
# Volume XXIII | 30 June 2023

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OEWG 45TH MEETING 3–7 JULY 2023 BANGKOK

**Daily coverage of the 45th Meeting of the Open-ended Working Group of the Parties to the Montreal Protocol, 2–7 July 2023 | Bangkok, Thailand >>>**

# GLOBAL

### 1. Kigali Amendment latest ratifications

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

**Spain, 9 June 2023**
**Bahamas, 30 May 2023**

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*

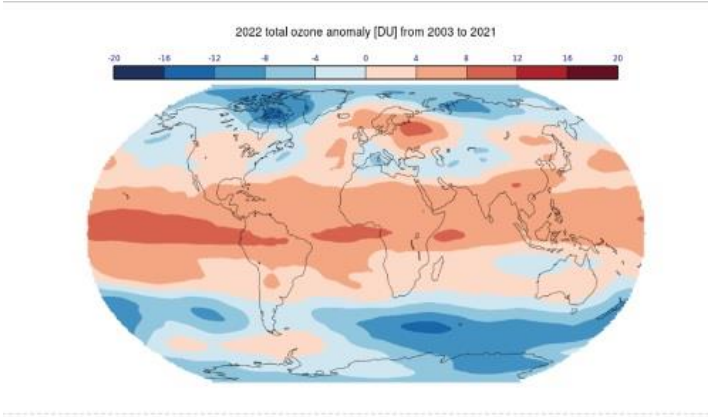
### 2. The ozone layer continues to slowly recover

The production and consumption of controlled ozone-depleting substances have been phased out up to 99%, thanks to the Montreal Protocol and its amendments. But it is important for long-term changes in the ozone layer to be well measured and their causes to be understood. The first **WMO Ozone and UV Bulletin** has just been released. Prof. Petteri Taalas, Secretary-General of WMO, highlights the importance of the Global Atmosphere Watch (GAW) community's efforts in coordinating the global ozone observing network, which monitored both ozone depletion and recovery. "I am proud of the central role WMO has played and continues to play. The success of the Montreal Protocol can inspire the world to address many other global environmental challenges through collective action, supported by science. Unfortunately, climate change is slowing down the recovery of the ozone layer. Ozone depletion is also affecting the climate of the lower atmosphere," he said.

The publication of this new annual Bulletin by WMO is intended to provide an update on a range of matters relating to stratospheric ozone and ultraviolet radiation around the world and replaces the earlier WMO Antarctic and Arctic ozone bulletins, last published seven years ago, which had a narrower technical focus. The Bulletin emphasizes the importance

of continued high-quality measurements of stratospheric ozone and its drivers to ensure that the long-term changes in the ozone layer are well measured and their causes understood.

Stratospheric ozone is slowly recovering, with a full recovery in most parts of the atmosphere projected to occur in the coming decades. The map, shows that in 2022, higher than normal ozone columns were observed in the tropics and subtropics and lower than normal ozone columns at higher latitudes, particularly in the southern hemisphere. The ozone layer protects life on Earth from harmful solar ultraviolet (UV) radiation, thus ozone observations are critical to protect human and environmental health.




*Deviation of the 2022 annual mean total ozone column from the 2003 to 2021 climatology*
*Source: Results are from the Copernicus Atmosphere Monitoring Service Reanalysis (Inness et al., 2019)*

**The Antarctic Ozone Hole in 2022: Later and Longer in Duration**

In 2022, the Antarctic ozone hole had a relatively late onset in September and a relatively large extent and depth in October and November. The delay and decreasing early September Ozone Mass Deficits are considered key pieces of evidence that the ozone layer is beginning to recover. The recent recurrence of years with late breakup dates has resulted in a statistically significant trend in later breakup dates of approximately five days per decade.

The causes of the recent weak southern hemisphere planetary wave activity and the delayed breakup dates are currently unknown.

**Hunga Tonga-Hunga Ha'apai volcanic eruption changed the stratosphere**

The Hunga Tonga-Hunga Ha'apai volcanic eruption in January 2022 was the largest in the last 100 years, injecting ice and water vapor high into the stratosphere. The eruption increased the water vapor content of the stratosphere by 5% to 10%, resulting in substantial cooling of the stratosphere above the southern hemisphere. The additional water vapor has resulted in less ozone in the lower stratosphere of the southern hemisphere in 2022. Enhanced water vapor and aerosol in the polar vortices are expected for the next several

winters, which could result in more polar stratospheric clouds, enhanced ozone depletion, and larger and longer-lasting "ozone holes".

**Increasing UV Awareness with the Global Solar UV Index**

A new app for smartphones has been recently launched globally, providing localized information on UV radiation levels through a five-day forecast. The **SunSmart app** was designed primarily to influence sun protection behavior by letting individual users know the times of the day when sun protection is required, no matter their location. The app seeks to bring worldwide consistency to UV reporting and public health messaging, in order to tackle the worldwide burden of skin cancer and UV-related eye damage. This app is the best companion for the Summer holidays in the Northern hemisphere!

**World Meteorological Organization (WMO), 28 June 2023**

*Image: WMO website*

**3. Long-term variability of human health-related solar ultraviolet-B radiation doses from the 1980s to the end of 21st century**


PHYSIOLOGICAL REVIEWS

REVIEW ARTICLE

LONG-TERM VARIABILITY OF HUMAN HEALTH-RELATED SOLAR ULTRAVIOLET-B RADIATION DOSES FROM THE 1980S TO THE END OF THE 21ST CENTURY

AUTHORS

CORRESPONDENCE

KEY WORDS

CLINICAL HIGHLIGHTS

**Abstract**

Solar ultraviolet-B (UV-B) radiation has played a crucial role in the evolution of life on Earth. UV exposure presents both risks and benefits to humans. Optimal UV-B exposure behaviors, that ensure balance between the risks and benefits of exposure to UV-B depend both on environmental and physiological factors and cannot be easily determined.

The present review provides the current state of knowledge relative to the effects of UV-B radiation to humans. The physical mechanisms that control the levels of solar UV-B radiation at the Earth's surface are also discussed.

A comprehensive review of the studies reporting on current trends in the levels of solar UV-B radiation at the surface and model projections of its future levels is examined and reveals the important role of man-made climatic changes in its evolution.

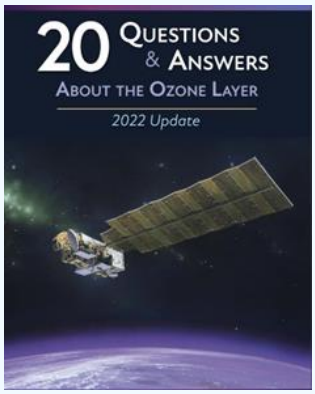
The review provides evidence that despite the success of the Montreal Protocol, the future evolution of the levels of solar UV-B radiation at the Earth's surface has important uncertainties caused by the expected changes in our climate.

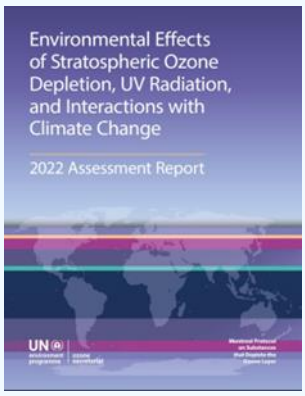
Therefore, it is recommended that the usual precautionary measures to protect from excess exposure of humans to solar UV-B radiation should continue to apply in the decades to come.

***Authors***: *Christos Zerefos, Ilias Fountoulakis, Kostas Eleftheratos, Andreas Kazantzidis.*

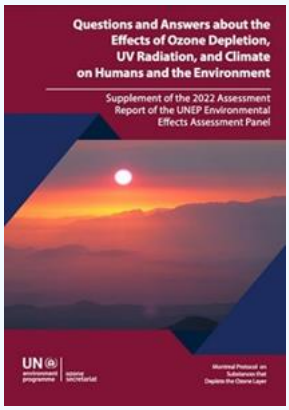
[Physiological Reviews, Volume 103, Issue 3, July 2023, Pages1693-2347]

*Image: Physiological Reviews website*









Eos

Protecting the Ozone Layer Is Delaying Arctic Melting

*The Montreal Protocol has unintentionally slowed global warming and pushed back the first ice-free Arctic summer by 15 years, according to new research.*

**4. Protecting the Ozone Layer Is Delaying Arctic Melting**

The Montreal Protocol has unintentionally slowed global warming and pushed back the first ice-free Arctic summer by 15 years, according to new research.

Efforts to protect the ozone layer have unintentionally benefited Earth's climate. The Montreal Protocol in particular has not only reduced the "ozone hole" but also slowed global warming.

The treaty, a groundbreaking 1989 international commitment to phase out production of ozone-depleting substances, has also delayed the occurrence of the first ice-free summer in the Arctic by up to 15 years, according to a new **analysis** published in the *Proceedings of the National Academy of Sciences of the United States of America*.

The Montreal Protocol grew from the recognition that chlorofluorocarbons (CFCs), used in everyday household products such as air conditioners and refrigerators, were depleting Earth's protective ozone layer and increasing our exposure to dangerous levels of ultraviolet radiation. But when countries worldwide united to phase out CFCs and other ozone-depleting substances, they didn't realize that the measure could also reduce climate change. CFCs are greenhouse gases 10,000 times stronger than carbon dioxide ($CO_2$) in warming power.

Previous studies have highlighted the importance of the Montreal Protocol in protecting the climate. A **2007 article** reported that this agreement alone had been more effective than the 1997 Kyoto Protocol, the first international treaty to specifically set legally binding targets to cut emissions. In 2020, the new study's authors even published a **paper** suggesting that without CFC emissions, Arctic warming between 1955 and 2005 would have been half as intense. These results spurred the idea of looking into the treaty's impact on the future of the region's ice, as well as its past.

**The Symbolic Moment of an Ice-Free Arctic**

Every winter, the surface of the Arctic Ocean freezes, reaching its maximum ice coverage around March. In the summer, most ice melts, reaching its lowest point in September. As the Arctic has warmed nearly 4 times faster than the rest of the planet in the past 4 decades, current projections have suggested the region might see its first ice-free summer between 2030 and 2050.

The first ice-free summer at the North Pole would have a major impact on local ecosystems and populations, as well as on climate. The ice loss would alter carbon cycling and reduce the white surface, which has a cooling effect on the planet by reflecting solar radiation back to space.

"It will be a really big change in the climate system and an important symbolic moment which underlines how much we have impacted the climate," said coauthor Mark England, a climate scientist at the University of Exeter in the United Kingdom.

England and his colleagues used climate models to calculate how much the reduction of CFC emissions has affected and will continue to affect climate and the Arctic. They simulated two climate systems: one in which the use of CFCs was not phased out and the real-world situation in which CFC emissions were reduced, thanks to the Montreal Protocol.

The researchers estimated that each metric ton of avoided CFC emissions corresponds to 7,000 square meters of avoided Arctic sea ice loss—a huge impact considering that each metric ton of avoided carbon dioxide emissions is estimated to convert to only 3 square

meters of retained sea ice. According to their projections, the Montreal Protocol has so far prevented more than half a million square kilometers of sea ice loss.

“The benefits from the Montreal Protocol are not in some faraway future: This is a climate treaty which is already having an impact today and [will continue to do so] over the next few decades,” said England.

**One of “Very Few Wins in the Climate Mitigation Space”**

Both models were tested under two different scenarios for future emissions of greenhouse gases based on the United Nations’ Intergovernmental Panel on Climate Change (**IPCC**) framework: a moderate scenario in which emissions peak around 2040 and a “disaster” scenario in which emissions continue to rise throughout the 21st century.

Under the moderate scenario, the researchers found that the Montreal Protocol will have prevented more than 1 million square kilometers of ice from melting in the summer by 2030 and up to 2 million square kilometers by 2040. They estimated that the reduction of CFCs has delayed the first ice-free summer by about 15 years in the moderate emissions scenario and by about 8 years in the disaster scenario.

For England, the analysis showed that international climate agreements can have real-world impact. “We have very few wins in the climate mitigation space,” he said. “But if we can document some of these positive effects, hopefully it can show the public that coordinated climate action is possible and should be celebrated.”

And the Montreal Protocol will continue to positively affect climate well beyond midcentury. The **Kigali Amendment to the protocol**, for instance, was ratified by nearly 150 UN member states and added hydrofluorocarbons (HFCs) to the list of targeted chemicals. These gases do not cause ozone depletion but are powerful greenhouse gases. According to England and his colleagues, the amendment will reduce global temperatures by between 0.3℃ and 0.5℃ by the end of the century.

**The Need for Vigilance in Reducing Carbon Emissions**

Despite positive news from the new study, Isaac Vimont, a climate scientist at NOAA’s Earth System Research Laboratories who was not involved in the study, stressed that “we are not off the hook and need to keep drastically reducing emissions of other gases like $CO_2$” to curb global warming.

Vimont was involved in a **recent study** that showed that even with the Montreal Protocol, emissions of some CFCs are on the rise again. Researchers don’t yet know the sources of these emissions, which are still low enough not to cause immediate worry. But Vimont said we have to remain vigilant.

“As long as the emissions don’t keep going up, [the rise in CFCs is] not going to impact the recovery of the ozone layer at this time,” he said. “But if the emissions continue to rise, they could become significant and impact both the climate and the recovery of the ozone layer.”

**Eos Science news by American Geophysical Union (AGU), 20 June 2023, By Sofia Moutinho**

*Image: EOS-AGU website*

**See also** >>> "Setting the Stage for Climate Action Under the Montreal Protocol", By Stephen O. Andersen et al. The successful ozone protection treaty evolved thanks to a dozen distinguished studies. EOS, Science news by AGU, Vol. 104 | NO. 7 July 2023, Pages 30-34


**5. 2023 World Refrigeration Day Promotes "Next Generation Cooling"**

**Paris, France, 26 June 2023** – UNEP OzonAction joined with the World Refrigeration Day Secretariat and industry associations worldwide to celebrate World Refrigeration Day, 26 June. The focus of the 2023 campaign is "Next Generation Cooling" (NextGenCooling), both in the sense of technology and the people who design, manufacture install, and operate it.

In the first sense, the celebrations highlight the new technological innovations in the cooling sector that maintain health and comfort of our built environment, protect perishables, enable data centers to operate, and facilitate a wide range of industrial processes on which everyday life depends.

In the second sense, the campaign defines the skill sets required of the people behind the innovation, particularly young people who will be the next generation of cooling professionals.

As the NextGenCooling campaign highlights, our wellbeing depends upon sustainable cooling. Technology choices and an evolving industry can safeguard the well-being of future generations.

NextGenCooling begins by implementing technology advancements emanating from both within the cooling industry and from other disciplines impacting society, such as artificial intelligence, and renewable and stored energy development. In the future, cooling will be even more energy efficient with reduced environmental impact as the Montreal Protocol and its Kigali Amendment speed the transition to refrigerants that do not deplete the ozone layer and have lower contribution to global warming.

NextGenCooling also requires an expanded and skilled workforce – men and women working in various capacities wherever cooling is used – meaning everywhere. The cooling industry needs to recruit, train, and retain people equipped with the knowledge and experience that a modern, forward-thinking industry requires. Just as no one should expect the cooling solutions of the future to be the same as those from the past, no one should expect the workforce to be the same either.

Manufacturers, distributors, service providers, design firms, facility operating staff, researchers, and others in the sector will require personnel with skill sets that include varied disciplines, creative thinking, and environmental awareness. This is as heating, ventilation, and conditioning and refrigeration (HVACR) systems continue to be more complex and require ever increasing diagnostic and problem-solving skill sets. New systems and tools to remotely control and monitor will be the norm and not the exception. It is especially important for the sector to attract females to fill workforce needs. Currently, women represent less than 3% of HVACR engineers and technicians.

The NextGenCooling campaign is aimed at drawing attention to the technologies and practices revolutionizing our ability to meet cooling demands while minimizing the environmental impact. By enhancing indoor comfort for occupants and reducing energy consumption, these innovative cooling technologies pave the way for a more sustainable future.

To create awareness of the importance of cooling to modern life, the campaign partners have prepared flyers describing what the Technology and the Work Force of NextGenCooling look like. These flyers are available for use by National Ozone Units.

- **Next Generation Cooling Technology Looks**
- **Next Generation Cooling's Workforce Looks**

UNEP and its partners encourage all institutions to use the occasion of this year's World Refrigeration Day to outreach their work in the important HVACR sector and to highlight the opportunities to further protect the environment through the Montreal Protocol and climate mitigation programmes.

**WORLD REFRIGERATION DAY FACTS:**

- Cost-effective, energy-efficiency improvements of over 50% are possible for refrigerators and air cond
- Air conditioning units are forecast to rise to 1.5 billion in 2030 from 900 million in 2019.
- Household refrigerator stocks are forecast to rise to 2 billion in 2030 from 1 billion in 2019.
- 20% of electricity used in buildings is for space conditioning and cooling energy demand is anticipate by 2050.
- 1.3 billion tonnes of food – a third of total food produced for human consumption – is lost or wasted including 475 million tonnes due to insufficient cooling.
- 30% of the world's population is exposed to deadly heatwaves more than 20 days a year.

**Contact:** Sonja Wagner, Programme Management Officer, UNEP OzonAction

*Image: WRD 2023 logo*

**6. The Green Cooling Revolution: How Solid-State Cooling is Reducing Energy Consumption**

In recent years, the world has been grappling with the effects of climate change, prompting governments, industries, and individuals to adopt greener practices in a bid to reduce greenhouse gas emissions. One of the most significant contributors to these emissions is the energy consumed by traditional cooling systems, such as air conditioners and refrigerators. As a result, researchers and engineers have been working tirelessly to develop innovative solutions that can help reduce energy consumption while still providing the desired cooling effect. One such solution is solid state cooling, a technology that promises to revolutionize the way we cool our homes, offices, and even our food.

Solid state cooling is a relatively new concept that relies on the use of advanced materials and electronic components to transfer heat without the need for any moving parts or harmful refrigerants. This is in stark contrast to traditional cooling systems, which rely on the circulation of refrigerants through a series of tubes and coils to absorb and release heat. While these systems have been effective in providing cooling, they are also known to consume large amounts of energy and contribute to the depletion of the ozone layer due to the release of harmful refrigerants, such as chlorofluorocarbons (CFCs) and hydrofluorocarbons (HFCs).

The most common form of solid-state cooling is thermoelectric cooling, which utilizes the Peltier effect to transfer heat from one side of a semiconductor material to the other. When a voltage is applied to the material, electrons move from the hot side to the cold side, effectively transferring heat and creating a cooling effect. This process is highly efficient, as it does not require any moving parts or the use of harmful refrigerants. Moreover, it can be easily scaled up or down, making it suitable for a wide range of applications, from cooling electronic components to providing temperature control in large buildings.

Another promising solid state cooling technology is magnetocaloric cooling, which relies on the ability of certain materials to change temperature when exposed to a magnetic field. By cycling these materials through a magnetic field, heat can be absorbed from the surrounding environment and then released as the material returns to its original state. This process is highly efficient and environmentally friendly, as it does not require any moving parts or the use of harmful refrigerants.

The potential benefits of solid-state cooling are immense, particularly when it comes to reducing energy consumption and greenhouse gas emissions. According to a study conducted by the Oak Ridge National Laboratory, widespread adoption of solid state cooling technologies could lead to a 20% reduction in energy consumption for cooling applications in the United States alone. This would not only help to reduce the country's reliance on fossil fuels but also contribute to global efforts to combat climate change.

Despite the promising potential of solid-state cooling, there are still several challenges that need to be addressed before the technology can be widely adopted. One of the main obstacles is the high cost of materials and manufacturing processes, which can make solid

state cooling systems more expensive than their traditional counterparts. However, as research continues and economies of scale are achieved, it is expected that the cost of solid-state cooling will decrease, making it a more viable option for consumers and businesses alike.

In conclusion, solid state cooling represents a significant breakthrough in the quest for more sustainable and energy-efficient cooling solutions. As the world continues to grapple with the effects of climate change, it is crucial that we continue to invest in and support the development of innovative technologies like solid state cooling, which have the potential to not only reduce energy consumption but also contribute to a greener and more sustainable future for all.

**EnergyPortal.eu, 18 June 2023**

*Image: EnergyPortal.eu website*

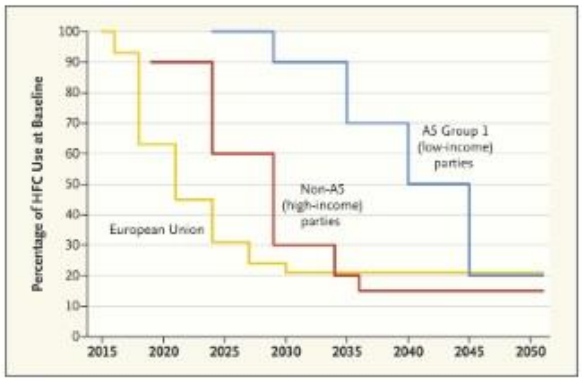
**7. Hydrofluorocarbons, Climate, and Health — Moving the Montreal Protocol beyond Ozone-Layer Recovery**

In 1974, Nobel Laureates Sherwood Rowland and Mario Molina predicted that the increasing use of chlorofluorocarbons (CFCs) in foam insulation, refrigeration, and aerosols including metered-dose inhalers for asthma and chronic obstructive pulmonary disease (COPD) would exponentially increase stratospheric chlorine loading and catalytically destroy the ozone layer, our primary protection against ultraviolet (UV) light. More than a decade later, the proof came along in the form of a large hole in the Antarctic ozone layer. By 1987, strong environmental leadership — with boosts from Margaret Thatcher's background in chemistry and a skin cancer on Ronald Reagan's nose that inspired him to take action — had resulted in the signing of the Montreal Protocol.[1]

Long-term ozone depletion results from the long atmospheric half-life of CFCs. Now that more than 99% of CFCs have been phased out, the ozone layer is recovering and projected to recover fully by about 2066.[2] Ozone depletion has caused tens of millions of excess skin cancers, and the long delay between UV exposure and cancer development means that this cancer epidemic will continue until about 2100. It is sobering to consider that CFCs made 60 years ago will still be causing skin cancer in 60 years' time — and without the Montreal Protocol, the problem would have been much worse.

This international agreement generated some important principles that still hold today. The science panels it created consist of volunteer experts and have remained largely politically independent. The protocol has been universally ratified, and all decisions have been made by consensus for 35 years. The Multilateral Fund has distributed $5.1 billion (U.S. dollars) for project funding and capacity building to 144 developing countries.

Although CFCs were phased out primarily to protect the ozone layer, there was an important side benefit: they are also potent greenhouse gases (CFC-11 has a global warming potential [GWP] of 5000, meaning 5000 times the GWP of carbon dioxide; CFC-12 has a GWP of 11,900), and their continued use would have warmed the planet substantially.[2] Hydrofluorocarbons (HFCs) were introduced as ozone-friendly substitutes for CFCs for many uses, but unfortunately, they are also greenhouse gases, even if not quite as bad as CFCs (e.g., HFC-134a has a GWP of 1430). Today, more than 90% of the 780,000 tonnes of high-GWP HFCs manufactured each year are used for refrigeration and air conditioning (RAC), and their use must be phased down quickly. Signatories to the Montreal Protocol responded to this urgent need in 2016 with the Kigali Amendment, which effectively made the protocol a climate-change convention. Many high-income countries are already implementing strong domestic regulations on fluorinated gases (F-gases) to phase down HFC use on, or even ahead of, schedule (see **graph**).




Schedule for HFC Phasedown under the Kigali Amendment for Non-A5 (High-Income) Parties and A5 Group 1 (Low-Income) Parties versus the F-Gas Regulations for the European Union.

Cooling is not a luxury. RAC is essential in both buildings and refrigerated cold chains for food and vaccines. Demand for cooling is increasing quickly, as populous tropical cities get even hotter. For example, in Mumbai, as much as 70% of peak energy use is for air conditioning, and India, like many hot countries, is committed to providing cooling to much more of its population. With temperatures and incomes both rising, the proportion of households worldwide with an air conditioner is projected to grow from one third today to two thirds by 2050 — more than a billion new air-conditioning units. RAC contributes to warming with both direct emissions of refrigerants and indirect emissions of greenhouse gases from the energy it uses. How can we ensure global access to cooling without exacerbating the climate crisis and trapping ourselves in a vicious cycle in which HFC refrigerants contribute to warming that then necessitates more air conditioning and energy consumption?

Industry has responded by developing RAC equipment containing more climate-friendly refrigerants, making it technically feasible to phase out 95% of high-GWP HFCs for most uses of RAC. This change also creates an opportunity to radically improve the energy efficiency of new RAC equipment, a synergy that is already being seen in high-income countries but not in low-income countries that import their RAC equipment. Instead, a large stock of inefficient HFC-containing equipment is being dumped in many low-income countries, especially in African countries. With a 20-to-30-year life span, this equipment will create a long-term economic burden from avoidable power generation for already-poor countries, and HFCs will continue to be needed to service the equipment. Early action to make efficient, HFC-free RAC equipment accessible in low-income countries could prevent this problem.

Low-income countries could also work together to adopt national and regional minimum energy performance standards for energy efficiency with an integrated HFC phasedown, as advocated by United for Efficiency (led by the United Nations Environment Program). Such efforts would encourage worldwide adoption of the best currently available HFC-free technologies, which could reduce the power needed for RAC by an amount equivalent to one fifth of future global electricity consumption. The result could be trillions of dollars saved owing to a major reduction in coal-fired power stations,

less pollution, and lower cardiorespiratory morbidity, especially if the initiative were linked to movement toward renewable-energy generation.

One difficulty is an ongoing debate about the best refrigerant substitutes for HFCs. There is a large role for "natural" refrigerants — such as hydrocarbons in domestic refrigerators, or carbon dioxide or ammonia in industrial applications — but the flammability of hydrocarbons limits their use in larger RAC applications. New low-GWP fluorinated refrigerants and blends are suitable options, but some European authorities and U.S. states propose to limit the use of many fluorinated chemicals designated as perfluoroalkyl and polyfluoroalkyl substances (PFAS). Some potential replacements for HFC refrigerants, such as very-low-GWP hydrofluoroolefins (HFOs), have been caught in this broad definition of PFAS, even though there is currently limited scientific information on their environmental accumulation or toxicity.[3] The balance of risks will require urgent consideration, a stepwise approach, and common sense, if we are to avoid delaying the climate benefits of HFC phasedown.

HFCs are also used as propellants in inhalers for asthma and COPD.[4] For 20 years, the conversion of CFC inhalers to HFC inhalers was carefully managed under an essential-use exemption to the Montreal Protocol to avoid causing patient harm and to protect patient choice. It's now clear, however, that the carbon footprint of HFC inhalers is substantial: emissions from each of the most commonly used albuterol inhalers, for example, are equivalent to those generated by a small family car traveling 200 miles. Many patients could use either similar HFC inhalers containing 50% less propellant or widely available dry-powder inhalers, whose carbon footprint is one twentieth that of standard inhalers. In a recent U.K. survey, four fifths of patients said they "would" or "might" consider switching to a greener inhaler. It is possible to have an impact by educating patients and clinicians about inhalers' carbon footprint. In the past 12 months, a campaign for use of greener inhalers in the greater Manchester area in England (population 2.8 million) has reduced the inhaler carbon footprint by 10%, equivalent to taking 3400 cars off the road.

Most inhalers manufactured in high-income countries use pharmaceutical-grade HFC-134a from a single U.K.-based company. This supply could fail by accident, or in response to national HFC regulations, or through commercial pressures. Four pharmaceutical companies have announced plans to reformulate inhalers using new lower-GWP propellants, either HFC-152a or HFO-1234ze. If they succeed, the first such inhalers could be on the market by 2025. But to avoid harming patients, we will need to carefully manage a global transition to lower-GWP inhalers while maintaining adequate choices for patients. There are about 70 companies worldwide manufacturing metered-dose inhalers, and no company has yet announced a target date for launching a reformulated albuterol inhaler, the most common and affordable relief inhaler. A global inhaler transition will probably take at least another decade and could lead to significantly increased cost to the 650 million patients with asthma or COPD.

The Montreal Protocol has been rapidly responsive to evolving science and has sought to deliver its benefits to low-income countries. It has protected the ozone layer and climate by phasing down CFCs. It now has to repeat the trick, and with renewed urgency. HFC phasedown is projected to deliver 0.3 to 0.5 degrees of climate benefit by 2100. Synchronous improvements in energy efficiency of RAC equipment could at least double that benefit.[5] Such a major near-term climate prize would enable more affordable cooling and would provide health and economic benefits to low-income countries — a "win–win–win.

**Author:** Dr. Woodcock, co-chair of the Technology and Economic Assessment Panel and a member of the Medical and Chemical Technical Options Committee for the Montreal Protocol; the views expressed in this article are those of the author and do not necessarily represent the position of the panel or committee.

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5.United Nations Environment Programme. Report of the Technology and Economic Assessment Panel: volume 3: decision XXXIII/5 — continued provision of information on energy-efficient and low-global-warming-potential technologies. May 2022 (link).

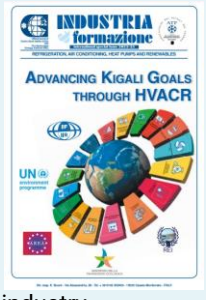
**The New England Journal of Medicine (NEJM), 24 June 2024**

*Image: NEJM*

**Watch out for Illegal Trade of HCFCs and HFCs**: Lessons learnt from the Global Montreal Protocol Award for Customs and Enforcement Officers. This publication provides an analysis of the cases submitted in the context of the **Global Montreal Protocol Award for Customs and Enforcement Officers**. The Global Award was launched in 2018 by UNEP OzonAction. This Global Award is intended to raise awareness about the Montreal Protocol and to recognise customs and enforcement officials for their efforts in preventing and combating illicit traffic in Montreal Protocol and Kigali Amendment-regulated substances. Ozone-depleting substances (ODS) include hydrochlorofluorocarbons (HCFCs) and other compounds with a high Global Warming Potential (GWP), particularly hydrofluorocarbons (HFCs).


**UNEP OzonAction, ASHRAE, April 2023 Fact sheet: Update on New Refrigerants Designations and Safety Classifications**. The purpose of this fact sheet is to provide an update on ASHRAE standards for refrigerants and to introduce the new refrigerants that have been awarded an «R» number over the last few years and introduced into the international market.


**Advancing Kigali goals through HVACR - *International Special Issue 2022-2023*** - To provide an update on this global effort, The Centro Studi Galileo (CSG) and the Renewable Energy Institute (REI), with support from the International Institute of Refrigeration (IIR), The United Nations Environment Programme-OzonAction, (UNEP- OzonAction) and The Air conditioning and Refrigeration European Association (AREA), Ministero Della Transizione Ecologica, have collected experiences from around the world, compiled in this special publication, featuring papers from leading global institutions and experts, addressing the current situation, the challenges ahead, and sharing opinions from different National Ozone Units, on issues related among others to HVAC&R, training, and the role of women in the cooling industry.



**Sustainable cold chains: Virtual Exhibition - The virtual exhibition for sustainable cold chains aims to highlight the critical role of cold chains in ensuring food safety and security, access to vaccines, reducing global warming and preventing ozone layer depletion.**


The exhibition showcases commercially available cold chain technologies for food and vaccines, mainly targeting applications and equipment with refrigeration and cooling cycles that use ozone and climate-friendly refrigerants and have enhanced energy efficiency characteristics. It also aims to promote game-changing and systemic approaches, relevant initiatives, and not-in-kind solutions to cold chains

These technologies and approaches directly contribute to meeting national obligations under the Montreal Protocol on Substances that Deplete the Ozone Layer including its Kigali Amendment and the Paris Agreement on Climate Change. Sustainable cold chain contributes to the achievement of many Sustainable Development Goals.

The exhibition is ongoing and continuously updated with submissions accepted on a rolling basis. The partners of the exhibition will continue promoting the exhibition at all relevant events and throughout 2022 and beyond.

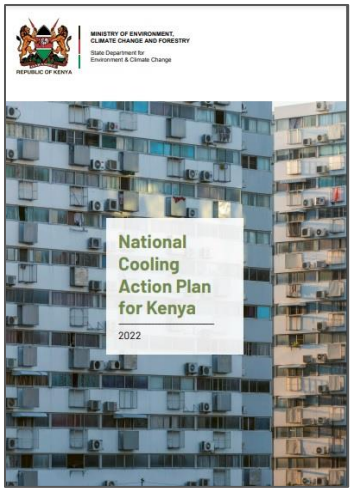
**Click here for more information / submit a nomination >>>**

*Image: Sustainable cold chains website*


Categories
1 exhibits
On site post-harvesting and/or precooling applications
6 exhibits
Storage of product, e.g., large warehouses / Distribution centers
0 exhibits
Storage on board ships, aircraft, and containers
4 exhibits
Food processing plants
1 exhibits
Transport (large and smaller trucks, smaller containers)
6 exhibits
Supermarkets (wholesale markets & Retailers)
1 exhibits
Food services (Restaurants, cafes, tourism facilities, etc)
2 exhibits
Vaccines and other pharmaceutical products
0 exhibits
Game-changing and systemic approaches

## AFRICA

**8. National Cooling Action Plan for Kenya**




**Introduction**

A National Cooling Action Plan defines a country's ambitions towards sustainable cooling and charts the best possible path for accommodating current and future cooling demand while minimizing possible impacts on the environment, especially climate impacts.

The Kenya National Cooling Action Plan is designed to enhance access to sustainable cooling for all Kenyans. The target is a holistic approach across sectors, taking into account the individual appliance, the building shell, as well as cold chains and the cooling needs for the entire population. This will be achieved by increasing access to and improving efficiency of cooling appliances available in Kenya, transitioning the cooling sector to refrigerants with low global warming potential in general and to natural refrigerants where feasible, and increasing access to agricultural cold chains.

In addition, the revision of building codes is initiated to mainstream passive cooling and to avoid the lock-in of poorly insulated new buildings that exhibit a high cooling load. Passive cooling measures can provide critical cooling services to populations lacking cooling appliances or the economic means to operate them, while also reducing and avoiding the cooling energy demand. Kenya's National Cooling Action Plan is a living document, that will be updated in regular intervals to include more measures as capacities for implementation increase.

The current focus lies on the promotion of energy efficient refrigeration and air-conditioning appliances, as those are rather straight forward measures that can be implemented in the short and medium term.

To promote the well-being of all Kenyans, strategies need to be developed to provide access to cooling to all inhabitants of Kenya, especially in hot regions. This development goal requires a broader scope than the uptake of energy efficient appliances and includes suitable building design and city planning to reduce active cooling demand in the first place as well as the affordability of cooling, be it active or passive.

**Read/Download >>>**

**Ministry of Environment Climate Change and Forestry, May 2023**

*Image: Ministry of Environment Climate and Forestry*

## ASIA AND THE PACIFIC

## 9. Japan Extends Its Natural Refrigerant Subsidy Project to Fiscal Year 2027, with ¥7 Billion for Fiscal 2023


The Japanese Ministry of the Environment (MOE) has declared it will continue its natural refrigeration equipment installation subsidy project through fiscal year 2027, with ¥7 billion (US$48.7 million) allocated for fiscal year 2023, which runs from June 1, 2023, to March 31, 2024.

MOE now calls the project "Promotion of HFC-Free and Decarbonization of Refrigeration Equipment Supporting the Cold Chain."

Since 2005, Japan has offered similar subsidies through its MOE and Ministry of Economy, Trade, and Industry. "We would like to continue to support the introduction of natural refrigeration equipment by Japanese companies through granting these subsidies," said Asako Toyozumi, Director of the Fluorocarbons Control Office, Global Environment Bureau at MOE.

Of the 3,630 projects subsidized to date, the commercial refrigeration sector has accounted for 2,478; these include supermarkets and convenience stores, with the majority using $CO_2$ (R744) systems, including air-cooled $CO_2$ condensing units. However, Japanese food retail chain Aeon and convenience store chain Lawson have started using hydrocarbon (R290 and R600a) refrigerant showcases.

The remaining 1,152 have been for applications in the industrial refrigeration sector, with the majority of the systems using ammonia (R717)/$CO_2$ systems like those produced by Japanese manufacturers Mayekawa and Mitsubishi Heavy Industries (MHI).

However, transcritical $CO_2$ refrigeration systems are gaining traction in Japanese industrial applications, including warehouses, factories, distribution centers, etc. According to the 2022 edition of the "**ATMO Report: State of the Industry**," Fukuoka-based cold storage operator Yoshio Ice Manufacturing & Refrigeration retrofitted a cold storage facility with a transcritical $CO_2$ system in February 2020 based on energy savings seen at a new facility built in 2018.

**Changes for small and medium-sized enterprises**

In an effort to make the subsidy project more accessible, Toyozumi indicated that some changes made for the fiscal year 2023 benefit small and medium-sized enterprises, including making application easier with relaxed installation schedule and costs rules and raising the project reimbursement upper limit from one-third to one-half of the construction costs.

One rule change affects large corporations applying for subsidies. “They must announce a target for introducing natural refrigerant equipment,” Toyozumi said.

Since Japan’s initial introduction of subsidies in 2005 for the installation of natural refrigeration equipment, there has been an “almost 100% subsidy grant rate,” Toyozumi said, indicating that nearly all of the funds allotted by MOE each year were used.

From fiscal year 2018 to 2022, the subsidy project operated under the name “Project to Accelerate the Introduction of Energy-Saving Natural Refrigerant Equipment for the Early Realization of HFC-Free and Low-Carbon Society,” with an allocated budget for fiscal year 2019 of ¥7.4 billion (US$51.5 million) and ¥7.3 billion (US$50.9 million) each fiscal year from 2020 to 2022.

“I hope that leading natural refrigerant equipment technology will emerge as a result of the advancement of natural refrigerant equipment introduction in Japan,” Toyozumi said.

“We would like to continue to support the introduction of natural refrigeration equipment by Japanese companies through granting these subsidies.”

*Asako Toyozumi, Director of the Fluorocarbons Control Office, Global Environment Bureau at MOE*

**r744, 26 June 2023, By Jae O. Haroldsen**

*Image: r744 Website*

**10. China Releases List to Guide and Promote Low-Global Warming Potential Alternatives to Ozone-Depleting Substances**


14 June 2023 – China released a **List of Recommended Alternatives to Ozone-Depleting Substances** (hereinafter referred as “the List”) to guide and promote low-global warming potential alternatives to ozone-depleting substances (ODS). Although the List is not legally enforceable, it does play a major role in encouraging and supporting scientific research, technical development, and market deployment of ODS alternatives in China, consistent with China’s obligations under the Montreal Protocol on Substances that Deplete the Ozone Layer.

It is noteworthy that all of the alternatives identified in the List have 100-year global warming potentials below 750. An annotation to the List mentions that relevant environmental protection and safety regulations and standards shall be applied when selecting and using the ODS alternatives.

This List recommends 23 alternatives to three HCFCs, including HCFC-22, HCFC-141b, and HCFC-142b, which account for 99% of the total production of HCFCs in China. The List includes 7 refrigerant alternatives, 7 alternatives for foam blowing agents, and 9 alternatives for cleaning solvents, involving the room air conditioner, residential heat pump

water heater, industrial and commercial refrigeration-system, foam, cleaning, and other sectors. ODS alternatives for the mobile air conditioning sector had not yet been officially identified at the time of this writing.

Original in **Chinese** language.

English translation of the List for reference purposes only is **here**

**Institute for Governance & Sustainable Development (IGSD), 14 June 2023**

*Image: IGSD Website*

# WEST ASIA

**11. Training of Trainers for Refrigeration and Air-Conditioning Instructors in Iraq**

**Erbil, Iraq, 23 June 2023** – Twenty-seven (27) Refrigeration and Air Conditioning (RAC) instructors (25 male, 2 female) from across Iraq successfully participated in the "Training of Trainers on the safe handling of refrigerants and application of good practices in refrigeration" held at the Vocational Training Directorate in Erbil, Iraq Kurdistan from 18 to 20 June 2023.

The training, organized by the **UNEP OzonAction Compliance Assistance Programme** (CAP) in West Asia in cooperation with the National Ozone Center (NOC) at the Ministry of Environment of Iraq, aimed to enhance the participants' knowledge, skills, and attitudes by focusing on various aspects of RAC work. Topics covered included the safe handling of flammable refrigerants, proper brazing techniques, tube processing, refrigerant recovery, evacuation procedures, and the avoidance of refrigerant purging during charging. The training also incorporated the application of institutional skills assessment, a valuable tool that can be replicated by participants when conducting technician training on good practices.

One of the highlights of the training, which was much appreciated by the participants, was the introduction of new technologies in RAC such as the use of non-flame pipe connections, particularly in refrigeration units employing flammable refrigerants.

Ms. Shatha Kalaf, National Ozone Officer of Iraq, emphasized the importance and significance of this training workshop for trainers in the HVAC sector and underscored its role in facilitating Iraq's transition towards long-term alternative technologies which in turn would help in ensuring the country's full and sustainable compliance with the **Montreal Protocol and its Kigali Amendment**.

Mr. Khaled Klaly, Montreal Protocol Regional Coordinator for West Asia, also acknowledged the vital role played by the Iraq NOC in maintaining compliance with the Montreal Protocol

and expressed appreciation for its important role in organizing the training and its commitment to implement activities under the HCFC Phase-Out Management Plan (HPMP).

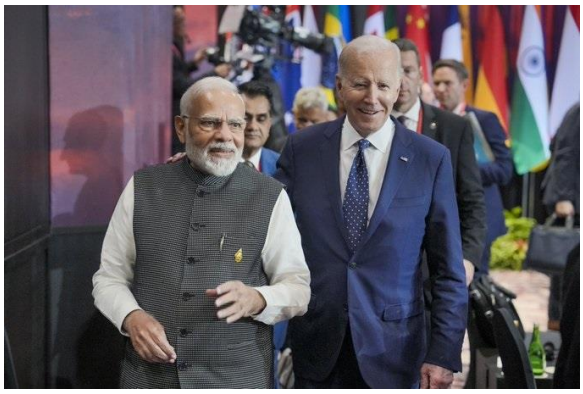
The training was facilitated by Mr. Khaled Klaly and Mr. Manuel Azucena, an internationally recognized Refrigerant Driving License Trainer. The expertise and guidance provided by the trainers contributed to the success of the training, equipping the RAC instructors with essential knowledge and skills. This training represents a significant step forward in building a sustainable and environmentally conscious RAC sector in Iraq.

**Contact:** Khaled Klaly, UNEP, OzonAction, Montreal Protocol Regional Coordinator for West Asia

*Image: OzonAction Website*

## NORTH AMERICA

**12. US-India Climate Partnership: A World of Opportunities**



Deepening the strategic partnership between the United States and India on issues of climate change and clean energy.

Prime Minister Narendra Modi's **Official State Visit to the United States** this week, follows a series of high-profile meetings between him and President Joe Biden over the past year. The two leaders have affirmed the deep and close partnership between the U.S. and India, and among other bilateral issues, strategic collaboration on climate change and clean energy is expected to be high on the agenda.

Given the severity of the climate crisis and the increasingly irreversible changes to the climate system, the actions of the United States and India will have a profound impact on how we tackle climate change. In 2015, at the **COP21** in Paris the world agreed to limit global warming to 1.5$^{O}$C. This year, the **COP28** in the United Arab Emirates marks the first "global stocktake" where countries will assess and track the progress towards achieving the goals of the **Paris Agreement**. India and the U.S., two of the world's largest economies, require close cooperation to meet their ambitious national climate and clean energy goals, as well as to ensure that the world remains on track to combat global warming.

Here are three key climate priorities facing the two nations.

**- Decarbonizing economic growth through renewable energy development and deployment [...]**

- **Bringing global attention to climate friendly cooling in the face of extreme heat**

Rising temperatures and rapid urbanization have spurred the need for cooling worldwide. By turning the focus on the cooling needs of people in heat stressed, developing parts of the world, India is keen to increase the profile of cooling efficiency in the face of extreme heat. The following issues for discussion could emerge from these two interrelated climate impacts:

- **Swift technology transfer**: Best available technologies and low global warming refrigerants for cooling equipment are either patent protected or not available to industry in developing countries. Making these available for global use and increased collaboration on life cycle refrigerant management for emissions avoidance would be beneficial for supporting implementation of the HFC phase down under the **Kigali Amendment to the Montreal Protocol** in India and other developing countries.
- **Standards and labelling**: The two countries can collaborate to develop globally acceptable, rigorous safety standards and life cycle management mechanisms to minimize refrigerant leakage, reclaim, and reuse. Similarly, for electrical appliances, sharing best practices on compliance and enforcement of energy

efficiency standards and labels will be beneficial to decarbonization efforts in both the countries.

- **Buildings and cool roofs**: The scale of India's urbanization offers a huge opportunity for the two nations to collaborate on green and net zero carbon building technologies. India has had success in traditional and passive cooling strategies such as **cool roofs** that would be useful for efforts to alleviate the rising heat stress in towns and cities in the United States.
- **Encourage research and innovation**: The United States could offer financial support to the **Global Cooling Prize**, which is a global competition designed to incentivize the development of a climate-friendly residential cooling solution.

**- Unlocking greater finance and investment for the clean energy transition [...]**

PM Modi's visit to Washington, D.C. marked by a state dinner, as well as an **address to a Joint Meeting of the United States Congress**. Even as the strategic partnership between the world's oldest and largest democracies continues to grow, it will be important to track how President Biden and PM Modi choose to deepen their engagement on confronting the common challenge of climate change.

**The Natural Resources Defense Council (NRDC), 20 June 2023, By Dr. Vyoma Jha, Sameer Kwatra**

*Image: NRDC website*

# EUROPE & CENTRAL ASIA

### 13. Georgia: Environment Ministry hosts meeting of importers of refrigeration agents


Tbilisi: A working meeting was held with importers of refrigerants in the Ministry of Environmental Protection and Agriculture of Georgia. Within the framework of the meeting, the representatives of respective state agencies presented legislative changes related to trade in refrigerants in the country.

The meeting was attended by the representatives of the Ambient Air Division (Ozone Unit) and Environmental Supervision Department of the Ministry, representatives of the Georgian Association of

Refrigerating, Cryogenic and Air-conditioning Engineers, importers of refrigerants, and technicians.

It is noteworthy that on June 16, the Georgian Parliament adopted legislative amendments that provide for the improvement of the management system of ozone-depleting substances and other refrigerants with high global warming potential covered by Montreal Protocol on Substances that Deplete the Ozone Layer.

The updated legislation sets out new requirements for persons involved in the management of refrigerants, including their importers. In particular, the quota and permit system will be established for the import of hydrofluorocarbons, the substances envisaged under the Kigali Amendment to the Montreal Protocol. Also, an electronic system will be created for managing/controlling refrigerants to replace the current system of accounting and reporting.

It is noteworthy that Georgia will soon become a party to the Kigali Amendment, an international effort to reduce the consumption of substances with a high global warming potential.

**Georgia Online, 29 June 2023, By Satyam Dawar**

*Image: Georgia Online website*

**Heat pumps - action plan to accelerate roll-out across the EU-**The use of efficient heat pumps in buildings, industry & local heat networks are key for cutting greenhouse gases and achieving the Green Deal & REPowerEU targets. The action plan on accelerating the heat pump market and deployment sets out 4 strands of action:


- partnership between the Commission, EU countries and the sector (including R&I)
- communication to all interest groups & a skills partnership for rolling out heat pumps
- legislation (ecodesign & energy labelling)
- accessible financing.

**Consultation period 7 June 2023 - 30 August 2023** *(midnight Brussels time)* **Go to consultation >>>**

**The Commission would like to hear your views.** This public consultation is open. Your input will be taken into account as we further develop and fine-tune this initiative. We will summarise the input we receive in a synopsis report, explaining how we have taken it into account. Feedback received will be published on this site and therefore must adhere to the **feedback rules**.

To be organised by the French Association of Refrigeration (AFF) under the theme "Towards Efficient, Controlled and Smart Refrigeration", **the 26th IIR International Congress of Refrigeration will be held in Paris, France, 21-25 August 2023.** This international event will bring together scientific and technical experts in all fields of refrigeration from across the globe, to provide perspectives on the future of the industry in line with sustainable development. Learn more >>>

26E CONGRÈS INTERNATIONAL DU FROID
26TH INTERNATIONAL CONGRESS OF REFRIGERATION

# FEATURED

UN environment programme | ozone secretariat

**Summary of the 34th Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer (MOP34), 31 October – 4 November 2022 | Montreal, Canada**

- Read/Download the full report
- pre/post documents, United Nations Environment Programme (UNEP), Ozone Secretariat MOP-34
- Daily highlights Earth Negotiations Bulletin-International Institute for Sustainable Development (IISD) / Presentations and statements / Side events

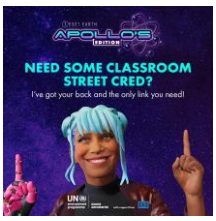
*Image: ENB-IISD website*

**Overview for the meetings of the ozone treaties -** Click here for upcoming and past Montreal Protocol Meetings dates and venues.

**World Ozone Day 2023 theme announced: Montreal Protocol: fixing the ozone layer and reducing climate change** - On World Ozone Day, we celebrate the achievements of the Montreal Protocol on Substances that Deplete the Ozone Layer in fixing the ozone layer and reducing climate change. The theme for the 2023 International Day for the Preservation of the Ozone Layer, to be marked on 16 September, is **Montreal Protocol: fixing the ozone layer and reducing climate change**. This reiterates the recent finding by the Scientific Assessment Panel of the positive impact the Montreal Protocol has on climate change, that ozone recovery is on track and how climate challenges can be supported through the Kigali Amendment.


The theme and other related materials available here in the six UN official languages.

**New gaming technology to create environment simulation game for teenagers-**The UN Environment Programme's (UNEP) Ozone Secretariat today launched a simulator game and avatar using the latest software technology. Apollo's Edition is the latest addition to the Reset Earth education platform. Targeting 13-18-year-olds, the free online education material developed provides educators with resources to teach students the importance of environmental protection.




**Online introductory course 'International legal framework on ozone layer protection' -** Designed for government representatives and national stakeholders new to the Vienna Convention and Montreal Protocol, students of environmental law, and anyone interested in learning about the ozone treaties, the online course launched by the Ozone Secretariat aims to provide an introduction to the international legal framework on ozone layer protection.
United Nations Environment Programme (UNEP), Ozone Secretariat

**Free teaching kits on ozone layer and environmental protection**


- New free online teacher toolkits and lesson plans based on the success of UNEP's Ozone Secretariat's ***Reset Earth*** animation and video game
- Targeting Tweens by adopting animation and gamification to create innovative online lessons to raise awareness on ozone layer and environmental protection
- Available online in digital and print format for universal access

**Read/download >>>** Ozone Secretariat's education platform

## 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:

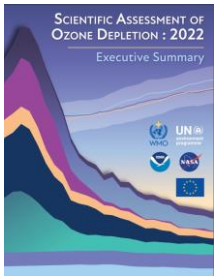
- The Technology and Economic Assessment Panel
- The Scientific Assessment Panel
- The Environmental Effects Assessment Panel

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 >>>

**Scientific Assessment of Ozone Depletion: 2022 -** Executive Summary

United Nations Environment Programme (UNEP), Ozone Secretariat




Multilateral Fund for the Implementation of the Montreal Protocol

**The Multilateral Fund for the Implementation of the Montreal Protocol**

The Fund is dedicated to reversing the deterioration of the Earth's ozone layer. It was established by a decision of the Second Meeting of the Parties to the Montreal Protocol (London, June 1990) and began its operation in 1991. The main objective of the Fund is to assist developing country parties to the Montreal Protocol whose annual level of consumption of the ozone depleting substances (ODS) chlorofluorocarbons (CFCs) and halons is less than 0.3 kilograms per capita to comply with the

control measures of the Protocol. Currently, 147 of the 197 Parties to the Montreal Protocol meet these criteria. They are referred to as Article 5 countries.

The Multilateral Fund is managed by an Executive Committee with equal membership from developed and developing countries. Since the inception of the Fund, the Executive Committee has held 91 meetings. The Fund Secretariat, located in Montreal, assists the Executive Committee in its tasks. Projects and activities supported by the Fund are implemented by four international implementing agencies and a few bilateral agencies.

Last 16 July 2022, following the adoption of interim budgets for the Multilateral Fund due to the Covid-19 pandemic, the Fifth Extraordinary Meeting of the Parties to the Montreal Protocol (5th ExMOP) decided on the replenishment of the Multilateral Fund for the triennium 2021-2023. The Parties agreed on a budget of US $540 million for the triennium.

As of 5 December 2022, the contributions received by the Multilateral Fund from developed countries, or non-Article 5 countries, totalled over US$ 5.02 billion. The Fund has also received additional voluntary contributions amounting to US $25.5 million from a group of donor countries to finance fast-start activities for the implementation of the HFC phase-down.

To facilitate phase-out by Article 5 countries, the Executive Committee has approved 144 country programmes, 144 HCFC phase-out management plans and has funded the establishment and the operating costs of ozone offices in 145 Article 5 countries.

**Latest News and Announcement:**
- Report of the Ninety-second Meeting of the Executive Committee, 13 June 2023
- Executive Committee Primer – 2023, An introduction to the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol, 24/4/2023
- Policies, Procedures, Guidelines and Criteria of the Multilateral Fund (Dec 2022), 3/30/2023
- Framework of activities for sustainability supported by the Multilateral Fund, 3/22/2023

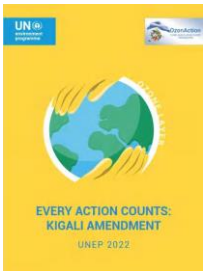
**Upcoming events:**
- The 93rd meeting is scheduled for 11 to 15 December 2023, in Montreal, Canada
- Click here for the Executive Committee upcoming and past Meetings and related documents.


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*




Every Action Counts: Kigali Amendment - UNEP 2022 - This brochure targets the general public and explains in a simplified manner what the Montreal Protocol and its Kigali Amendment signify. It includes some actions that everybody can do to support the Kigali Amendment. It also covers the relationship between the Kigali Amendment and Sustainable Development Goals. It introduces some examples of successful communication campaigns on the Kigali Amendment. English / Spanish

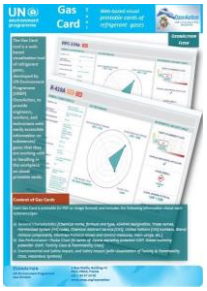
Gender Mainstreaming in the Montreal Protocol: Experiences in Latin America and the Caribbean -Taking into account that women and girls constitute half of the world's population and, therefore, represent half of the potential and innovation necessary to face the "triple planetary crisis" — climate change, nature and biodiversity loss, pollution and waste —, positioning people and the planet as central pillars of the transformation necessary to overcome it, and considering the guiding principles and the scopes of action of the Operational Policy on Gender Mainstreaming of the Multilateral Fund, the United Nations Environment Programme (Latin America and the Caribbean Office). English / Spanish


**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.

**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.

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**
**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).
**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 the 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)*

HCFC Quota and Licence Tracker **- 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 $CO_2$-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, $CO_2$-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 all the official facts and figures in one place. Conversion formulas need to be applied to calculate $CO_2$-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)

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**

**Updated OzonAction "WhatGas?" Mobile App**


The OzonAction 'WhatGas?' application is an information and identification tool for refrigerants gases: ozone depleting substances (ODS), HFCs and other alternatives. It is intended to provide some 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.

This latest release includes the 2022 Harmonized System (HS) Codes for HFCs and blends, which facilitates the process of inspection and identification of controlled and alternative substances.

Scan the QR code to download the app (*currently available for Android devices only*). If you've already downloaded the app, to update visit the **Google Play Store**

**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

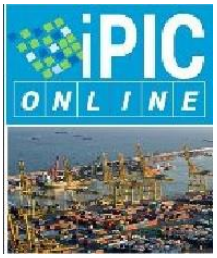
You can watch these videos on the OzonAction YouTube Channel:

- **Techniques, Safety and Best Practice**
- **Flammable Refrigerant Safety**

The videos are also available for download by request from UNEP OzonAction: **unep-ozonaction@un.org**

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](#).



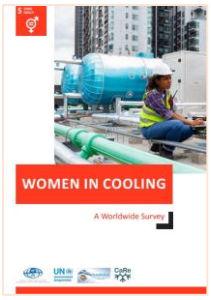

[OzonAction's iPIC platform - Updated](#) Collaboration between China and Thailand using OzonAction's informal Prior Informed Consent (iPIC) system has resulted in the prevention of a huge consignment of ozone-depleting and climate damaging hydrochlorofluorocarbons (HCFCs). Those chemicals, which are 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](#)**

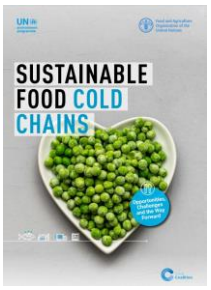

As part of IIR and UNEP OzonAction's partnership, a set of Cold Chain Technology Briefs was released over the past few years, which includes in-depth summaries about the cold chain in different key sectors. They include descriptions of technology, refrigerant options and trends and conclude with prospects 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](#)**

## PUBLICATIONS

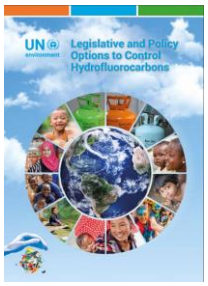
**Results of a Worldwide Survey about Women in Cooling Released by IIR and UNEP OzonAction** - Refrigeration, Air-Conditioning, and Heat-pumps (RACHP) are crucial for our health, nutrition, comfort, and well-being. It is one of the sectors that crosscuts many of the UN sustainable development goals and can contribute significantly to safeguard the environment, advance welfare of humanity and support the growth of employment and economics worldwide. Women are highly under-represented in this sector as indicated by the fact that only 6% of the members of national refrigeration associations/ organisations/institutions are women. In order to better understand the background, motivation, challenges, and opportunities faced by women working in RACHP a worldwide survey was undertaken by the International Institute of Refrigeration (IIR) and OzonAction of UN Environment Programme (UNEP) in cooperation with several partners. **Read/Download the Full Report**




**Sustainable Food Cold Chains: Opportunities, Challenges and the Way Forward**-This [UNEP-FAO] report explores how food cold chain development can become more sustainable and makes a series of important recommendations. These include governments and other cold chain stakeholders collaborating to adopt a systems approach and develop National Cooling Action Plans, backing plans with financing and targets, implementing, and enforcing ambitious minimum efficiency standards. At a time when the international community must act to meet the Sustainable Development Goals, sustainable food cold chains can make an important difference.

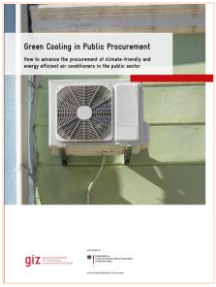



**Legislative and Policy Options to Control Hydrofluorocarbons** - In order to follow and facilitate the HFC phase-down schedules contained in the Kigali Amendment, the Parties, including both developed and developing countries, will have to implement certain measures. This booklet contains a recommended 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. **10-2022**
*(in Italian).*

**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**

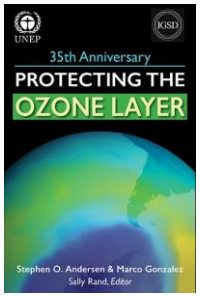



E-Book on Process Safety Management (PSM) Training for Ammonia Refrigeration - a new e-book about the critical elements of a process safety management (PSM) training program for facilities operating an ammonia refrigeration system. The e-book, titled "**7 Keys to a Compliant PSM Training Program for Ammonia Refrigeration**," outlines important questions a facility's program should address and questions that trained plant personnel should be able to answer. Topics covered include:

- Safety hazards and health considerations
- Emergency shutdown procedures
- Addressing deviations from system operating limits
- Risks and costs of non-compliance with regulatory standards

Request free Download **here**


**Protecting the Ozone Layer - 35th Anniversary Edition** - a new book celebrating the 35th Anniversary of the Montreal Protocol. The electronic version (Kindle Edition) of the book has become **available for purchase $3.03 on Amazon**. The book highlights successes and documents innovation during the first 35 years and inspires new ambition to strengthen protection of stratospheric ozone and climate before Earth passes tipping points. The book tells the story of the Montreal Protocol, revealing a model of cooperation, collaboration, universal ratification, record of compliance with over 99 per cent of controlled ozone-depleting substances (ODSs) phased out, the ozone layer on the path to recovery, the 2007 Montreal Adjustment, and the 2016 Kigali Amendment moving the Montreal Protocol further into environmental protection. Unfinished business includes: HCFC phase out, ODS bank management, HFC phase down, uncontrolled ozone-depleting greenhouse gas nitrous oxide (N2O), feedstock exemptions for plastics production, and dumping of obsolete cooling appliances.




*The book was released at 34th Meeting of the Parties to the Montreal Protocol on 31 October 2022.*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