

# Cooling Emissions and Policy Synthesis Report:

Benefits of cooling efficiency and the Kigali Amendment



Workplace



Homes



Food



Medicine



Institutions



Transport



Data centers

# ACKNOWLEDGEMENTS

This report is a joint publication by the United Nations Environment Programme (UNEP) and the International Energy Agency (IEA). It is based on the UNEP and IEA assessment of development and climate benefits of efficient and climate friendly cooling and drawn from a longer analysis of the climate and development benefits of efficient and climate-friendly cooling available at [ccacoalition.org/cooling-policy](http://ccacoalition.org/cooling-policy). UNEP and the IEA would like to thank the Steering Committee for the guidance, K-CEP for providing support and all authors and reviewers for their contributions.

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Supported by:

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COOLING EFFICIENCY PROGRAM

## Suggested citation

United Nations Environment Programme and International Energy Agency (2020).

***Cooling Emissions and Policy Synthesis Report.***

UNEP, Nairobi and IEA, Paris.



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## FOREWORD

Efficient and climate friendly cooling is a crucial piece of the climate and sustainable development puzzle. We need cooling to protect vulnerable populations from heatwaves, keep vaccines viable and food fresh, and workforces productive. It is essential for equity and development, especially as climate change raises global temperatures. The global pandemic has emphasized just how important cooling is to society, with many stuck indoors in hot climates during lockdowns and global cooling infrastructure essential to storing and delivering an eventual vaccine. There is, however, a catch.

There are an estimated 3.6 billion cooling appliances in use globally today, and that number is growing by up to 10 devices every second. This growth is set to increase the sector's greenhouse gas emissions dramatically, further warming the planet. Air conditioners are a double burden. In most cases, they use hydrofluorocarbons (HFCs), extremely potent greenhouse gases, and require significant energy to run. Without policy intervention, direct and indirect emissions from air conditioning and refrigeration are projected to rise 90 per cent above 2017 levels by the year 2050.

This report lays out ways to resolve this dilemma by delivering efficient and climate friendly cooling for all – in particular by rapidly phasing down hydrofluorocarbons in the cooling sector and delivering cooling more efficiently through more efficient equipment and more efficient buildings.

This report tells us there are many actions we can take to get cooling right. The Montreal Protocol's Kigali Amendment to phase down HFC refrigerants. Proven policies such as minimum energy performance standards. National Cooling Action Plans. The integration of efficient cooling into enhanced Nationally Determined Contributions of the Paris Agreement. Transformative initiatives like the Cool Coalition. Moving on all of these offers us a chance to slow global warming, improve the lives of hundreds of millions of people, and realize huge financial savings. As nations invest in COVID-19 recovery, they need to ensure that they use their money wisely to reduce climate change, protect nature and reduce risks of further pandemics. Backing sustainable cooling can help to achieve all of these goals."

We hope this report will help to raise awareness about one of the most critical and often neglected climate and development issues of our time. For policy makers, industry leaders and the general public, we hope it serves as an important guide to the role cooling can play in delivering on our climate and sustainable development goals. We need to seize this three-in-one cooling opportunity. And we need to do it now.



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# PREFACE

As we face the growing climate emergency, where the world is starting to warm itself with self-reinforcing feedbacks, and tipping points are fast approaching, it is instructive to look to the Montreal Protocol on Substances that Deplete the Ozone Layer for guidance and inspiration.

The Montreal Protocol is widely acknowledged as the world's most successful environmental treaty. It solved the first great threat to the global atmosphere from chlorofluorocarbons and other fluorinated gases that were destroying the protective stratospheric ozone shield. At the same time, the Protocol has done more to reduce the climate threat than any other agreement. This is because fluorinated gases are powerful greenhouse gases, as well as ozone depleting substances. The Montreal Protocol and preceding efforts to eliminate CFCs have avoided an amount of warming that otherwise would have equaled the contribution from carbon dioxide (Velders et al. 2007).

It is astounding that a single treaty has done this double duty so brilliantly. There are many lessons to be learned, including that the Montreal Protocol has always been a "start and strengthen" treaty: it started with mandatory control measures to cut fluorinated gases on a precise schedule, learned on-the-job by striving to meet the controls, and gained confidence from its initial success to do still more for the environment.

The Montreal Protocol's latest control measure is the 2016 Kigali Amendment to phase down hydrofluorocarbons, or HFCs, primarily used as refrigerants. While HFCs do not affect the ozone layer, they are potent greenhouse gases and phasing them down has the potential to avoid up to 0.5°C of warming by the end of the century. The initial phasedown schedule of the Kigali Amendment ensures about 90% of this will be captured.

Just minutes after the Kigali Amendment was agreed, the Parties to the Montreal Protocol passed the first of a series of decisions to improve the energy efficiency of cooling equipment in parallel with the switch from HFCs to climate-friendly refrigerants. Improving the efficiency of cooling equipment has the potential to more than double the climate benefits of the Kigali Amendment, with the combined potential to avoid the equivalent of up to 260 billion tons of carbon dioxide by 2050. This will save nearly \$3 trillion dollars in energy generation and transmission costs, in addition to reducing consumers monthly electricity bills, while also protecting public health and agricultural productivity by reducing air pollution.

This synthesis report analyzes these and other benefits, and provides more detailed support in an accompanying assessment (Dreyfus et al. 2020).

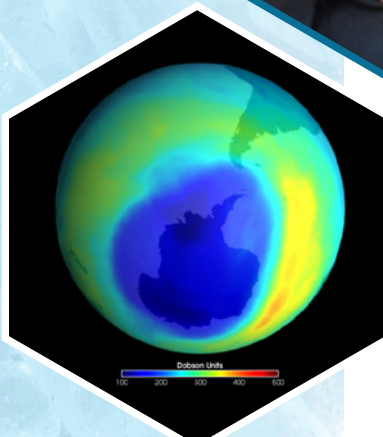
We should all draw courage from the success of the Montreal Protocol and the parallel efforts to improve energy efficiency of cooling equipment, which together represent one of the most significant climate change mitigation strategies available.

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Box A:

## **THE IMPACT OF COVID-19 ON COOLING, AND THE ROLE OF ECONOMIC RECOVERY PACKAGES**

The novel coronavirus (Covid-19) pandemic has created an extraordinary global health and economic crisis. Beyond the immediate impact on health, the current crisis has major implications for global economies, energy use and CO<sub>2</sub> emissions. The economy could decline by 6% in 2020, whilst energy demand which declined by 3.8% in the first quarter of 2020, could fall by 6% by the end of 2020 (IEA 2020a). Global energy-related CO<sub>2</sub> emissions could fall by 8% in 2020. This global economic downturn will also have an impact on investment in energy systems, including efficient climate-friendly cooling. For example, it is expected that investment in efficiency in buildings will fall by over 10% in 2020 (IEA, 2020b).

Unprecedented action and leadership from governments, companies and real-world decision makers will be required to put the world on an economic recovery path, to boost the economy to retain and create new jobs, whilst at the same time generating the conditions for achieving sustainable and affordable cooling. The use of sustainable economic recovery packages has been proposed by many countries including the European Commission, and many international organisations such as the International Monetary Fund and the World Bank (WB 2020, IMF 2020, IEA 2020c). The IEA's Sustainable Recovery plan suggests that an additional USD 1 trillion of spending over the next three years, could increase GDP by 3.5%, put global CO<sub>2</sub> emission on a declining path, and create several million jobs. Spending on improving the efficiency of buildings for example, could generate between 9 and 30 jobs per million USD invested, noticeably higher than the number of jobs generated from spending elsewhere in the energy sector (IEA 2020c).





More specifically for cooling, the K-CEP program has identified six high-impact opportunities where efficient, climate-friendly cooling could generate jobs, raise economic output and reduce emissions (E3G-K-CEP 2020). These are:

- 1.** Conditional bailouts for hard-hit sectors that support sustainable cooling. Funds to bail out hard-hit sectors should be tied to the adoption of climate-friendly cooling solutions.
- 2.** Rebates and incentives to promote cooling efficiency in the built environment, increasing demand for efficient appliances and climate-friendly cooling technologies will create jobs and also induce spending from lower energy bills.
- 3.** Policy design to address resilient and responsive cold chain logistics for healthcare and food security. A growth in cooling is needed for food and medical supplies, will improve health outcomes, reduce food and vaccine loss, and also build capacity to respond to future shocks.
- 4.** Supporting measures to encourage implementation of cooling retrofits and passive technologies. Retrofitting of buildings with better cooling features are low-capital investments which are labour intensive.
- 5.** Expanding financing models to meet cooling needs. Funding can be used to promote and also support initial capital investment now to realise future savings.
- 6.** Public and private financing investment in R&D for cooling. Grants and loans will sustain future innovation and deliver future improvements, offering innovators a competitive advantage.

The timing of impact of the different recovery measures will vary. For example, cooling system maintenance and painting roofs with reflective paint will increase employment in a relatively short period (in the order of months), whilst investing in more efficient equipment and buildings will take longer.



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Energy-Related Emissions from the Cooling Sector and Opportunities for Mitigation



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