



# GOVERNMENT ACTION



## ON EFFICIENT, CLIMATE-FRIENDLY COOLING

*This guide outlines the opportunity for governments to advance efficient, climate-friendly cooling.*





# 1. INTRODUCTION

Cooling is central to health, prosperity, and the environment. It can be provided actively (e.g. via air conditioning) or passively (e.g. through cool building design). Applications range from space cooling for buildings and vehicles and cooling of industrial processes to cold chains for food and medicines. Efficient, climate-friendly cooling for all underpins many Sustainable Development Goals and represents an opportunity to avoid substantial greenhouse gas (GHG) emissions.

However, most cooling is currently highly polluting due to the use of high global warming potential (GWP) refrigerants and the indirect emissions from the electricity used to run appliances such as air conditioners and refrigerators. Existing pollution needs to be cut urgently and booming demand for cooling met sustainably, complementing the Kigali Amendment that phases-down HFCs. The Cool Coalition has come together to accelerate efficient, climate-friendly cooling through a unified effort of governments, businesses and civil society. It takes a cross-sectoral approach to cooling, including building design, energy efficiency, renewables, and energy storage.

Ensuring cooling needs are met affordably, efficiently, cleanly and innovatively, including for the 1.1 billion people who lack access to basic energy services, is a big opportunity for governments to cut GHG emissions while strengthening resilience to a warming world. It also serves other strategic policy priorities, including better health, higher productivity, trade and innovation advantage, cleaner air and enhanced food and energy security.

This guide is one in a series that is also being disseminated to businesses, investors and civil society to elevate cooling as an inclusive, impactful and urgent opportunity. It:

- Sets out the case for government action
- Introduces a framework for government action
- Outlines the types of actions that can be taken
- Highlights case studies of cooling action
- Recommends next steps, resources, and contacts

# 2. THE CASE FOR GOVERNMENT ACTION



## Cooling growth challenges the energy system

There are 1.6 billion residential air conditioners in use today. Most households in hot countries have not yet purchased their first air conditioner (AC), and ownership could rise to 5.6 billion by 2050. Without accelerated action on efficient, climate-friendly cooling, energy demand for space cooling – the fastest-growing source of energy demand in buildings – could triple by mid-century and require USD3.2 trillion of power generation investment to be met.

Ensuring, for example through raising national minimum standards, that the energy performance of the most efficient AC products available today becomes the norm could: halve the energy demand forecast for 2050, to 6,300 TWh; enhance energy security by curbing space cooling's growing contribution to peak power demand and avoiding the need for USD1.2 trillion of generation investment<sup>1</sup>; and secure significant energy cost savings for households and businesses. But standards are only one part of the solution.

Today's unmet cooling needs extend well beyond conventional space cooling for buildings into cold chains, mobility and industry. Genuine cooling for all – that protects vulnerable people from the effects of heat extremes and broken cold chains – could mean energy demand as high as 15,500 TWh in 2050, even if aggressive energy efficiency and demand-response standards for cooling equipment are pursued<sup>2</sup>.

Therefore, to ensure that pressure on the energy system from cooling demand is kept to a minimum, it will be essential for governments to carefully assess cooling needs and rethink how cooling can be provided, with policy, business models and finance to match. It will require reduced reliance on conventional cooling technology and will, for example, require a shift from active to passive cooling, smarter building codes and 'cooler' urban planning; as well as shifting the modality of cooling to district energy systems in cities and off-grid systems in remote areas.



## The GHG reduction potential is large

Current, conventional cooling technologies, such as air-conditioning and refrigeration, rely on human-made refrigerants – fluorinated (F) gases – that can be 10,000 times more potent than carbon dioxide in causing global warming. Left unchecked, F-gases could account for nearly 20 percent of climate pollution by 2050<sup>iii</sup>, which is why the HFC phase down of the historic Kigali Amendment to the Montreal Protocol – and its ratification by national governments – is critically important.

Cooling's large and growing demand for electricity, often from fossil fuels, means that it poses a serious challenge to reducing emissions: in 2017 the amount of residential AC load connected to the world's power grids (estimated at 100GW) exceeded the record amount of solar generation added that year (94GW)<sup>iv</sup>. Action on energy efficiency, managing energy demand for cooling and promoting alternative cooling solutions – to accompany and accelerate the F-gas phase down – is therefore critical and could amount to more than doubling the climate benefits from phasing out high global warming potential refrigerants.

## Supporting Sustainable Development Goals

Access to efficient, climate-friendly cooling underpins the ability of hundreds of millions of people to realize the Sustainable Development Goals. In a warming world, access to cooling is not a luxury – vulnerable populations are depending on it for nutritious food, safe medicines, productivity and protection from extreme heat.

470 million people in poor rural communities in hot climates lack access to electricity and therefore to conventional space cooling and refrigeration technologies – including intact cold chains for food, agricultural produce and medicines. This can limit good health outcomes, agricultural productivity and opportunities for economic self-sufficiency.

630 million people on the lowest incomes in the hottest cities, often in poor quality housing, may only have intermittent access to cooling services or struggle to afford them. This can compromise food safety and exacerbate vulnerability to heat stress from increasingly frequent and intense heatwaves brought about by human-induced climate change<sup>v</sup>.

By integrating efficiency into the implementation of the Kigali Amendment, governments have an opportunity to deliver the Sustainable Development Goals. This requires an assessment of populations at risk, and solutions – through finance, technology, and holistic thinking – that meet cooling needs.

# 3. THE CASE FOR GOVERNMENT ACTION

The Cool Coalition takes an inclusive view of government action to promote efficient, climate-friendly cooling for all. To help elevate cooling as an inclusive, impactful and urgent opportunity, the Coalition particularly welcomes ambitious action on cooling that:

- Is transformational on mitigation or adaptation, in terms of novelty or scale;
- Brings sustainable development co-benefits;
- Is replicable and can be scaled up;
- Is measurable, especially in terms of GHG reduction, and deliverable in the next 3 to 5 years;
- Is innovative, in terms of technology or approach, and visibly inspiring for others looking to take action.

Our framework for government action on cooling focuses on three, sometimes overlapping, realms of activity:

- **Domestic:** actions at the national and sub-national level to promote, and enhance access to efficient, climate-friendly cooling solutions;
- **Regional:** collective government action where there are common interests, motivations and pooled resources to promote efficient, climate-friendly cooling;
- **International:** action by governments to assist others – technically, financially – in supporting access to and innovation in, efficient, climate-friendly cooling for all, whilst also boosting trade.





# 4. EXAMPLE OF ACTIONS

We encourage governments to commit to ambitious action on efficient, climate-friendly cooling and to raise awareness of the need for action by others, including other governments, businesses, investors and civil society – not only domestically but also in collaboration with regional and international partners.

The five examples set out below illustrate some of the inclusive and impactful actions that governments can take. Other actions may be appropriate and better suited to country needs and/or contexts. Where additional solutions that meet the scale of the challenge are identified, we encourage governments and other actors to advocate them, and to contact the Cool Coalition for partnership opportunities.

Impactful actions on efficient, clean cooling should be integrated into 2020 Nationally Determined Contribution (NDC) enhancements.

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TYPE OF ACTION	REALM OF ACTION		
	DOMESTIC	REGIONAL	INTERNATIONAL
<b>Develop and implement a National Cooling Action Plan (NCAP), feed in to NDC and elevate cooling for all as a strategic development, infrastructure and security priority</b>	Develop broad NCAP or relevant national strategy that integrates Montreal Protocol-mandated F-gas transition plans and commits to improved cooling efficiency and access to cooling for vulnerable populations with measurable energy, GHG and access milestones and targets – such as a quantified trajectory for tightening minimum energy performance standards (MEPS) over time and covering the other types of action below. Ensure actions relevant to GHG mitigation and climate adaptation are reflected in enhanced NDCs.	Make cooling part of regional economic and security cooperation discussions. Identify elements of prospective NCAPs that would be stronger if taken forward regionally (e.g. model MEPS and enforcement, shared public procurement standards, vaccine and food cold chains) and pursue these jointly.	Provide technical assistance and capacity building to support the development and implementation of comprehensive, cross-ministerial NCAPs that simultaneously address the Montreal Protocol, the Paris Agreement and SDGs. Mainstream efficient, climate-friendly cooling within overseas development assistance and national development bank priorities, and engage multilateral development banks to do the same.
<b>Introduce, raise, monitor and enforce standards (MEPS for appliances and codes for buildings), to help minimise cooling demand</b>	At the earliest opportunity, introduce or enhance MEPS with significant beyond BAU GHG reduction impact for different cooling end-users that can form the core of an effective national strategy on cooling efficiency. Ensure national building codes and planning rules are developed to prevent overheating and minimise the need for active space cooling in all buildings. Regularly update standards in sync with the 5 year NDC ratcheting cycle.	Adopt common, or 'model', MEPS and pool resources to monitor and enforce compliance of imported products to the region.	Provide technical assistance on establishing or enhancing nationally appropriate standards for appliances and buildings, and offer capacity building and finance for monitoring and enforcing compliance.
	Ban imports of second-hand equipment that does not meet efficiency and pollution standards.		Reciprocate domestic and regional action by limiting exports of second-hand equipment that fails standards.
<b>Drive demand by introducing fiscal incentives, financial mechanisms and consumer information programs to transform the market for efficient, climate-friendly cooling</b>	Introduce incentives, finance and information to increase the market share of efficient, climate-friendly cooling solutions, such as: labelling (equipment and systems, including buildings) and consumer advice, on-bill financing, rebates and fiscal incentives, scrappage schemes, demonstration programmes, bulk procurement initiatives, as well as legal frameworks for energy performance contracting and 'cooling as a service' models.	Adopt common equipment and systems labelling regimes for consumers in conjunction with 'model' MEPS. Establish regional knowledge sharing platforms to exchange experience of what works to transform the market.	Facilitate the introduction of market transformation programmes through capacity building for administering incentive schemes, finance for demonstration programmes and technical assistance for enabling the growth of innovative business models.
	Ensure the public sector leads by example, for example through procurement requirements for the most efficient, climate-friendly appliances and buildings. Adopt common approaches to public sector procurement standards, purchasing or leasing regionally where possible, and ensuring servicing happens regularly.		
<b>Stimulate supply through RD&amp;D in incremental and disruptive cooling innovation, based on cooling needs of all sectors</b>	Challenge and support industry and research institutions to help meet the needs identified in NCAPs through dedicated research, development and demonstration (RD&D) funding, tax incentives and awards for cooling innovation. Pool assessments and RD&D resources regionally where appropriate. Support technology or sector specific roadmaps that drill down into components of NCAPS.		Provide technical assistance, capacity building, knowledge transfer and finance – where appropriate through Mission Innovation – that support urban and rural infrastructure investment for advanced cooling solutions (e.g. cool roofs, off-grid systems, urban planning and greenery, district cooling).
<b>Ratify the Kigali Amendment to the Montreal Protocol and accelerate action beyond compliance</b>	Without delay, ratify the Kigali Amendment to the Montreal Protocol and aim to implement the F-gas transition faster than required in order to enhance emissions reductions. Identify opportunities to engage regionally for faster action, for example by sharing best practice, and facilitating trade in low or no GWP refrigerants. Integrate F-gas actions in NDC enhancements.		Continue to adequately recapitalise the Multilateral Fund (MLF) and provide additional technical assistance to developing countries willing to go faster than the Kigali Amendment, and for efforts to integrate efficiency into the F-gas transition.

# 5. CASE STUDIES OF COOLING ACTION



## Domestic

**India's Cooling Action Plan<sup>vi</sup>**, a world first, was the result of a multi-stakeholder process which included six government ministries, five government agencies and four NGOs. It spans buildings, cold-chain, transport, servicing, refrigerants and RD&D with a 20-year time horizon, with goals and accompanying near, mid and long-term action set out across these sectors. It designates cooling as integral to India's national science and technology program and, as well as targeting the reduction of refrigerant demand, it seeks to reduce cooling energy requirements by 25-40% by 2038. The Plan identifies thermal comfort for all, productivity gains, cost savings, a doubling of farmers' income, enhanced food security, better public transport, increased employment, a boost to domestic manufacturing and the development of an innovation ecosystem as major co-benefits.

In partnership with UN Environment's United for Efficiency (U4E) initiative, the **Rwandan Government's Cooling Initiative<sup>vii</sup>** undertook a cooling market assessment and developed a national cooling strategy that introduces MEPS and labelling, financial mechanisms to support investments in efficient, climate-friendly cooling, and market monitoring and enforcement. The performance requirements are drawn from U4E's forthcoming model regulations for refrigerators and air conditioners, which track with trends in major markets that are proactively transitioning to superior cooling solutions. Notably, this namesake of the Kigali Amendment to the Montreal Protocol is going beyond MEPS, and including robust refrigerant gas GWP limits as part of its regulations.

The **construction of passive housing in Mexico** is gaining support including through the EcoCasa programme, managed by the government's Sociedad Hipotecaria Federal that provides grants and low-interest finance to developers that incorporate energy efficiency and low energy design into new homes. So far, over 50,000 comfortable low energy dwellings, home to 220,000 Mexicans, have been built across Mexico with the programme's support. CO<sub>2</sub> emissions are 20-40% lower than for a standard new home<sup>viii</sup>. With Latin America Investment Facility support, EcoCasa is also looking to finance construction of up to 600 Passive Houses in Mexico that have 80% lower CO<sub>2</sub> emissions. Adapted to local conditions, a Passive House development in Morelia in Michoacán state focused on thermal envelopes and shading to reduce space cooling demand, saving households money on equipment and energy costs.

## Regional

The **European Union's Ecodesign and Energy Labelling** framework governs the improvement of the bloc's harmonized MEPS for a comprehensive range of products – including cooling equipment – maintains a harmonized consumer energy labelling regime, and the collaboration of a network of national market surveillance authorities to ensure compliance. In 2020 compared to business as usual, the framework will have saved 15% of the EU's primary energy demand, avoided 306MtCO<sub>2</sub>e of GHG emissions, saved consumers €63 billion and generated €66 billion extra revenue for industry, and supported an additional 930,000 jobs<sup>ix</sup>.

## International

**Efficiency for Access** supports access to cooling collaboratively. The UK, US and Swedish governments have joined forces with international development organisations and philanthropic foundations to support access to efficient, climate-friendly and affordable refrigeration, cold chain and space cooling solutions. The program aims to accelerate development of the market for efficient, climate-friendly off-grid cooling solutions, thereby reducing their cost and in this way widening access to cooling.

Earlier this year, China's National Development and Reform Commission, in partnership with UNIDO, UNESCAP and Energy Foundation China, launched the **BRI Green Cooling Initiative** at the Second Belt and Road Forum for International Cooperation in Beijing<sup>x</sup>. It will provide capacity building, knowledge sharing and cooperation on energy efficiency policies and standards, business model innovation and technology exchange in support of greener cooling in countries along the Belt and Road, bringing economic and trade benefits.

The Biarritz pledge for fast action on efficient cooling was presented at the occasion of the G7 Summit, held in August 2019 in France, during the session on climate, biodiversity and oceans.

This pledge, that was supported by several G7 countries and invited countries to the Summit, aims to promote parallel efforts to improve the energy efficiency and lifecycle management of the cooling sector while countries implement the phase-down of hydrofluorocarbon (HFC) refrigerants, in accordance with the Kigali Amendment to the Montreal Protocol.



# 6. NEXT STEPS



## 6.1 About the cool coalition

The Cool Coalition is a global multi-stakeholder network that connects a wide range of key actors from government, cities, international organizations, businesses, finance, academia, and civil society groups to facilitate knowledge exchange, advocacy and joint action towards a rapid global transition to efficient and climate-friendly cooling. The Cool Coalition promotes an 'avoid-shift-improve-protect' holistic and cross-sectoral approach to meet the cooling needs of both industrialized and developing countries through urban form, better building design, energy efficiency, renewables, and thermal storage as well as phasing down HFCs. Cool Coalition members are collaborating on science, policy, finance and technology to meet growing demands for cooling in a comprehensive manner, all aimed at raising climate ambition in the context of the Sustainable Development Goals while complementing the goals of the the Kigali Amendment to the Montreal Protocol and Paris Climate Agreement.

The overall approach is to:

- **REDUCE** where possible the need for mechanical cooling through better urban planning and building design, and the use of nature-based solutions such as green public spaces and green roofs and walls.
- **SHIFT** cooling to renewables, district cooling approaches, solar powered cold chains, etc.
- **IMPROVE** conventional cooling by increasing the efficiency of air conditioning and refrigeration equipment and demand response measures.
- **PROTECT** vulnerable people from the effects of extreme heat and consequences of unreliable medical and agricultural cold chains.
- **LEVERAGE** cooperation between different actors active in cooling to achieve a greater collective impact.

## 6.2 Get in touch

The Cool Coalition already has more than 80 leading organisations driving change in the cooling sector. Please reach out to [unep-coolcoalition@un.org](mailto:unep-coolcoalition@un.org) to find out more about how you can engage including on how to join, actions, and events.

For more information please contact:

Lily Riahi, Partnerships & Engagement, [Lily.Riahi@un.org](mailto:Lily.Riahi@un.org) and Sophie Loran, Communications & Outreach, [Sophie.loran@un.org](mailto:Sophie.loran@un.org)

## 6.3 Commit to cooling action

Governments are critical actors in addressing the cooling challenge. Adoption of the actions and case studies outlined above can catalyse much needed progress and position businesses as innovators and climate leaders.

An endorsement form to join or collaborate with the cool coalition and commit to action is enclosed at the end of the document. Please complete and send back to [unep-coolcoalition@un.org](mailto:unep-coolcoalition@un.org).

A range of additional resources are set out below to help governments to find out more about the importance of cooling and how to take action.

For more information, visit our website: [www.coolcoalition.org](http://www.coolcoalition.org)





## FURTHER RESOURCES

The following organizations provide information and or technical assistance for efficient, climate-friendly cooling:

- Green Cooling Initiative <https://www.green-cooling-initiative.org>
- Heriot Watt and Birmingham Universities' Clean Cooling Landscape Assessment is a comprehensive online resource of data and research on efficient, clean and affordable cooling from multiple perspectives
- IEA's report on the Future of Cooling provides a compelling assessment of the risk of a 'cold crunch' from growth in space cooling demand in the decades ahead, and how it can be avoided.
- Kigali Cooling Efficiency Program's Resources page
- Rocky Mountain Institute's report on Solving the Global Cooling Challenge focuses on room AC and the role of innovation
- SEforAll's report: Chilling Prospects: Providing sustainable cooling for all provides an overview of the development risks from a lack of access to cooling, and sets out pathways to providing sustainable solutions.
- United for Efficiency: <https://united4efficiency.org/resources>
- District Energy in Cities Initiative: <http://www.districtenergyinitiative.org>
- Climate Group EP100: <https://www.theclimategroup.org/project/ep100>
- Basel Agency for Sustainable Energy's Cooling as a Service initiative

## ENDNOTES

- i International Energy Agency (2018) The Future of Cooling: Opportunities for energy-efficient air conditioning
- ii Birmingham University (2018) A Cool World – Defining the Energy Conundrum of Cooling for All
- iii Kigali Cooling Efficiency Program (2018) Why Cooling
- iv Rocky Mountain Institute (2018) Solving the Global Cooling Challenge: How to Counter the Climate Threat from Room Air Conditioners
- v Sustainable Energy for All (2018) Chilling Prospects: Providing Sustainable Cooling for All
- vi Government of India (2019) India Cooling Action Plan
- vii UN Environment (2019) Rwanda's ambitious plan for clean and efficient cooling
- viii Sociedad Hipotecaria Federal (2018) EcoCasa
- ix European Commission (2019) Ecodesign Impact Accounting: Status Report 2018
- x Energy Foundation China (2019) Stakeholders Join Hands to Boost Cooling Efficiency in BRI Countries

# COMMON STATEMENT AND ENDORSEMENT FORM ON COOLING



We recognize that efficient and climate-friendly cooling can make a huge difference in the fight against climate change and pollution, sustainably provide essential cooling to hundreds of millions more people, and bring huge financial savings.

The Cool Coalition is a unified front to seize this opportunity, linking the Kigali Amendment to the Montreal Protocol, the Paris Agreement on Climate Change, and the Sustainable Development Goals. It is a coalition of proactive governments, businesses, and civil society organizations that aims to inspire ambition, identify solutions, and accelerate progress toward efficient and climate-friendly cooling.

The Cool Coalition takes a cross-sectoral and holistic approach to reducing emissions from the cooling sector by looking at a broad range of solutions, ranging from urban form, building design, district cooling to nature-based solutions to highly efficient and climate-friendly cooling technologies that use low- or zero GWP refrigerants.

We commit to act boldly to get the best cooling solutions adopted at scale and within a meaningful timeframe. To that end, we will:

- Advocate: Raise awareness on efficient and climate-friendly cooling
- Collaborate: Actively participate in a community that breaks down silos and promotes cross-cutting actions for efficient and climate-friendly cooling
- Act: Help secure and/or make commitments on efficient and climate-friendly cooling

**Name of entity:**

**The organization is a:**

Government

I [President/ Head of State/ Minister of/ Ministry Representative of \_\_\_\_\_]

**confirm our collaboration with the Cool Coalition and/or Collaborating Organizations/Institutions (please specify below) and endorse the above Common Statement on cooling and hereby agree to pursue the following action(s) to promote efficient, climate-friendly cooling: [Include here one or more actions that align with the aims of the Cool Coalition.]**

Last Name:

First name:

Website:

Email address:

Phone:

**Please briefly describe the nature of your contribution to efficient, climate-friendly cooling:**

Signature:

Date: