

# OzoNews

A fortnightly electronic news update on ozone and climate protection and the implementation of the Montreal Protocol brought to you by OzonAction

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## GLOBAL

### 1. Kigali Amendment latest ratifications

Congratulations to the latest countries which have ratified the Kigali Amendment:

**Serbia, 8 October 2021**  
**India, 27 September 2021**  
**El Salvador, 13 September 2021**



At the Twenty-Eighth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, held in Kigali from 10 to 15 October 2016, the Parties adopted, in accordance with the procedure laid down in paragraph 4 of article 9 of the 1985 Vienna Convention for the Protection of

the Ozone Layer, a further amendment to the Montreal Protocol as set out in Annex I to the report of the Twenty-Eighth Meeting of the Parties (Decision XXVIII/1).

Kigali Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, Status of Ratification 15 October 2016 to [date](#).

## United Nations Treaty Collection

Image: UN Treaty Collection website

## 2. Summary of the Combined Twelfth Meeting of the Conference of the Parties to the Vienna Convention for the Protection of the Ozone Layer (part II) and the Thirty-Third Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer: 23-29 October 2021

“The effective implementation of the Montreal Protocol and the Kigali Amendment will go down in history as having put humanity back on track to a peaceful and sustainable future.” Those were the words of Inger Andersen, Executive Director of the United Nations Environment Programme (UNEP), at the close of the meeting, but which guided how delegates worked through a limited, but intense agenda.

Convening online to consider time-sensitive issues, the combined twelfth meeting of the Conference of the Parties to the Vienna Convention for the Protection of the Ozone Layer (part II) and the thirty-third Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer (COP 12(II)/MOP 33) took key decisions related to monitoring controlled substances and energy efficiency.

Due to the unexpected emissions of trichlorofluoromethane (CFC-11) in 2018, the issue of gaps in monitoring of substances controlled by the Protocol has been growing in the scientific community as well as among parties to the Protocol. Although additional monitoring responsibilities may be seen as burdensome, developing countries have long been calling for the requisite capacity and infrastructure to effectively implement the Protocol. At this meeting, delegates took the first step, requesting the assessment panels to work out what would be needed to increase the monitoring capacities in regions where capacity is limited or altogether absent.

Delegates also continued work on what is becoming an increasing focus of the Montreal Protocol: low global-warming-potential (GWP) and energy efficient technologies. Five years after the adoption of the Kigali Amendment to the Protocol, the need for more sectors to adopt energy efficient technologies is an increasing concern and desire among all parties. The meeting considered two draft decisions, which took different approaches to address this issue. One, which was forwarded to the next in-person meeting of the MOP, addressed trade in soon-to-be obsolete technologies, which could be a threat to the future implementation of the Kigali



Amendment. The other sought to broaden the list of sectors required to implement more energy-efficient technology. Both drafts gave parties much food for thought throughout the seven-day meeting. Over 300 delegates attended this meeting, and worked collaboratively to overcome the challenges of the online setting, adopting 18 decisions on administrative and technical matters on, among others:

- the replenishment of the Multilateral Fund;
- financial reports and budgets of the trust funds for the Vienna Convention and the Montreal Protocol;
- compliance and reporting;
- membership of Montreal Protocol bodies; and
- recommendations of the Ozone Research Managers of the Vienna Convention.

Due to the COVID-19 pandemic, COP 12(II)/MOP 33 was held virtually from 23-29 October 2021, with the preparatory segment convening from 23-28 October, and the high-level segment convening on 29 October 2021.

[The Earth Negotiations Bulletin, 1 November 2021, Vol. 19 No. 157](#)

Image: IISD website

See also >>> [IISD Daily coverage and photos](#)

### 3. Vienna Convention, Montreal Protocol Offer Lessons for Climate Agreements

The latest 'Still Only One Earth' policy brief from IISD looks back at when "the world was struck with fear" in 1985 after scientists discovered a massive hole in the ozone that forms a protective layer over the Earth. The brief reviews the steps taken to heal the ozone layer through two intergovernmental agreements – the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer – and what else must be done. It also highlights lessons for addressing climate change.

Author Kate Helfenstein reports that the adoption of the Convention and Protocol helped to avoid two million cases of skin cancer per year and delayed the increase in climate forcing—the change in globally averaged temperature changes due to natural or human-induced activities—by 7-12 years.

The brief explains that the Montreal Protocol shows what is possible when science, diplomacy, and business cooperate to implement international environmental agreements. It makes the story of the ozone layer "one of multilateralism's great successes." The Montreal Protocol is crafted so that as scientific evidence shows a need for further action, adjustments and amendments can be made. The most recent of these science-based updates is the Kigali Amendment, which addresses hydrofluorocarbons (HFCs). As a result of this Amendment, the world can avoid 0.4°C of global warming by 2100.

The Protocol also established a Multilateral Fund to help provide financial resources ensuring that all countries are able to comply with their obligations to protect the ozone



layer. Parties also set differentiated phase-out and phase-down schedules. With these two features the Protocol addresses the differentiated circumstances of all Parties.

The private sector has also been key to ensuring success, particularly the early commitment of DuPont, the leading CFC manufacturer at the time, to completely phase-out of CFCs. More recently, in the run-up to the adoption of the Kigali Amendment, Coca-Cola announced its goal to ensure new coolers and vending machines would be HFC-free by 2015.

Helfenstein writes that the Montreal Protocol provides the hope that other urgent environmental issues can be resolved swiftly and amicably, particularly if all stakeholders work together. In the words of David Doniger, Natural Resources Defense Council, “We saved the ozone layer. We can save the climate.”

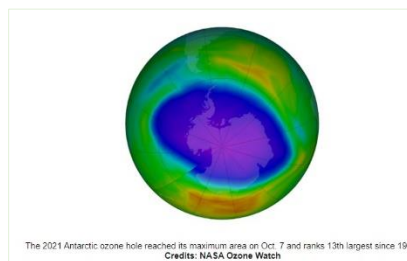
The [‘Still Only One Earth policy brief series’](#) is being published by IISD in the lead-up to the 50<sup>th</sup> anniversary of the Stockholm Conference on the Human Environment (Stockholm+50). The briefs assess successes and shortcomings of five decades of global environmental policy.

#### [IISD, 29 September 2021](#)

Image: UN Photo/Mark Garten

#### **4. 2021 Antarctic Ozone Hole 13<sup>th</sup> Largest Since 1979**

There has been much speculation around the 2021 Antarctic ozone hole and whether this year would result in a record-breaking large hole. On 27 October, NASA and NOAA confirmed the 2021 ozone hole reached its maximum area on October 7, peaking at 9.6 million square miles (24.8 million square kilometers) – roughly the size of North America – ranking it the 13th largest since 1979. The hole will likely persist into November, even early December.



“This is a large ozone hole because of the colder than average 2021 stratospheric conditions, and without a Montreal Protocol, it would have been much larger,” said Paul Newman, chief scientist for Earth Sciences at NASA’s Goddard Space Flight Center in Greenbelt, Maryland.

The Montreal Protocol was set up in 1987 to protect human health and the environment from the adverse effects of ozone layer depletion caused by several man-made substances such as chlorofluorocarbons (CFCs). With the universal support of 198 nations, the Montreal Protocol led to the phase-out of almost 99 per cent of ozone-depleting substances.

While initial measurements in September caused concern, the overall trend is towards the ozone hole slowly closing. Estimates predict that it will return to pre-1980 levels by the 2060s.

Very low winter temperatures in the Antarctic stratosphere during August to October lead to the formation of polar stratospheric clouds. Special reactions that occur in these clouds lead to the formation of reactive forms of chlorine and bromine, derived from man-made ozone-depleting substances, which then initiate ozone-destroying reactions with the help of sunlight in the Antarctic at the end of winter. The size of the 2021 ozone hole, therefore, is more a reflection of the colder than average temperatures and strong winds circling the Antarctic from August up until now.





strengthening the skills and the business and financing models that underpin the investment in cooling equipment.

### [Cool Coalition Secretariat, September 2021](#)

Image: Cool Coalition

## **6. OzonAction and IIR Shine the Spotlight on Vaccine Cold Chain Technology**

Since the start of the COVID-19 vaccination campaigns at the end of 2020, the world has become aware of the importance of refrigeration and, in particular, of the cold chain, which is essential for the organisation of a global vaccination campaign against the SARS-COV-II virus. The use of very low storage temperatures for the first vaccines has raised the public's awareness about the importance of the cold chain for vaccine preservation and mobilised all those involved in temperature-controlled logistics. Vaccines, which appeared more than two centuries ago in the United Kingdom have been stored under controlled temperatures for a very long time. In 1920, Professor d'Arsonval proposed using vacuum freeze-drying at  $-80^{\circ}\text{C}$  to replace the iceboxes and antiseptics commonly used for transporting and preserving vaccine pulps.



A vaccine cold chain has been developed for many years, particularly under the aegis of the World Health Organization (WHO). Prior to COVID-19, more than 4.7 billion doses of vaccine were injected worldwide each year, representing a market of more than US\$40 billion (2019), which is expected to reach US\$80 billion by 2025. The COVID-19 vaccination campaign has revolutionised the vaccine cold chain, with volumes almost twice as high as usual, but also because of the new storage and transport temperature ranges that require new equipment, new solutions and new organisations. To date, more than 7 billion COVID-19 vaccines have already been preordered worldwide, with storage temperatures ranging from  $-90^{\circ}\text{C}$  to  $+8^{\circ}\text{C}$ .

This note provides an overview of the vaccine cold chain in general and COVID-19 in particular, its requirements and challenges. First, the effects of temperature on these vaccines, old and new, and their storage and transport requirements should be known. Second, the temperature-controlled logistics of vaccines in general and COVID-19 vaccines in particular, and the equipment and solutions used for their cold chain, must be analysed.

Finally, if refrigeration is essential for our health as well as for our food, it must be sustainable, and it is therefore necessary to analyse the challenges to be met so that the cold chain for vaccines disrupted by COVID-19, is sustainable in the short, medium, and long term. [...]

The vaccine cold chain is more critical than ever to the success and performance of vaccination campaigns around the world. The COVID-19 pandemic has highlighted the

major role of the cold chain and more than doubled the needed capacity by adding new temperature ranges.

Refrigeration and health professionals must work together to meet this unprecedented challenge of primary importance to humanity: controlling and curbing the first major global pandemic in human history. This will of course require technical solutions, but above all it will require the men and women in the refrigeration and health sectors to implement new solutions on a daily basis and to continue this effort for many years to come!

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As part of IIR and UNEP OzonAction's partnership, a set of Cold Chain Technology Briefs was released over the past few years, which includes in-depth summaries about the cold chain in different key sectors. They include descriptions of technology, refrigerant options and trends and conclude with prospects and challenges. They cover the main cold chain sub-sectors, i.e., [Production & Processing](#), [Cold Storage](#), [Transport Refrigeration](#), [Commercial & Domestic](#), and [Fishing Vessels](#).

**Download the Cold Chain Technology brief in [English](#) | [French](#) | [Russian](#) | [Spanish](#)**

**[The United Nations Environment Programme \(UNEP\), OzonAction, 8 September 2021](#)**

*Image: OzonAction*

## **7. World Bank Mobilizes USD\$157 million for Clean Cooling from Green Climate Fund**



The Cooling Facility, one of the world's first initiatives to focus on cooling, will help countries develop low-carbon and inclusive cooling solutions.

Greater and rapid access to cooling has become a development necessity. At 1.5°C of warming, experts warn that 2.3 billion people could be both exposed and vulnerable to heatwave events – a threshold that could be reached as early as 2030. At the same time, as demand for cooling rises, so do greenhouse gas (GHG) emissions from cooling systems. To promote low-carbon and inclusive cooling solutions, the World Bank mobilized USD\$157 million from the Green Climate Fund (GCF). The funding will go to nine countries for investments in climate-friendly cooling technologies, and the strengthening of enabling environments for clean cooling-related solutions.

The World Bank's Cooling Facility, through which GCF funds will be channeled, is one of the world's first multi-country financing initiatives to focus on cooling. It will seek to help countries develop the necessary market infrastructure, financing mechanisms, and policies

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and regulations to deploy clean cooling at scale. It will focus on space cooling (i.e., energy efficient buildings and appliances), as well as refrigeration and cold chains.

The Facility will help address barriers that have so far limited the deployment of clean cooling technologies. It will work with nine countries across different sectors, looking at different cooling solutions:

- In El Salvador, Sao Tome and Principe and Somalia, the facility will support reliable and climate friendly vaccine cold chains as well as clean cooling in health facilities. Through these three interventions, the Cooling Facility will contribute to the Bank's operational response to COVID-19 and the strengthening of these countries' health systems.
- In Kenya and Malawi, the Cooling Facility will support clean and affordable cooling in rural communities and agricultural sectors.
- In North Macedonia, Panama, Bangladesh and Sri Lanka, the facility will support energy efficient buildings, providing thermal comfort with both passive measures and low carbon cooling solutions.

Financing mobilized for the facility from the GCF is expected to leverage an additional USD\$722.8 million in World Bank co-financing. Over the next ten years, the Cooling Facility aims to reduce or avoid an estimated 9.13 million tons of CO<sub>2</sub> emissions, in addition to supporting countries' climate adaptation efforts.

The Cooling Facility is also supportive of the goals and requirements of the Kigali Amendment to the Montreal Protocol, under which HFCs – powerful greenhouse gases often used as refrigerants - are being phased down.

The scale of the cooling challenge is unprecedented and has only been exacerbated by the COVID-19 pandemic, which has exposed important cooling gaps.

Globally, there are already more than 1.1 billion people lacking proper access to cooling – from cold chains and refrigeration to ensure the safety of foods, medicine, and vaccines, to space cooling to ensure comfortable, healthy, and productive homes, institutions, and workplaces.

At the same time, the global cooling equipment stock, amounting to about 3.6 billion cooling appliances, is already consuming about 17% of the world's demand for electricity, and projected to grow exponentially in the coming decades, especially in developing countries.

[Energy Sector Management Assistance Program \(ESMAP\), 7 October 2021](#)

*Image: ESMAP website*

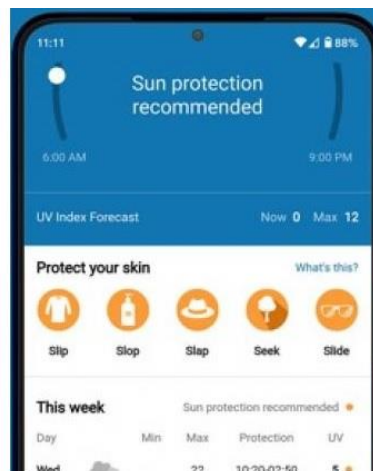
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## 8. WMO supports new Sun-Smart UV App

A new SunSmart Global Ultraviolet Radiation App for mobile phones has been developed by leading health, radiation, and weather organizations, with the support of WMO. It provides geo-located 5-day UV and weather forecasts and sun protection times along with tailored notifications. The sun's UV rays can impact vitamin D production, cause DNA damage, skin cancers and certain eye diseases, such as cataracts.

The App has been launched ahead of the southern hemisphere summer and on the eve of a meeting of parties to the Vienna Convention and Montreal Protocol on Substances which Deplete the Ozone Layer.



The ozone layer is on track to recovery, but the current levels of ozone depleting substances in the atmosphere still meant that the ozone hole will continue to reappear annually over the Antarctic and also the Arctic. If ozone-depleted air is transported to the middle latitudes, populated regions are exposed to increased level of harmful UV solar radiation.

WMO monitors the state of the ozone layer through its Global Atmosphere Watch programme. And it is committed to advancing integrated health services as part of its work with the World Health Organization to translate science into services for society.

As part of the implementation of this integrated health services plan, WMO has supported the "SunSmart Global UV" App, which was developed by world leading health, radiation and weather organizations and is now available globally in Google and Apple App stores.

« What makes this App unique is that it provides behavioral prompts to reduce the risks associated with UV exposure based on current UV levels in any location,» says WMO Secretary-General Prof. Petteri Taalas.

"It can also be adapted with the support of country-level weather bureaus to accept data from local UV measuring stations according to the current user location resulting in more accurate current UV Index readings. In an easy-to-understand language it provides clear guidance as to when sun protection is required and when it is not and how to protect yourself, » he said.

« We encourage the users in your country to utilize the application to ensure better health protection,» said Prof. Taalas in a circular letter to WMO Members.

The application allows inclusion of the national and local data streams in it and adaptation to other languages. It is available in the WMO's official languages.



## UV Index

The App is based on the UV Index (UVI), which describes the level of solar UV radiation at the Earth's surface.

The UV Index was developed jointly by the Global Atmosphere Watch Programme (GAW) of WMO, the World Health Organization (WHO), United Nations Environment Programme (UNEP), the International Commission on Non-Ionizing Radiation Protection (ICNIRP) and the German Federal Office for Radiation Protection (Bundesamt für Strahlenschutz, BfS) to inform and alert the general public of the potential health risk associated with high UV solar radiation levels.

It seeks to bring worldwide consistency to UV reporting and public health messaging. The UV Index is reported on a scale of 1 (or "Low") to 11 and higher (or "Extreme") and the higher the index value is, the greater is the potential for damage to the skin and eye, and the less time it takes for harm to occur. The Maximum UV Index is at the solar noon when the sun is highest in the sky. Adapting outdoor activities and using sun protection are recommended starting at UV Index 3. UV damage is accumulative and even at low levels UV can be harmful when exposed for long periods.

The success of the UV index depends on how well such information is communicated to the public. The SunSmart Global UV App will therefore be an invaluable public health tool. It was developed in Australia where a similar App demonstrated improved UV protection public awareness.

The SunSmart Global UV (SSGUV) App has been developed by Cancer Council Victoria (CCV) in Australia in conjunction with project partners, Deakin University, the Australian Radiation and Nuclear Safety Agency (ARPANSA), the Bureau of Meteorology (BOM), European Centre for Medium-Range Weather Forecasts (ECMWF), ARC Research Hub for Digital Enhanced Living and the World Meteorological Organization (WMO).

The UV Index forecast is produced by the European Commission Copernicus Atmosphere Monitoring Service (CAMS) which is managed by the European Centre for Medium Range Weather Forecasts (ECMWF) and the weather forecast is provided by the Hong Kong Observatory, a WMO accredited centennial observing station.

[World Meteorological Organization \(WMO\), 22 October 2021](#)

*Image: WMO website*

## AFRICA

### 9. Rwanda Environment Management Authority (REMA) urges switch to climate-friendly fridges

The number of refrigerators used in Rwanda has been rising steadily, raising risks to the environment, according to the latest study dubbed Domestic Refrigerating Appliance and Room Air Conditioner Market Study.



Driven by a steady rise in economic growth, and a significant expansion of electrification, more Rwandans are now using refrigerators.

According to the study, Kigali leads with 30,155 refrigerator owners, followed by the Southern Province with 23,389, Western Province 17,341, Eastern Province 16,052 and the Northern Province with 10,575 refrigerators.

It was conducted by Rwanda Environment Management Authority (REMA), which revealed that a total of 97,512 refrigerators in Rwanda were in circulation in 2020.

However, even as 58.6 per cent of the fridges in households are new meaning, they were bought less than three years ago, the study shows that there is a large number, 36 per cent, which is approximately 35,104 households who purchased their refrigerating appliances more than four years ago and may still use potent gas that deplete ozone layer.

The findings indicate that medium-income households, high-income households, micro-entrepreneurs in urban areas control the big market.

The study underpins the development of a financial mechanism that aims to accelerate the switch to more energy-efficient and climate-friendly cooling solutions.

As the number of household refrigerators, air conditioners are expected to increase substantially in the next 15 years, environmentalists say countries have to ratify and implement Kigali Amendment to the Montreal Protocol.

The Kigali Amendment aims to reduce the production and consumption of gases used in cooling equipment by more than 80 per cent over the next 30 years.

With the potential to avoid up to 0.4 degrees Celsius of warming by the end of the century, the amendment is an important tool to achieve the goals of the Paris Agreement and avoid catastrophic climate change.

“Let us be inspired by the Kigali Amendment and the Montreal Protocol and seize the opportunity in Glasgow by delivering on the promise of the Paris Agreement,” Jeanne d’Arc Mujawamariya, the Minister for Environment in Rwanda.

In the lead up to the COP26 UN Climate Summit in November this year in Glasgow, Scotland, more than ever, the world needs to demonstrate emission reductions and build resilience to the impacts of climate change.

She made the call while Celebrating Five Years of the Kigali Amendment at the Kigali Convention Centre where the Kigali Amendment was signed in 2016. [...]

Rwanda ratified it in 2017 after one year it was adopted.

“Rwanda stands ready to do our part. We are committed to achieving our short-term climate action plan and our long-term vision to be carbon neutral by 2050,” she said.

Juliet Kabera, Director General, Rwanda Environment Management Authority, said that Rwanda has so far reduced Ozone-depleting gases by 54 per cent.

She said that there are different financing mechanisms including grants to help shift to environmental friendly appliances and gases.

“The country has also adopted a National Cooling Strategy that promotes energy-efficient appliances that comply with minimum energy performance standards. Rwanda is also committed to catalysing cold chain solutions that are more efficient, climate-friendly, and cheaper to buy and operate,” she said.

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Rwanda also hosts the Africa Centre of Excellence for Sustainable Cooling and Cold Chain – a permanent centre established in partnership with the United Kingdom, the UN Environment Programme, the Centre for Sustainable Cooling, and leading academics.

The centre will foster collaboration on research and development, capacity building, awareness raising, technology deployment, and investment in market-appropriate solutions.

REMA has also launched a facilitation to offer on-bill financing to make energy-efficient and climate-friendly refrigerators and ACs more affordable.

The scheme is under Rwanda Cooling Finance Initiative (R-COOL FI) implemented by REMA and supported by United Nations Environment Programme's United for Efficiency initiative.

It aims to promote energy-efficient and climate-friendly cooling and recycling of existing inefficient systems.

The project aims to unlock \$4 million in financing to support the purchase of 12,500 energy-efficient and climate-friendly cooling products in Rwanda by 2024.

[The New Times Rwanda, 19 October 2021, By Michel Nkurunziza](#)

*Image: New Times Rwanda website*

## ASIA AND THE PACIFIC

### 10. Asia-Pacific launch a year-long Ozone2Climate Art Contest



“How can our daily life contribute to the ozone layer protection?” Mr. Siwakorn Maneethein, a third-year student of Geological Sciences at the Faculty of Science, Chiang Mai University, Thailand, enthusiastic about sustainable natural resources and environmental preservation shared his understanding of this significant question at a press conference of the launch of the [Asia Pacific](#)

[Ozone2Climate Art Contest](#) on World Ozone Day, 16 September 2021.

In 2015, Maneethein, then a junior high school student aged 14, won the national contest essay on the topic ‘How does our daily life protect the ozone layer?’ organized by the National Ozone Unit of Thailand. Beforehand, Maneethein and two fellow students had thoroughly researched ozone layer protection and consulted with teachers on the subject. Maneethein then presented his views and saw the value of everyone in participating towards reducing the destruction of the ozone layer and global warming. He particularly appealed to his generation to contribute by choosing products not containing ozone depleting substances (ODS) but environmentally friendly ones. Satisfied that Thailand had successfully phased out CFCs in 2010 and switched to less damaging substances, Maneethein emphasized that the ozone layer and climate protection cannot be achieved

individually, but requires cooperation among all, especially youth like himself who are the future generation.

Due to restrictions caused by the ongoing COVID-19 pandemic, the public awareness raising Ozone2Climate Art Contest was launched online by United Nations Environment Programme (UNEP) OzonAction, the United Nations Educational, Scientific and Cultural Organization (UNESCO), and more than 30 countries in the Asia Pacific region. A key factor of the Art Contest is to engage the general public especially the youth like Mr. Siwakorn Maneethin to link daily life activities and choices with the common environmental challenges faced globally, and consider how to be engaged to identify solutions, and most importantly, how everyone can contribute to addressing the challenges.

Officially opened on World Ozone Day, 16 September 2021, **the Art Contest will run its course and close on 31 March 2022**, followed by the regional contest of nominated winners. The final winners in the three categories of artworks - photography, drawing, and graphic design, will be evaluated and announced on World Ozone Day in 2022.



As highlighted by Mr. James S. Curlin, Head of UNEP OzonAction, the role of industry and the public in the promotion of Ozone2Climate safe alternative technologies to replace ODS and high-global warming potential refrigerants is critical for the success of achieving ozone layer protection and climate-friendly targets. He further called on “everybody in the Asia-Pacific region and world at large to take action and play their role” noting especially that “the procurement power of the public will guide the market to favour Ozone2Climate products.”

Mr. Alex Rendell, UNEP’s National Goodwill Ambassador for Thailand, whose video message was pre-recorded, invited everyone to join this art contest to learn more about the issue that is critical to our lives and our well-being by sharing their ideas through the contest to show how ozone layer depletion and climate change can be solved. He further shared his idea on how everyone can contribute to protecting the ozone layer and climate by making conscientious and more environmentally friendly choices such as buying refrigerators and air-conditioners that are energy efficient and use climate-friendly refrigerants and maintaining that equipment in good condition to minimize refrigerant leakage and enhance energy performance.

Other high-level participants who addressed the press and public, and responded to questions were, Ms. Megumi Seki, Executive Secretary of UNEP’s Ozone Secretariat, Ms. Isabelle Louis, Deputy Regional Director at UNEP’s Asia Pacific Office, Ms. Rika Yorozu, Head, Executive Office and Regional Programme Coordinator for UNESCO Bangkok, and Mr. Jackrit Suthakorn, Dean of the Faculty of Engineering, Mahidol University, a supporting partner of the regional contest.

As of today, 33 developing countries in the region – Bangladesh, Bhutan, Cambodia, China, Cook Islands, Fiji, India, Indonesia, Iran, Kiribati, Republic of Korea, Lao PDR, Malaysia, Maldives, Marshall Islands, Micronesia, Mongolia, Myanmar, Nauru, Niue, Palau, Pakistan, Papua New Guinea, Philippines, Samoa, Solomon Islands, Sri Lanka, Thailand, Timor-Leste, Tonga, Tuvalu, Vanuatu, and Viet Nam, have joined the regional initiative.

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The art contest was organized as part of the Asia-Pacific Regional Networks of Ozone Officers, as part of UNEP's workplan under the Montreal Protocol's Multilateral Fund.

For more information about the contest, please visit: [www.ozone2climate.org](http://www.ozone2climate.org)

**Contact:** [Shaofeng Hu](#), Senior Montreal Protocol Regional Coordinator, UNEP, [OzonAction](#) Compliance Assistance Programme (CAP) Asia-Pacific.

*Images: OzonAction*

### **11. HFC phase-down: India can solve its cooling problem through collaborative research, development and deployment**



India recently ratified the Kigali Amendment to the Montreal Protocol for the phase-down of hydrofluorocarbons (HFCs). HFCs have high global warming potential (GWP) and are primarily used as refrigerants in cooling applications. India's decision could prevent emissions of about 105 million tonnes of CO<sub>2</sub> equivalent (mtCO<sub>2</sub>eq) and shave as much as 0.5°C off the rise in global average surface temperatures. Also, a transition away from HFCs is expected to offer opportunities for domestic innovation, production and manufacturing of alternative chemicals and technologies. What does all this mean for cooling and thermal comfort in India?

Access to cooling in India continues to be abysmally low. The India Cooling Action Plan (ICAP) estimates that only 8 per cent of Indian households have air conditioning. We also have one of the world's lowest energy consumption levels for space cooling: just 69 kWh per capita. Further, the infrastructure gap in key components of India's cold chain (such as pack-houses, reefer transport and cold chambers) is as high as 90 percent, according to the National Centre for Cold chain Development (NCCD). This causes 16 percent of India's fruits and vegetables to go to waste each year, causing significant losses to producers—not to mention a multiplier effect in the form of wasted critical inputs like water and fertilisers. Be it global warming mitigation, protection from extreme heat events, or economic efficiency, every metric points to India's need to enhance cooling and thermal comfort.

By deciding to phase down HFCs, we have given ourselves a chance to obliterate the climate impact of current and future cooling applications. To make the most of India's massive cooling opportunity, we must invest in large-scale collaborative research, development and deployment (RD&D) of next-generation technologies.

Doing so is essential for India to develop a multi-pronged strategy to meet its Kigali objectives and further decrease its energy and climate footprint. But how do we foster an atmosphere of innovation for driving advances in sustainable cooling?

First, scale up bilateral and multilateral technology cooperation to facilitate accessibility and capacity building in low-access and resource-poor regions. This will steer the focus to applied R&D: adapting technologies for specific purposes rather than developing them from scratch.

Second, make changes in the institutional framework for R&D in India to improve industry participation in public research programmes. It is important to incentivise both university

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researchers and their industry counterparts for effective collaboration. One way to do this on the academic front is by structuring incentives into tenures and appraisals for research professors.

Third, linking technological developments with disruptive business models could attract climate financiers and venture capital, fuelling further innovation. Hence, it is crucial to promote emerging business models such as Cooling as a Service (CAAS) and technologies like District Cooling, which create efficiency of use and lower barriers to access. We should begin by commissioning pilot projects to gauge their viability in different sectors.

Fourth, focus on developing and deploying low-cost technological solutions for communities facing extreme heat such as cool roofs and cooling hubs. In this regard, the role of end-consumers themselves is important for the successful adoption of cooling technologies. This calls for building trust and confidence between private players, government agencies, university researchers, and civil society organisations (CSOs), and ensuring that they work in concert with each other.

Fifth, provide R&D support to small and medium enterprises to enable their participation in local as well as international value chains. A Production-Linked Incentive (PLI) scheme approved in April 2021 seeks to address the issue of value chain localisation by supporting component manufacturing in the white goods sector (LEDs/consumer electronics like ACs and refrigerators). By combining manufacturing incentives and technology diffusion in the local value chains, the equipment manufacturers can achieve operational and technical flexibility and make it easier for Indian firms to further absorb new technologies.

Cooling holds transformative potential for India. It offers us an opportunity to make our labour more productive and our farm supply chains more efficient. It will also help us create jobs and growth through manufacturing. Our chance to act is now.

[CNBCTV18, 1 October 2021](#)

*Images: CNBCTV18 website*

## WEST ASIA

### 12. 4 innovative technologies that can replace ACs and refrigeration

Buildings account for 38% of the world's greenhouse gas emissions. Among the factors is wasteful energy use tied to heating and cooling. Scientists are working on innovative solutions to combat this issue.



Traditional air conditioners also spew millions of tons of CO<sub>2</sub> worldwide daily. A new, lower-energy alternative to air conditioning works by sucking the body heat out of nearby people. This paint is so white that coating a building with it could reduce or even eliminate the need for air conditioning.

As incomes in developing countries continue to rise, demand for air conditioners is expected to triple by 2050. Air conditioning is currently responsible for almost 20% of electricity use in buildings around the world.

A United Nations report published late last year found that buildings account for 38% of the world's greenhouse gas emissions, a percentage that's rising. Among the factors for the uptick is wasteful energy use tied to heating and cooling.

Most air conditioners use refrigerant gases called hydrofluorocarbons (hfc's). Though these do not deplete Earth's ozone layer in the way the chlorofluorocarbons they replaced back in the mid-1990s did, but they have up to 11,700 times the warming potential of carbon dioxide, and the United Nations has warned that not addressing HFC use could mean "we essentially cook ourselves."

Still, according to the IEA, traditional air conditioners also spew millions of tons of CO<sub>2</sub> worldwide daily. The global commercial refrigeration equipment market is forecast to reach \$53.23 billion by 2026, according to a new report by Reports and Data. Here we look at global solutions to solve cooling-related environmental problems, starting from Saudi.

### **Salt crystals**

A new experimental electricity-free cooling system is under development at Saudi Arabia's King Abdullah University of Science and Technology (KAUST), [a press statement](#) revealed. All the system requires is salt and sunlight to cool a space or refrigerate food at temperatures of 3.6°C.

The KAUST electricity-free cooling system is detailed in a paper in the journal [Energy and Environmental Science](#).

The machine takes advantage of a natural "phase-change" phenomenon that sees energy absorbed when salt crystals dissolve in warm water which rapidly cools as the salt dissolves.

photo

Ammonium nitrate crystals have high water solubility and cooling power, are cheap, and are already widely used in fertilizers, meaning they are commercially viable.

Scientists found that ammonium nitrate could be used to cool the space surrounding an ammonium nitrate-filled metal cup from room temperature at 25° C to 3.6° C in about 20 minutes. The temperature then remained 15° C for more than 15 hours.

The KAUST team believes their system can be used for cooling rooms as well as for food refrigeration. The salt can be crystallized and reused once again after it is dissolved by evaporating the water via solar heat. The water can also be reused via a solar still.

### **Emissions free heat pump**

Exergyn, a clean-tech specialist, has attracted global attention by developing and patenting an emissions-free heat pump that contains no refrigerant gases, one of the main causes of global warming.

Technologies such as Exergyn's are seen as key to decarbonizing the sector, which is estimated to be worth \$1 trillion.

The company has teamed up with Carrier in an attempt to bring the technology to market. It is also understood to be in talks with the US company about a possible buyout.

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In a recent memo to the board, clean-tech expert Chas Anders Hall, who sits on Exergyn's advisory council, said the company's technology could be worth in excess of \$500 million.

Geothermal heat pumps are a poorly named appliance because they heat and cool buildings. They also don't require fossil fuels like propane, oil, gas, or coal, all fuels used to heat buildings today.

They run solely on electricity, so there is still that element of a power grid that is still powered by coal and natural gas, but by itself, it's not a major pollutant.

A heat pump can be cost-prohibitive and run anywhere from \$6,500 to \$13,000.

### **Radiant cooling**

A new, lower-energy alternative to air conditioning works by sucking the body heat out of nearby people using membrane-assisted radiant cooling.

Researchers tested a "cool tube" pedestrian pavilion in tropical Singapore and found 79% reported feeling comfortably cooled by the pavilion despite air temperatures of 85 to 87 degrees Celsius.

Radiant cooling is maybe best known today as a part of smart home engineering: panels in the floor or ceiling, filled with circulating cool water, that absorb ambient heat and create a cool effect.

The cooling effect of the "cool tube" worked even at a high relative humidity in the tropical climate.

### **"Very" white paint**

Researchers from Purdue University developed a paint so white that coating a building with it could reduce or even eliminate the need for air conditioning in a building, a press statement revealed.

It's so white, in fact, that it has been awarded a Guinness World Record title for the world's whitest paint.

Purdue team's latest white paint formula reflects up to 98% of light. It uses a chemical compound called barium sulfate, which is typically used to make photo paper and white cosmetics.

The team also used a wide range of different barium sulfate particle sizes in their paint, allowing it to scatter a higher range of light spectrum from the Sun as different sizes scatter different sunlight wavelengths.

The team developed their paint so as to reflect sunlight away from buildings. Because the paint they developed absorbs less heat from the Sun than it emits, it can even cool the surface on which it is coated, reducing the need for air conditioning.

The Purdue team claims that covering a roof area of approximately 92 square meters would allow the equivalent cooling power of 10 kilowatts.

[AME info, 23 October 2021, By Hadi Khatib](#)

*Image: AME info website*

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# NORTH AMERICA

## 13. Are you ready to take action on climate friendly refrigerants?

Download the [guide](#) to learn how to purchase the best products and avoid obsolete hydrofluorocarbon (HFC) refrigerants that are being phased down under the American Innovation & Manufacturing Act in the U.S. and the Kigali Amendment to the Montreal Protocol internationally.

Developed by the Sustainable Purchasing Leadership Council (SPLC), in partnership with IGSD, the Guide to [Climate Friendly Refrigerant Management and Procurement](#), 2021 edition, is a toolkit designed to help select affordable, energy-efficient refrigeration and cooling equipment that uses next-generation refrigerants that are more climate-friendly.

This document focuses primarily on space conditioning and refrigeration equipment where climate-friendly alternatives are readily available, cost-effective, and compliant with U.S. environmental and safety standards. While this toolkit focuses on procurement, it also covers the importance of refrigerant management and developing an organizational HFC policy to avoid negative climate change impacts of HFCs.

In its second version, this guide was developed by the SPLC Climate Friendly Refrigerant Action Team who is dedicated to investigating global regulatory and voluntary programs to avoid and/or reduce emissions from high global warming potential (GWP) HFCs. The second edition of the guide covers new developments that have occurred since the passage of the American Innovation & Manufacturing Act in 2020, which phases down the climate impact of production & consumption of HFCs in the USA by 85% by 2036.

Read/download the Guide to [Climate Friendly Refrigerant Management and Procurement](#).

For inquiries contact co-author [Kristin Taddonio](#).

[Institute for Governance & Sustainable Development \(IGSD\), 29 September 2021](#)



### RECOMMENDATIONS FOR CLIMATE FRIENDLY REFRIGERANT MANAGEMENT AND PROCUREMENT

Developed by the Sustainable Purchasing Leadership Council (SPLC) Action Team on Climate Friendly Refrigerants, in partnership with the Institute for Governance & Sustainable Development (IGSD).

This document is the updated edition of the Recommendations for Climate Friendly Refrigerant Management and Procurement authorized by the SPLC Climate Friendly Refrigerant Action Team. The Climate Friendly Refrigerant Action Team is dedicated to investigating global regulatory and voluntary programs to avoid and/or reduce emissions from high global warming potential (GWP) HFCs. This document identifies opportunities and specific procurement options 1) to avoid high GWP HFC refrigerants when purchasing new energy efficient refrigeration and air conditioning equipment, and 2) to reduce refrigerant leakage and service emissions. We invite you to read and put this work to use in your own procurement processes, and to offer additional insights and experiences to sharpen and improve the guidance over time.

Publication Date  
September 22, 2021

This document updates and replaces the original Procurement Recommendations for Climate Friendly Refrigerants version 1.0, published in September 2020.

## 14. US EPA considers R410A ban from 2025

Industry and environmental groups in the US are pushing for a ban on R410A in new domestic and commercial air conditioning equipment from January 1, 2025.

The proposals are contained in petitions before the United States Environmental Protection Agency (EPA) which have been submitted under the recently passed AIM Act to restrict the use of HFCs.





The EPA has granted, or partially granted, 11 petitions. Seven of these petitions relate specifically to the air conditioning and refrigeration industry.

Several of the petitions received and granted by the EPA contain overlapping requests to restrict HFCs in specific sectors. In many instances, the HFC restrictions, sectors covered, and transition timelines are identical.

In general, the petitions request a 150 GWP limit threshold for most refrigeration including supermarkets and ice rinks, and a 750 GWP limit for air conditioning.

The petitions largely support the SNAP Rules 20 and 21, which were originally proposed by the EPA in 2014 but overturned in the US Court of Appeals in 2017. These proposals, which sought to prohibit the use of certain higher GWP refrigerants in specific applications, were later adopted by California and a number of other US states.

Granted petitions include those representing manufacturers – the Air conditioning, Heating and Refrigeration Institute, and Association of Home Appliance Manufacturers – and the environmental groups – the Environmental Investigation Agency, Natural Resources Defense Council and the Institute for Governance & Sustainable Development.

In the air conditioning sector, this could see a ban on new equipment with a GWP of 750 or greater for all domestic and commercial units from 2025, with an extension for VRF to January 1, 2026. For air conditioning chillers, the petitioners call for the ban to become effective from January 1, 2024.

This proposal would effectively ban R410A, due to its GWP of 2,088, leaving the flammable A2L refrigerants R32, with its GWP of 677, and R454B (GWP R466) as the main currently available commercial options, with flammable A3 propane in smaller systems. It may be no coincidence that the 750 GWP maximum leaves the door open for Honeywell's non-flammable A1 refrigerant R466A, with its GWP of 733, if or when it becomes commercially available.

The possibility of a 750 GWP maximum is also being considered by the European Commission under the current revision of the European F-gas regulation.

On the refrigeration front, the petitions also propose bans on the use of refrigerants with a GWP of 150 or above in all new supermarket systems, cold storage warehouses, some industrial process refrigeration, and other stationary refrigeration equipment on January 1 2023.

### **Phase down**

The final HFC phase down rule under the AIM Act, signed last month, establishes a comprehensive programme to cap and phase down the production and consumption of HFCs in the US by 85% by 2036.

A key part of the AIM Act authorises the EPA to restrict the use of HFCs in sectors where they are used, either fully, partially, or on a graduated schedule.

The EPA will now have two years to consider these petitions and propose and finalise rule makings. Other petitions not yet granted are still being considered.

[CoolingPost, 10 October 2021](#)

*Image: CoolingPost website*

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## 15. Protecting the ozone layer could prevent cancer cases and other diseases in the U.S



Protecting the ozone layer could prevent cancer cases and other diseases in the U.S

[Download PDF Copy](#)

Reviewed by Emily Henderson, B.Sc.

Oct 7 2021

An international agreement to protect the ozone layer is expected to prevent 443 million cases of skin cancer and 63 million cataract cases for people born in the United States through the end of this century, according to new research.

The research team, by scientists at the National Center for Atmospheric Research (NCAR), ICF Consulting, and U.S. Environmental Protection Agency (EPA), focused on the far-reaching impacts of a landmark 1987 treaty known as the Montreal Protocol and later amendments that substantially strengthened it. The agreement phased out the use of chemicals such as chlorofluorocarbons (CFCs) that destroy ozone in the stratosphere.

Stratospheric ozone shields the planet from harmful levels of the Sun's ultraviolet (UV) radiation, protecting life on Earth.

To measure the long-term effects of the Montreal Protocol, the scientists developed a computer modeling approach that enabled them to look to both the past and the future by simulating the treaty's impact on Americans born between 1890 and 2100. The modeling revealed the treaty's effect on stratospheric ozone, the associated reductions in ultraviolet radiation, and the resulting health benefits.

In addition to the number of skin cancer and cataract cases that were avoided, the study also showed that the treaty, as most recently amended, will prevent approximately 2.3 million skin cancer deaths in the U.S.

### Mounting concerns over the ozone layer

Scientists in the 1970s began highlighting the threat to the ozone layer when they found that CFCs, used as refrigerants and in other applications, release chlorine atoms in the stratosphere that set off chemical reactions that destroy ozone. Concerns mounted the following decade with the discovery of an Antarctic ozone hole.

The loss of stratospheric ozone would be catastrophic, as high levels of UV radiation have been linked to certain types of skin cancer, cataracts, and immunological disorders. The ozone layer also protects terrestrial and aquatic ecosystems, as well as agriculture.

Policy makers responded to the threat with the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer, in which nations agreed to curtail the use of certain ozone-destroying substances. Subsequent amendments strengthened the treaty by expanding the list of ozone-destroying substances (such as halons and hydrochlorofluorocarbons, or HCFCs) and accelerating the timeline for phasing out their use. The amendments were based on input from the scientific community, including a number of NCAR scientists, that were summarized in quadrennial Ozone Assessment reports.

To quantify the impacts of the treaty, the research team built a model known as the Atmospheric and Health Effects Framework. This model, which draws on various data sources about ozone, public health, and population demographics, consists of five computational steps. These simulate past and future emissions of ozone-destroying substances, the impacts of those substances on stratospheric ozone, the resulting changes in ground-level UV radiation, the U.S. population's exposure to UV radiation, and the incidence and mortality of health effects resulting from the exposure.

The results showed UV radiation levels returning to 1980 levels by the mid-2040s under the amended treaty. In contrast, UV levels would have continued to increase throughout this

century if the treaty had not been amended, and they would have soared far higher without any treaty at all.

Even with the amendments, the simulations show excess cases of cataracts and various types of skin cancer beginning to occur with the onset of ozone depletion and peaking decades later as the population exposed to the highest UV levels ages. Those born between 1900 and 2040 experience heightened cases of skin cancer and cataracts, with the worst health outcomes affecting those born between about 1950 and 2000.

However, the health impacts would have been far more severe without the treaty, with cases of skin cancer and cataracts rising at an increasingly rapid rate through the century.

"We peeled away from disaster," Lee-Taylor said. "What is eye popping is what would have happened by the end of this century if not for the Montreal Protocol. By 2080, the amount of UV has tripled. After that, our calculations for the health impacts start to break down because we're getting so far into conditions that have never been seen before."

The research team also found that more than half the treaty's health benefits could be traced to the later amendments rather than the original 1987 Montreal Protocol. Overall, the treaty prevented more than 99% of potential health impacts that would have otherwise occurred from ozone destruction. This showed the importance of the treaty's flexibility in adjusting to evolving scientific knowledge, the authors said.

The researchers focused on the U.S. because of ready access to health data and population projections. Lee-Taylor said that the specific health outcomes in other countries may vary, but the overall trends would be similar.

"The treaty had broad global benefits," she said.

The [study](#), funded by the EPA, was published in *ACS Earth and Space Chemistry*. NCAR is sponsored by the National Science Foundation.

[News-Medical, 7 October 2021](#)

*Image: Medical news website*

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**EUROPE & CENTRAL ASIA**

## **16. New EU funded project began on October 1<sup>st</sup>, 2021: “SophiA - Sustainable off-grid solutions for pharmacies and hospitals in Africa”**

With a budget of 8 million euros over four years, SophiA will develop containerized solutions for hospitals using natural refrigerants, solar thermal and photovoltaics to enable more and more African people to access carbon-neutral energy for electricity, heating and cooling of medicine and health care units as well as safe and clean drinking water, increasing the quality of life in a sustainable way.

Funded by the European Union’s Horizon 2020 research and innovation programme and coordinated by Karlsruhe University of Applied Sciences (HKA), SophiA had its first consortium meeting on October 12-13, 2021. More than 50 participants representing the 13 project partners, as well as members of the Advisory Board and Friends of SophiA, attended the meeting organized as a hybrid event in Karlsruhe and online. At this official launch of the project, participants were welcomed by Dr. Med. Frank Mentrup, Lord Mayor of the City of Karlsruhe, Prof. Dr. Franz Quint, Prorector for Research, Cooperations and Quality Management at HKA, and representatives of the European Climate, Environment, and Infrastructure Executive Agency (CINEA).



### **SophiA in a nutshell**

SophiA aims to provide sustainable off-grid energy supplies and water free of bacteria and viruses for rural and remote health facilities in Africa, thereby accelerating the sustainable development, growth and economic transformation, and ensuring improved access to energy and health services for all.

Using various technologies, such as photovoltaics, solar thermal, electrical and thermal storage, sophisticated water treatment and natural refrigerants with low global warming potential, SophiA will develop and manufacture locally innovative, modular, affordable and efficient solar powered systems for providing:

- electricity supply for use during power grid failure;
- safe and clean drinking water, free of bacteria and viruses;
- hot water and when needed also steam;
- cooling of surgical or intensive care units;
- cooling of medicines at +5 °C; and food, when needed;
- low temperature storage of blood plasma at -30 °C;
- ultra-low temperature storage of sensitive medication (e.g., some Covid-19 or Ebola vaccines) at -70 °C.

In addition, PV MedPort, a simple and 100% solar powered solution will be developed and tested as a mobile health care station in small remote areas in 4 different geographical conditions in Africa.

SophiA systems will be manufactured in Africa and will provide for the first-time innovative solutions based on climate-friendly natural refrigerants to cover cooling demand for three

different temperature ranges (-70°C, -30°C and +5°C). The systems will be tested and demonstrated at four rural hospitals in remote regions throughout the African continent covering the major geographical regions and different climatic condition in Burkina Faso, Cameroon, Malawi and Uganda.

Joining forces for a clean energy transition, the multinational and multidisciplinary SophiA team will use a holistic approach for developing tailored solutions to provide green energy and clean water to hospitals in Africa, without the need to re-design the existing infrastructures.

### **SophiA consortium**

SophiA involves 13 partners from Europe (France, Germany, Switzerland) and Africa (Burkina Faso, Cameroon, Uganda and South Africa): Karlsruhe University of Applied Sciences (HKA - IKKU; coordinator); University of Applied Sciences of Eastern Switzerland (OST - SPF); Makerere University; Institut International d'Ingénierie de l'Eau et de l'Environnement; Steinbeis Europa Zentrum; Ministry of Public Health in Cameroon; International Institute of Refrigeration; Operieren in Afrika; Everflo; Kovco; Martin Systems GmbH; Simply Solar GbR; Raach Solar.

Read/download [French](#) language version.

[International Institute of Refrigeration \(IIR\), Press release 20 October 2021](#)

*Image: IIR website*

## **17. El papel de los refrigerantes naturales en la climatización y refrigeración**

Nos encontramos en un momento decisivo de lo que es una nueva era en el sector de la refrigeración. En esta nueva década de "lucha contra el cambio climático" se abandonarán definitivamente los refrigerantes fluorados de alto efecto invernadero en favor de refrigerantes y soluciones alternativas. Los refrigerantes naturales están llamados a ocupar un lugar privilegiado, con sus ventajas e inconvenientes. Contrarrestar estos inconvenientes son los retos tecnológicos a los que nos enfrentamos hoy en día.

Arrastramos medio siglo de oleadas de innovación en refrigerantes sintéticos, muy seguros y manejables, que han permitido todo el desarrollo del sector de la refrigeración comercial y el aire acondicionado, pero desgraciadamente a costa de perjuicios medioambientales inicialmente desconocidos.

Cada nuevo refrigerante sintético ha dado lugar a una nueva amenaza para el medio ambiente: los CFCs a la destrucción de la capa de ozono (ODP), los HFCs al calentamiento global (PCA) y para los HFOs la comunidad científica advierte ya de la potencial amenaza del ácido trifluoroacético (TFA). Y es que solo el retorno a refrigerantes naturales parece garantizar la sostenibilidad del planeta a largo plazo.

La denominación de 'refrigerante natural' es controvertida, pues a la postre todos los refrigerantes se producen o sintetizan en la industria. Pero a diferencia de los denominados 'refrigerantes sintéticos' los refrigerantes naturales son sustancias ya presentes en la naturaleza en grandes cantidades. Es por ello que su liberación a la atmósfera por la mano del hombre, ya sea deliberada o accidental, no altera el equilibrio medioambiental. Tal es el caso, por ejemplo, del amoníaco, que se origina en la descomposición de la materia orgánica, y forma parte del ciclo natural del nitrógeno.

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Son las políticas medioambientales, principalmente lideradas por la Unión Europea, las que han forzado la reducción del uso de gases fluorados e impulsado el desarrollo de los refrigerantes naturales; inicialmente en el sector de la refrigeración comercial, y seguidamente en el sector de la climatización. En efecto, en la última reunión de evaluación de la efectividad del reglamento F-gas, se puso de manifiesto una reducción del 37% en la comercialización de gases fluorados, o el equivalente del 47% en emisiones de CO<sub>2</sub>.

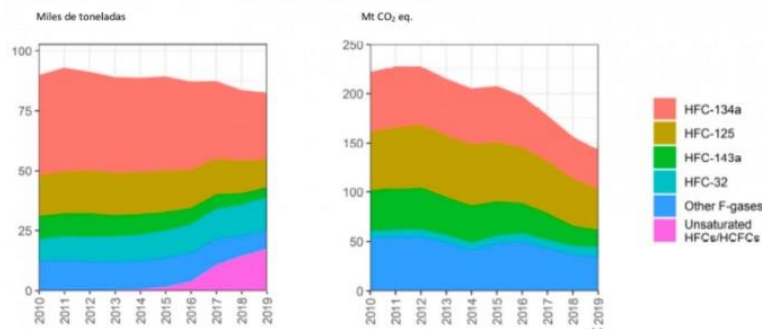


Figura 1.

Esta reducción de emisiones de 2014 a 2019, cifrada en 44 MtCO<sub>2</sub>eq, ha sido en su mayor parte debida a los avances en el sector de la refrigeración (62%), tanto por la introducción de los HFO como gracias a los refrigerantes naturales. Para los próximos años se esperan similares reducciones en el sector de la climatización, y la refrigeración móvil, donde la inminente revisión del reglamento FGas introducirá nuevas medidas.

Actualmente, los principales refrigerantes naturales utilizados en el sector son el amoníaco, el dióxido de carbono, y los hidrocarburos como el propano o el isobutano. Otros refrigerantes naturales como el propileno o el etano, tiene un uso más marginal. [...]

[Interempresas, 1 de noviembre 2021](#)

Image: Interempresas website

FEATURED

Overview for the meetings of the ozone treaties in 2022

[68<sup>th</sup> IMPCOM](#), Venue – to be determined, | 09 July 2022  
[44<sup>th</sup> OEWG](#), Venue – to be determined, | 11 - 15 July 2022  
[69<sup>th</sup> IMPCOM](#), Venue – to be determined, | 29 October 2022  
[33<sup>rd</sup> MOP Bureau](#), Venue – to be determined, | 30 October 2022  
[34<sup>th</sup> MOP](#), Venue – to be determined, | 31 October - 04 November 2022

Click [here](#) for past and upcoming Montreal Protocol Meetings Dates and Venue.

#### Upcoming meetings

2022

##### 68th IMPCOM

Venue – to be determined, | 09 Jul 2022

##### 44th OEWG

Venue – to be determined, | 11 - 15 Jul 2022

##### 69th IMPCOM

Venue – to be determined, | 29 Oct 2022

##### 33rd MOP Bureau

Venue – to be determined, | 30 Oct 2022

##### 34th MOP

Venue – to be determined, | 31 Oct - 04 Nov 2022

## The UN Environment Assessment Panels

The Assessment Panels have been vital components of ozone protection since the Montreal Protocol was first established. They support parties with scientific, technological and financial information in order to reach decisions about ozone layer protection and they play a critical role in ensuring the Protocol achieves its mandate. The Assessment Panels were first agreed in 1988 to assess various direct and indirect impacts on the ozone layer. The original three panels are:

- [The Technology and Economic Assessment Panel](#)
- [The Scientific Assessment Panel](#)
- [The Environmental Effects Assessment Panel](#)

In the past there were 4 main panels. The Panels for Technology and Economic Assessments were merged in 1990 into one Panel, now called the Technology and Economic Assessment Panel.

**Why are the three current panels important to ozone layer protection?** Each carries out assessment in its respective field. Every four years, the key findings of all panels are consolidated in a synthesis report. [Learn more >>>](#)



## [THE MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL](#)

- The Executive Committee Eighty-seventh Meeting, Montreal, 28 June-2 July 2021

## REPORT OF THE INTERSESSIONAL APPROVAL PROCESS AND ONLINE MEETINGS FOR THE 87<sup>TH</sup> MEETING

The present document consists of the following two parts:

I. Process for the 87<sup>th</sup> meeting, describing the agreed process followed by the Executive Committee for conducting the 87<sup>th</sup> meeting, which included consideration of several items of the agenda through an intersessional approval process (IAP) and several other items through online meetings.

II. Comments, discussions and decisions by the Executive Committee, containing a compilation of comments and discussions where applicable, and decisions on each of the documents considered during the 87<sup>th</sup> meeting, presented in the order of the agenda of the meeting.

- Click [here](#) for the Executive Committee upcoming and past Meetings and related documents..



## OzonAction

[OzonAction Compliance Assistance Programme](#) produces and outreaches a wide variety of information and capacity building materials and tools that support the implementation of the Montreal Protocol programs and assist Article-5 countries in meeting the compliance targets. These include publications, technology briefs and factsheets, mobile applications, videos, e-Learning, modelling and database programs and special educational or certification programs.

**The section below features several of our most recent products.**

Visit [OzonAction website](#) for more information, discover the entire range of products.

*Images in this section are by OzonAction*

**New OzonAction Knowledge Maps tool** - The UNEP OzonAction Knowledge Maps tool was developed to provide the National Ozone Units (NOUs) and different UNEP partners with a simple tool to help them access data and information about relevant stakeholders, who are

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mainly involved in the implementation of programmes and projects under the Montreal Protocol (MP) supported by Multilateral Fund (MLF).

Currently, the first two available knowledge maps are described below:

**Refrigeration, Air-Conditioning, and Heat Pumps (RACHP)**

**Associations & Organizations:** This Knowledge Map provides a global directory of RACHP associations, societies, and organisations around the world. These are key stakeholders for ensuring safe and efficient refrigerant transitions, for the training of technicians and supporting the national policies related to the Montreal Protocol.



**Local Technical & Vocational Education and Training (TVET):**

This Knowledge Map provides a global directory of TVET entities and centres around the world. These are the strategic partners for conducting and promoting training and certification programmes related to the refrigeration servicing sector.

To develop this tool, UNEP OzonAction collected and reviewed different datasets from multiple sources, and then presented the collected datasets into a common platform and format (mainly in the form of a global map so that data can be geographically displayed). Kindly note that the data and information provided will be updated regularly through the feedback that will be received from NOUs and partners to update and/or add new records. Other maps are currently under development which will include access to other key data and information of importance to the implementation of Montreal Protocol programmes.

Click [HERE](#) to access the OzonAction Knowledge Maps tool

Click [HERE](#) to download the OzonAction Knowledge Maps tool flyer

**Gas Card Tool: Web-based Visual Printable Cards of Refrigerant Gases**

developed by the UN Environment Programme (UNEP) OzonAction, to provide engineers, workers, and technicians with easily accessible information on substances/ gases that they are working with or handling in the workplace on visual printable cards.

**Content of Gas Cards** - Each Gas Card is printable (in PDF or image format) and includes the following information about each substance/gas: a) General Characteristics (Chemical name, formula and type, ASHRAE designation, Trade names, Harmonized System (HS) codes, Chemical Abstract Service (CAS), United Nations (UN) numbers, Blend/ mixture components, Montreal Protocol Annex and Control measures, main usage, etc.) b) Gas Performance—Radar Chart (in terms of: Ozone depleting potential-ODP, Global warming potential- GWP, Toxicity Class & Flammability Class) c) Environmental and Safety Impact, and Safety Impact (with visualization of Toxicity & Flammability Class, Hazardous Symbols).



b) Gas Performance—Radar Chart (in terms of: Ozone depleting potential-ODP, Global warming potential- GWP, Toxicity Class & Flammability Class) c) Environmental and Safety Impact, and Safety Impact (with visualization of Toxicity & Flammability Class, Hazardous Symbols).

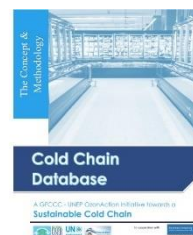
**More Information** - The Gas Card web based tool is part of UNEP OzonAction's portfolio of activities and tools to assist various stakeholders in developing countries, including customs officers and technicians, to achieve and maintain compliance with the Montreal Protocol on Substances that Deplete the Ozone Layer. In the left navigation bar of the Gas Card tool web page, you will find a list of commonly used HFCs and HFC Blends in different sectors.\*

## Using the Gas Gard web-based tool

- The Gas Gard tool is available online on the [OzonAction website](#)
- Read the full [2021 annual iPIC report](#)
- See the [flyer](#) introducing the new iPIC platform

*\* Based on the Overall Analysis of the Results of the Survey of ODS Alternatives Report (conducted in 119 countries from 2012 to 2015)*

**OzonAction and GFCCC launch the methodology questionnaires the Cold Chain Database Initiative** - The Global Food Cold Chain Council (GFCCC) and the United Nations Environment Programme (UNEP) OzonAction announced the launch of their Cold Chain Database and Modeling initiative. The initiative marks the first formal step to assist developing countries in identifying their cold chain baseline along with consumption of relevant HCFCs or HFCs or other refrigerants. The initiative was conceived in 2019 and kicked off during the 31<sup>st</sup> Meeting of Parties to the Montreal Protocol (Rome, Italy), which concluded with the Rome Declaration on “The Contribution of the Montreal Protocol to Food Loss Reduction through Sustainable Cold Chain Development”. The launch also comes in advance of the United Nations Food Systems Summit.



With the support provided by the Montreal Protocol’s Multilateral Fund, the Cold Chain Database initiative is currently being piloted in six countries – Bahrain, Bosnia and Herzegovina, Maldives, North Macedonia, Paraguay, and Senegal. From the pilot data gathering initiatives, a model is being developed that will allow the projection of benefits of cold chain expansion.

GFCCC is an independent not-for-profit industry organisation that seeks to simultaneously reduce food waste, and related greenhouse gas emissions in the processing, transportation, storage, and retail display of cold food by expanding and improving access to energy efficient low-global warming potential technology. The Cold Chain Database concept, methodology and data collection questionnaires are offered to interested countries and partners to help in assessing local cold chain capacities and designing respective action plans and policies.

> [GFCCC-UNEP OzonAction Cold Chain Modelling Press Release](#)

> [GFCCC-UNEP Cold Chain Database Methodology Final](#)

> For countries or partners interested to use the model data collection detailed questionnaires, please fill in the [Expression of Interest and NDA of Cold Chain Database](#) form and return to [Ayman Eltalouny](#)

**Contact:** [Ayman Eltalouny](#), Coordinator International Partnerships, UNEP, OzonAction

**United Nations Environment Programme (UNEP), OzonAction**

Image: OzonAction



Substances	Monthly ODP demand	Monthly licence demand	Country	Units	Date
...	...	...	...	...	...
...	...	...	...	...	...
...	...	...	...	...	...

**[HCFC Quota and Licence Tracker - UNEP OzonAction](#) launches a new desktop application to assist with HCFC licences and quotas - National Ozone Officers have the great responsibility of managing the allocation and monitoring of quotas for substances controlled under the Montreal**

Protocol. This process can be complex with many importers, especially if the country imports a range of different hydrochlorofluorocarbons (HCFCs) and mixtures containing HCFCs. To address this challenge, OzonAction developed a new desktop application that helps Ozone Officers with the tasks of planning, calculating, monitoring and managing consumption quotas and licences. It can be used on a daily basis to track and manage the current year's quota allocations for different importers, or for future planning by trying different scenarios that adjust the type of substances imported, their quantity, or the number of importers. The HCFC Quota and Licence Tracker allows Ozone Officers to see the effect of such scenarios on the national HCFC consumption and helps ensure that the quotas stay within agreed HCFC Phase-out Management Plan (HPMP) targets. For countries that have ratified the Kigali Amendment, in the future OzonAction will extend the tracker to include hydrofluorocarbons (HFCs) once countries begin designing their quota systems for those controlled substances.

**Access the:**

- [HCFC Quota tracker app](#)
- [Flyer for more information on the tracker](#)
- [Short video tutorial on the OzonAction YouTube Channel](#)

**[GWP-ODP Calculator Application](#) – Updated**

**“Quickly, efficiently and accurately convert between values in metric tonnes, ODP tonnes and CO<sub>2</sub>-equivalent tonnes”**



Data are extremely important for the Montreal Protocol community, and the data reporting formats for both A7 and CP have changed recently, to a large degree triggered by the Kigali Amendment. HFCs, blends, CO<sub>2</sub>-equivalent values, etc, now have to be addressed much more frequently by Ozone Officers during their daily work. Sometimes the terminology and values are complex and can be confusing, and it helps to have it all the official facts and figures in one place. Conversion formulas need to be applied to calculate CO<sub>2</sub>-eq values from both GWP and metric tonne values. This free app from OzonAction is a practical tool for Ozone Officers to help demystify some of this process and put frequently needed information at their fingertips.

**What's new in the app:**

- An updated more user-friendly interface
- Multilingual interface: English, French and Spanish
- A new **Kigali Amendment mode** - in this mode the GWP values used to calculate the refrigerant blends/mixtures only include GWP contributions from components that are controlled HFCs

- Latest updated ODP and GWP values from the recent reports from the Montreal Protocol technology and scientific expert panels as well as the Intergovernmental Panel on Climate Change (IPCC) reports
- References added for sources of all values
- New refrigerant mixtures (with ASHRAE -approved refrigerant designations)

The new and updated UNEP OzonAction ***GWP-ODP Calculator*** application will help you to convert between values in metric tonnes, ozone depleting potential (ODP) tonnes and CO<sub>2</sub>-equivalent tonnes of substances controlled by the Montreal Protocol and their alternatives.

This application, available at no cost, is particularly useful for National Ozone Officers to assist with understanding and calculating quantities of controlled substances, both pure substances and mixtures, for quota assignment, reporting requirements, etc. Other stakeholders interested in ODP and global warming potential (GWP) values of controlled substances and their alternatives will also find this tool useful.

Operation of the application is very simple – just select a substance from the dropdown list and enter the known value in the appropriate field; the calculator will automatically perform the conversion between metric tonnes, ODP tonnes and/or CO<sub>2</sub>-equivalent tonnes and display the corresponding converted values. The ODP, GWP and information about the substance is provided. For mixtures, the components of the mixture and their relative proportions (metric, ODP, CO<sub>2</sub>-equivalent tonnes) are also calculated.

The updated ***GWP-ODP Calculator*** application now includes a new Kigali Amendment mode. The app can now be used in two different modes: the regular "Actual Values" mode and the "Kigali Amendment" mode. In the Kigali Amendment mode, the GWP values provided are those specified in the Kigali Amendment to the Montreal Protocol, i.e., GWP values are only assigned to controlled HFCs. In this mode the GWP values used to calculate the refrigerant blends/mixtures only include GWP contributions from components that are controlled HFCs. The user can effortlessly switch between modes.

The OzonAction GWP-ODP Calculator uses standard ODP values and GWP values as specified in the text of the Montreal Protocol to make the conversions. Other ODP and GWP values from the recent reports of the Montreal Protocol Technology and Economic Assessment Panel and Scientific Assessment Panel as well as the Intergovernmental Panel on Climate Change (IPCC) are used when appropriate, with references to sources of all values used. The app includes new refrigerant mixtures (with ASHRAE- approved refrigerant designations).

This application is designed primarily for use by Montreal Protocol National Ozone Units and other related stakeholders. The application was produced by UN Environment Programme (UNEP) OzonAction as a tool principally for developing countries to assist them in meeting their reporting and other commitments under the Protocol and is part of the OzonAction work programme under the Multilateral Fund for the Implementation of the Montreal Protocol.

If you already have the application installed on your device, be sure to update to benefit from the new features. The app can be viewed in English, French or Spanish.



Smartphone Application: Just search for "***GWP-ODP Calculator***" or UNEP in the Google Play store or use the QR code – free to download! If you already have the application installed on your device, be sure to update to benefit from the new features.



Desktop Application: *GWP-ODP Calculator* is also available online on the OzonAction [website](#)



Watch the new short introductory tutorial **video** on the *GWP-ODP Calculator* - available now on [YouTube](#)

>>> Read/download the [flyer](#) for more information

## OzonAction [WhatGas?](#) Updated

### New features:

- An updated more user-friendly interface
- Multilingual interface: English, French and Spanish
- HFCs and HFC containing mixtures
- Latest updated ozone depleting potential and global warming potential values from the recent reports from the Montreal Protocol technology and scientific expert panels as well as the Intergovernmental Panel on Climate Change; as well as the standard ODP and GWP values as specified in the text of the Montreal Protocol
- References to sources of all values used
- New refrigerant mixtures (with ASHRAE approved refrigerant designations)
- Values for 'actual GWP' and 'Kigali Amendment context' GWP for pure substances and mixtures (i.e. only including GWP values/components assigned to controlled hydrofluorocarbons - HFCs).



**The *WhatGas?* application** is an information and identification tool for refrigerant gases: ozone depleting substances (ODS), HFCs and other alternatives. It is intended to provide a number of stakeholders, including Montreal Protocol National Ozone Officers, customs officers, and refrigeration and air-conditioning technicians with a modern, easy-to-use tool that can be accessed via mobile devices or the OzonAction website to facilitate work in the field, when dealing with or inspecting ODS and alternatives, and as a useful reference tool. If the user requires additional information or assistance in identifying a refrigerant gas they are inspecting or that is described in the relevant paperwork, this can be easily obtained by consulting the application.

### Using the application:

If you already have the application installed on your device, be sure to update to benefit from the new features.

**Smartphone Application:** Just search for "WhatGas?" or UNEP in the Google Play store or use the QR code – free to download!



**Desktop Application:** *WhatGas?* is also available online on the OzonAction [website](#)

**For more information:** Watch the new short introductory tutorial [video](#) on *WhatGas?* available on [YouTube](#)

See/download the [WhatGas? flyer](#)

**Over 10,000 installations on Android and iOS devices to date!**

## [RAC Technician Videos](#) - Full length films!

Two 'full length' videos for refrigeration and air-conditioning (RAC) sector servicing technicians: on 1) Techniques, Safety and Best Practice and 2) Flammable Refrigerant Safety.




The OzonAction Refrigeration and Air-Conditioning Technician Video Series consists of instructional videos on techniques, security and best practice and flammable refrigerant safety. They are intended to serve as a complementary training tool RAC sector servicing technicians to help them revise and retain the skills they have acquired during hands-on training. The videos are not intended to replace structured formal technician training, but to supplement and provide some revision of tips and skills and to build on training already undertaken.

These videos are based on the successful UNEP OzonAction smartphone application, the RAC Technician Video Series app. This application has been downloaded on more than **86,000** devices since its launch.


Following many requests to make the videos more versatile and better suited to classroom and training settings, OzonAction has responded to this demand and produced two 'full-length' instructional videos.

You may wish to share this message and the flyer with:

- Your national/regional RAC associations
- Training or vocational institutes
- Master RAC trainers in your country
- Any other interested national stakeholders

 You can watch these videos on the OzonAction YouTube Channel:

- [Techniques, Safety and Best Practice](#)
- [Flammable Refrigerant Safety](#)

 The videos are also available for download by request from UNEP OzonAction: [unep-ozonaction@un.org](mailto:unep-ozonaction@un.org)



If you prefer to access the video clips via the OzonAction smartphone application, just search for "RAC Technician Video Series" or UNEP in the Google Play Store and iTunes/App Store or scan the QR code – **Free to download!** The flyer is available from the [OzonAction website](#).

## [Refrigerant Cylinder Colours: What has Changed](#)

*A new UNEP OzonAction factsheet on the new AHRI revised guideline on a major change to refrigerant cylinder colours*

One of the ways in which refrigeration cylinders are quickly identified is by cylinder colour. Although there was never a truly globally adopted international standard, the guideline from the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) although not required by law was used by the vast majority of industry and chemical producers around the world.

An AHRI revised guideline, first published in 2015, now removes paint colour assignments for refrigerant containers and specifies that all refrigerant containers should have the same paint colour from 2020 onwards.

NOOs and technicians should be aware of this change and inform national stakeholders, as well as familiarising themselves with relevant container labels and markings for refrigerants.

Read/download the [factsheet](#)



## [Update on new refrigerants designations and safety classifications](#)

The latest version of the factsheet providing up to date information on refrigerant designations and safety classifications is now available (September 2020 update).

The factsheet, produced by [ASHRAE](#) in cooperation with [UN Environment Programme OzonAction](#) is updated every 6 months. The purpose is to provide an update on ASHRAE standards for refrigerants and to introduce the new refrigerants that have been awarded an "R" number (or ASHRAE designation) over the last few years and which have been introduced into the international market.

Read/download the [factsheet](#)



The factsheet, as well as more information on ASHRAE-UNEP joint activities and tools, is also available on the [ASHRAE UNEP Portal](#).

**Contact:** [Ayman Eltalouny](#), OzonAction, UN Environment Programme

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### [OzonAction's iPIC platform - Updated](#)

Collaboration between China and Thailand using OzonAction's informal Prior Informed Consent (iPIC) system has resulted in the prevention of a huge consignment of ozone-depleting and climate damaging hydrochlorofluoro-carbons (HCFCs).

Those chemicals, which are primarily used as refrigerants for air conditioners and fridges, are controlled under the Montreal Protocol on Substances that Deplete the Ozone Layer and are being phased out by all countries according to a specific timeline.

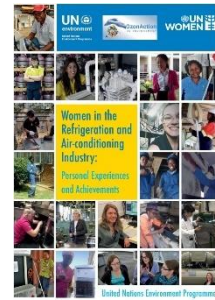


### [Women in the refrigeration and air-conditioning industry: Personal experiences and achievements](#)

The United Nations Environment Programme's (UNEP), OzonAction, in cooperation with UN Women, has compiled this booklet to raise awareness of the opportunities available to women and to highlight the particular experiences and examples of women working in the sector and to recognise their successes.

All of the professionals presented in the booklet are pioneers. They are role models whose stories should inspire a new generation of young women to enter the weld and follow in their footsteps.

Read/download the [publication](#)

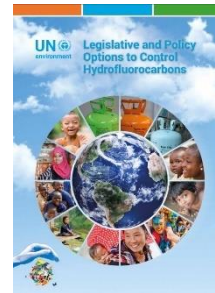


## PUBLICATIONS

### [Legislative and Policy Options to Control Hydrofluorocarbons](#)

In order to follow and facilitate the HFC phase-down schedules contained in the Kigali Amendment, the Parties, including both developed and developing countries, will have to implement certain measures.

This booklet contains a recommended set of legislative and policy options which the developing (Article 5) countries may wish to consider for implementation. It is intended to be a guide/tool for countries. [Read/download](#)





Latest issue of Centro Studi Galileo magazine,  
[Industria & Formazione, n. 8-2021](#)  
(in Italian).



[Sustainable Cooling in support of a Resilient and Climate Proof Recovery](#), Report by the Climate and Clean Air Coalition (CCAC), 2021



[Solar Cooling \(2020\), 40<sup>th</sup> Informatory Note on Refrigeration Technologies. Summary](#) - Solar cooling is a promising and environmentally friendly technology that can help meet the growing global demand for space cooling. Solar cooling can be achieved by various technologies. The two main commercial options are photovoltaic (PV)-driven vapour compression chillers and heat-driven cooling machines powered by solar collectors. Thermal cooling equipment can be coupled with various types of solar collectors with different efficiencies and costs. Overall system efficiencies of PV-driven and solar thermal-driven plants may not have such different values. Economic analysis indicates that the investment cost for the PV solution is at least half that of other systems. Solar cooling may have a very positive environmental impact by reducing the use of fossil fuels, and the technology may be considered mature to compete with conventional cooling equipment.



*\* This Informatory Note is an update of a previous version published in April 2017. It was prepared by Renato Lazzarin (President of IIR Section E).*

**A Summary for policy makers - Solar Cooling 2020 is [available](#) in English and French languages.**

[International Institute of Refrigeration, March 2021](#)

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[Leaks, maintenance and emissions: Refrigeration and air conditioning equipment report](#) details common faults identified in both residential and commercial refrigeration and air conditioning equipment. The report also lists the impacts of these faults and how routine maintenance of the equipment has the potential to significantly reduce electricity use, refrigerant leaks, and emissions.

*The research was supported by an extensive survey of international and domestic literature included as Appendix B to the report.*

[Australian Government, Department of Agriculture, Water and the Environment, Expert Group, 2021](#)



[Green Cooling in public procurement](#) How to advance the procurement of climate-friendly and energy-efficient cooling equipment in the public sector? Air conditioning in public buildings is often responsible for around 50% of total electricity consumption. Switching to climate-friendly cooling technologies ("Green Cooling") can reduce costs and energy consumption and improve the carbon footprint of public buildings. This study takes a closer look at the benefits of Green Cooling in the public sector and discusses current barriers and possible solutions. The information presented provides a solid basis to revise current procurement criteria for sustainable cooling systems in public buildings. [Read/Download the study](#)



[Cut Super Climate Pollutants Now!](#): The Ozone Treaty's Urgent Lessons for Speeding Up Climate Action (Resetting Our Future). We have a decade or less to radically slow global warming before we risk hitting irreversible tipping points that will lock in catastrophic climate change. The good news is that we know how to slow global warming enough to avert disaster. Cut Super Climate Pollutants Now! explains how a 10-year sprint to cut short-lived "super climate pollutants" -- primarily HFC refrigerants, black carbon (soot), and methane -- can cut the rate of global warming in half, so we can stay in the race to net zero climate emissions by 2050.

*Authors: Alan Miller, Durwood Zaelke, Stephen O. Andersen.*



## MISCELLANEOUS

**I am in the Montreal Protocol Who's Who... Why Aren't You?**



The United Nations Environment Programme, OzonAction, in collaboration with Marco Gonzalez and Stephen O. Andersen are updating and expanding the "[Montreal Protocol Who's Who](#)".

We invite you to submit your nomination\*, and/or nominate Ozone Layer Champion(s). *The short profile should reflect the nominee's valuable work related to the Montreal Protocol and ozone layer protection.*

Please notify and nominate worthy candidates through the [on-line form](#).

We look forward to receiving your nomination(s), and please feel free to contact our team for any further assistance concerning your nomination.

**Take this opportunity to raise the profile of women and men who made an important contribution to the Montreal Protocol success and ozone layer protection.**

- View the «Montreal Protocol Who's Who» [Introductory video](#)
- Contact : [Samira Korban-de Gobert](#), UN Environment Programme, OzonAction

*\* If you are already nominated, no need to resubmit your profile*



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If you have questions or comments regarding any news item, please contact directly the source indicated at the bottom of each article.

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