Annex 3: Policy overview

Case	Stage	Replicability	Key features	Comprehensiveness	Challenges
GCAP (China)	Implemented	High	Strong stakeholder engagement, policy package	Policy package including MEPS, labelling, subsidies, education campaigns, R&D funding, AC retrofits	Policy replicability, may need strong state capacity
Coolease & R-COOL-GO (Rwanda)	In progress	High - upon adaptation to demographic and fiscal context	Low interest loans (salaried persons) or asset backed lending (SMEs), positive list of eligible products, maintenance integrated in lending contract	Medium: financing instrument with positive product list, maintenance provisions, well-targeted to efficient AC adoption but lacks demand side measures	MRV data unavailability, structural exclusion of 62% population in R-COOL GO, low public engagement
Cool Biz (Japan)	Implemented	Moderate-high	Behavioural change through norm-shifting (dress codes), higher AC set-points (28°C), leadership signalling, and public campaigns	Medium: strong on acceptability and behaviour, but limited without complementary technical and infrastructural measures	Some reported thermal discomfort, contingency on organisational support

Regional initiative I: ASEAN SHINE	Implemented	High	Regional MEPS harmonization, common test methods, public-private framework	Medium: mainly regulatory, limited enforcement tools	High retooling costs for producers, uneven market readiness, phased implementation needed
Regional initiative II: SADC MEPS harmonization	Implemented (Phase 1: 2024-2027)	High	Regional MEPS harmonization, two-phased, broad product scope	Medium-high: regulatory, but with focus on stakeholder coordination and information sharing	Low compliance, weak monitoring capacity, resource constraints, lack of reliable data