

# OzoNews

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

**Volume XXIII | 15 June 2023**

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**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. Report of the Ninety-second Meeting of the Executive Committee

### Introduction

1. The 92<sup>nd</sup> meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol was held from 29 May to 2 June 2023 at the headquarters of the International Civil Aviation Organization (ICAO), Montreal, Canada.

2. The meeting was attended by representatives of the following countries, members of the Executive Committee in accordance with decision XXXIV/20 of the Thirty-Fourth Meeting of the Parties to the Montreal Protocol:

(a) Parties operating under paragraph 1 of Article 5 of the Protocol (Article 5 Parties): Brazil (Vice-Chair), Burkina Faso, China, Cuba, Ghana, Kenya, and Kuwait; and

(b) Parties not operating under paragraph 1 of Article 5 of the Protocol (non-Article 5 Parties): Australia (Chair), Belgium, Estonia, Finland, Italy, Japan, and the United States of America.

3. In accordance with the decisions taken by the Executive Committee at its Second and Eighth meetings, representatives of the United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP) both as implementing agency and as Treasurer of the Fund, the United Nations Industrial Development Organization (UNIDO) and the World Bank attended the meeting as observers.

4. The Executive Secretary of the Ozone Secretariat, the President of the Bureau to the Thirty-Fourth Meeting of the Parties and members of the replenishment task force of the Technology and Economic Assessment Panel (TEAP) were also present.



5. A representative of the European Union attended as an observer.
6. Representatives of the Environmental Investigation Agency, the Institute for Governance and Sustainable Development, the National Resources Defense Council, the Private Sector Commission for Studies on Sustainable Development of Mexico, and the Refrigerant Gas Manufacturers' Association of India also attended as observers.

Read/download the [full report >>>](#)

### [The Multilateral Fund for the Implementation of the Montreal Protocol, 13 June 2023](#)

Image: *Multilateral Fund website*

## 3. Questions and Answers about the Effects of Ozone Depletion, UV Radiation, and Climate on Humans and the Environment

### Introduction

This collection of Questions & Answers (Q&As) was prepared by the Environmental Effects Assessment Panel (EEAP) of the Montreal Protocol under the umbrella of the United Nations Environment Programme (UNEP). The document complements [EEAP's Quadrennial Assessment 2022](#) and provides interesting and useful information for policymakers, the general public, teachers, and scientists, written in an easy-to-understand language.

The Montreal Protocol is an international treaty with the goal to protect the Earth's ozone layer, which guards life on our planet from harmful ultraviolet (UV) radiation from the Sun. The treaty has been agreed upon by all member states of the United Nations and aims to limit the release of chemical substances into the Earth's atmosphere that harm the ozone layer. These chemicals are called "ozone depleting substances" or simply ODSs. As part of the Montreal Protocol, several advisory bodies were established to annually assess important new scientific information on changes in the ozone layer and how these may affect life on Earth, as well as to evaluate alternative technologies that would allow elimination of the ODSs. The EEAP is one of these advisory bodies and assesses the various environmental effects of ozone layer depletion.

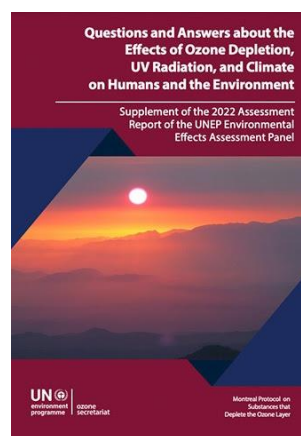
The Q&As discuss the importance of UV radiation for life on Earth and consider both harmful and beneficial effects. They also describe changes in UV radiation that have occurred in the past and are predicted to take place during the 21<sup>st</sup> century.

Some of these changes are also linked to climate change. The Q&As focus on consequences from changes in ozone on human health and life on land, lakes, and the oceans.

You will find that the scope of the Q&As reflect the links among many important issues influencing life. Aside from the atmospheric and biological roles, UV radiation, ozone, and climate change play a part in the quality of the air we breathe. The last two Q&As discuss the effects of UV radiation on materials used for buildings and other applications and the role of UV radiation in plastic pollution on land and in the oceans.

Taken together, the Q&As highlight the crucial role of the Montreal Protocol in protecting life on Earth and are aimed at increasing our understanding so that we can continue to pursue innovative ways to maintain environmental sustainability and quality of life.

*Janet F. Bornman Co-Chair, Environmental Effects Assessment Panel*



## The United Nations Environment Programme (UNEP), The Environmental Effects Assessment Panel, 12 June 2023

Image: UNEP, Ozone Secretariat website

### 4. Technology and Economic Assessment Panel - 2022 Assessment Report

#### Introduction

At the 31<sup>st</sup> Meeting of the Parties to the Montreal Protocol (MOP-31) in November 2019, parties adopted Decision XXXI/2 requesting the Scientific Assessment Panel (SAP), the Environmental Effects Assessment Panel (EEAP) and the Technology and Economic Assessment Panel (TEAP) to update their 2018 Assessment Reports in 2022 for consideration by the forty-fifth Open-Ended Working Group (OEWG45) and the 35<sup>th</sup> MOP in 2023 (MOP-35). In paragraph 8 of that decision, the parties requested the TEAP, in its 2022 Assessment Report to consider the following topics:



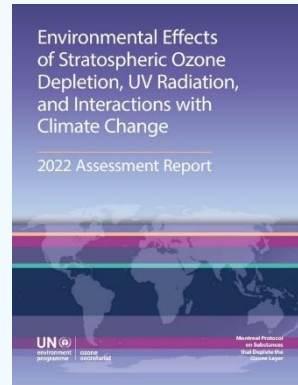
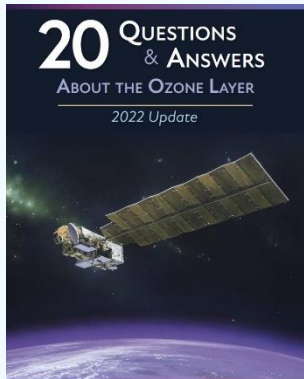
- a) Technical progress in the production and consumption sectors in the transition to technically and economically feasible and sustainable alternatives and practices that minimize or eliminate the use of controlled substances in all sectors;
- b) The status of banks and stocks of controlled substances and the options available for managing them so as to avoid emissions to the atmosphere;
- c) Challenges facing all parties to the Montreal Protocol in implementing Montreal Protocol obligations and maintaining the phase-outs already achieved, especially those on substitutes and substitution technologies, including challenges for parties related to feedstock uses and by production to prevent emissions, and potential technically and economically feasible options to face those challenges
- d) The impact of the phase-out of controlled ozone-depleting substances and the phase down of HFCs on sustainable development;
- e) Technical advancements in developing alternatives to HFCs suitable for usage in countries with high ambient temperatures, particularly with regard to energy efficiency and safety.

In response to Decision XXXI/2, the Panel's Flexible and Rigid Foams Technical Options Committee (FTOC), Fire Suppression (formerly Halons) Technical Options Committee (FSTOC), Methyl Bromide Technical Options Committee (MSTOC), Medical and Chemicals Technical Options Committee (MCTOC), and Refrigeration, Air Conditioning and Heat Pumps Technical Options Committee (RTOC) have each produced a 2022 report, which address new developments as well as global progress in the transition away from ozone depleting substances (ODS) and hydrofluorocarbons (HFCs) in the various sectors of use. The main findings from the TOCs are integrated into this 2022 TEAP Assessment Report.

The 2022 TEAP Assessment Report comprises Executive Summaries from each TOC. Key findings identified by each TOC are included in Chapter 2. In addition, this report provides a list of Task Force and Working Group reports that TEAP has produced in response to specific decisions of parties for the period 2019-2022.

## The United Nations Environment Programme (UNEP), Technology and Economic Assessment Panel (TEAP), 5 June 2023

Image: UNEP, Ozone Secretariat website



### 5. Cold chain reduces food loss and waste, here is how

An estimated **14 percent** of total food produced for human consumption is lost, while 17 per cent is wasted. This is enough food to feed around one billion people in the world. The lack of effective refrigeration contributes to about 526 million tonnes of food going to waste every year.



One major solution to food loss and waste is better **cold chain management**, ensuring that products are kept at a suitable and uninterrupted temperature conditions all the way from harvest to plate.

Lack of access to refrigeration along the food chain creates a vicious cycle of food waste and income loss for farmers. This poses a challenge in developing countries, particularly in rural areas, where most of the food is produced.

Scaling up cold chain infrastructure through sustainable, renewable energy to power cooling and, where viable, using renewable energy to reduce the impact on climate warming that is in line with **The Montreal Protocol on Substances that Deplete the Ozone Layer and its Kigali Amendment** and **Rome Declaration** is key.

**UN Environment Programme (UNEP), 5 June 2023**

*Image: UNEP website*

### 6. Green Cooling Initiative to Host Webinar on How to Cool Naturally Around the Globe

The **Green Cooling Initiative** (GCI), a global initiative that aims to promote sustainable cooling, will hold a free webinar on June 27 from 1–2 pm CEST to present the Green Cooling Initiative and some of its projects in the Global South supporting the uptake of natural refrigerants and energy-efficient appliances in refrigeration and air-conditioning sector.



The webinar, co-hosted by ATMOsphere (publisher of R744.com), will also explain the benefits of joining GCI's Network of like-minded stakeholders supporting the uptake of natural refrigerants.

Webinar attendance is free through registration at this [link](#).

Established in 2012, GCI focuses on sustainably transforming the cooling sector in emerging and developing countries. The work is supported and funded by the German Federal Ministry for Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) in the context of the International Climate Initiative (IKI). It is run by the governmental development agency GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH).

GCI also supports partner countries in implementing the provisions of the Montreal Protocol and its Kigali Amendment both strategically and in terms of technology.

Recently, GCI has published two papers supporting the feasibility of low-GWP refrigerants (below 150) in both [split air conditioners](#) and [heat pumps](#). Other examples of GCI projects are the development of a roadmaps for [Ghana's refrigeration and air-conditioning](#) and the creation of a [greenhouse gas inventory for Kenya's refrigeration and air-conditioning sector](#).

The GCI's free Network is currently expanding its [membership](#) base, which includes manufacturers and other organizations. To be eligible, manufacturers must make at least one commercially available product or major component in one of the refrigeration and air conditioning sectors that uses only a natural refrigerant and has above-average energy efficiency.

Also eligible are suppliers of natural refrigerants as well as companies from developing countries that do not have their own product yet but are interested in technology transfer and are willing to commit to advancing natural refrigerants and improving energy efficiency in their products.

[r744, The GreenCooling Initiative, 8 June 2023, by Thomas Trevisan](#)

Image: r744

See also [>>> Global Green Cooling Network Invites Manufacturers to Join](#)

## 7. Exploring Eco-Friendly Alternatives: Advancements in Magnetic Cooling

The increasing awareness of climate change and the need for sustainable living has led to a surge in demand for eco-friendly alternatives in various industries. One such area that has seen significant advancements is the field of refrigeration. Traditional refrigeration systems, which rely on the compression and expansion of refrigerants, have been criticized for their contribution to greenhouse gas emissions and global warming. As a result, researchers and engineers have been exploring innovative solutions to address these concerns, and magnetic cooling has emerged as a promising alternative.



Magnetic cooling, also known as magnetocaloric cooling, is a cutting-edge technology that uses magnetic fields to alter the temperature of certain materials, known as magnetocaloric materials. These materials have the unique property of heating up when exposed to a magnetic field and cooling down when the magnetic field is removed. This phenomenon, called the magnetocaloric effect (MCE), has been

known for over a century, but it is only in recent years that it has been harnessed for practical applications in refrigeration.

The potential benefits of magnetic cooling are immense. First and foremost, it is an environmentally friendly technology, as it does not rely on harmful refrigerants like hydrofluorocarbons (HFCs) or chlorofluorocarbons (CFCs), which are known to contribute to ozone depletion and global warming. Instead, magnetic cooling systems use solid magnetocaloric materials, which are non-toxic and can be easily recycled. This makes them a much more sustainable option compared to traditional refrigeration systems.

In addition to being eco-friendly, magnetic cooling systems also boast impressive energy efficiency. Studies have shown that they can be up to 30% more energy-efficient than conventional refrigeration systems, which translates to significant cost savings for consumers in the long run. This is particularly important given the rising energy costs and the need to reduce energy consumption to mitigate the effects of climate change.

Moreover, magnetic cooling systems have the potential to be more reliable and require less maintenance than their traditional counterparts. This is because they have fewer moving parts, which reduces the likelihood of mechanical failure and wear and tear. In turn, this can lead to a longer lifespan for the appliance and lower overall costs for the user.

Despite these promising advantages, there are still some challenges that need to be addressed before magnetic cooling can become a mainstream technology. One of the main hurdles is the development of magnetocaloric materials that exhibit a strong MCE at room temperature. While several materials have been identified, such as gadolinium and its alloys, researchers are still working on optimizing their properties and reducing their cost for widespread commercial use.

Another challenge lies in the design and optimization of magnetic cooling systems themselves. Engineers need to develop efficient and compact systems that can effectively harness the MCE and integrate seamlessly into existing appliances, such as refrigerators and air conditioners. This requires a deep understanding of the underlying physics and engineering principles, as well as close collaboration between researchers and industry partners.

Despite these challenges, the future of magnetic cooling looks bright. With continued research and development, it is likely that we will see the widespread adoption of this eco-friendly technology in the coming years. This would not only help reduce the environmental impact of refrigeration but also contribute to a more sustainable and energy-efficient future for all.

In conclusion, magnetic cooling represents a promising eco-friendly alternative to traditional refrigeration systems. Its potential benefits, such as reduced greenhouse gas emissions, increased energy efficiency, and lower maintenance costs, make it an attractive option for both consumers and industry stakeholders. While there are still challenges to overcome, the ongoing research and development in this field suggest that magnetic cooling could play a significant role in shaping a more sustainable future for refrigeration and cooling technologies.

[EnergyPortal.eu](https://energyportal.eu), 11 June 2023, by Daniel Hall

*Image: Energy portal*

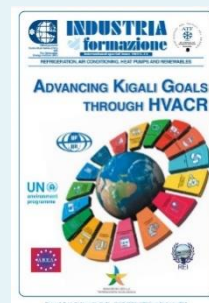
**Watch out for Illegal Trade of HCFCs and HFCs:** Lessons learnt from the Global Montreal Protocol Award for Customs and Enforcement Officers. This publication provides an analysis of the cases submitted in the context of the **Global Montreal Protocol Award for Customs and Enforcement Officers**. The 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 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. State Launches The National Cooling Action Plan (Kenya)

The Ministry of Environment, Climate Change and Forestry today launched the 2023 to 2027 National Cooling Action Plan for Kenya (NCAP).

NCAP is designed to accelerate Kenya's shift to sustainable cooling systems through transition to high energy efficiency appliances, use of natural refrigerants, and enhanced access to agricultural cold chain solutions.



Speaking during the launch at a Nairobi hotel, State Department for Environment and Climate Change Principal Secretary (PS) Eng Festus K Ng'eno said the National Cooling Action Plan 2022 aims to increase the performance and efficiency of energy consuming cooling alliances and transition the cooling sector to refrigerants with low environmental impacts among others.

Ng'eno said normal cooling equipment directly contributes to greenhouse gas (GHG) emissions through production and consumption of hydrofluorocarbon (HFCs) and hydrochlorofluorocarbon (HCFCs) potent greenhouse gasses and ozone depleting substances used in refrigeration and air conditioning.

"In order to avoid these emissions, the government has embarked on a transition to sustainable cooling practices through the development of the National Cooling Action Plan (NCAP) that aims to increase access to energy efficient cooling solutions with low environmental impacts", he said.

Emerging data shows that Kenya's Nationally Determined Contributions (NDC) has committed to reducing greenhouse gas (GHG) emissions by 32% or 143MT of CO<sub>2</sub> equivalent by 2030, and therefore, providing conventional cooling services poses a challenge to attainment of this ambitious target.

The PS also said that Green Cooling solutions with natural refrigerants is the way forward, because they are eco-friendly, ozone-friendly and have minimal impact on global warming.

"The National Cooling Action Plan is all about creating the right conditions for the growth of the sustainable cold chain market and by providing financial incentives for cold storage systems and making sure everyone understands the incredible benefits of zero emission cold chains", said PS.

He at the same time urged all stakeholders to actively engage and collaborate in implementing the National Cooling Action Plan (NCAP).

[Kenya News Agency, 14 June 2023, by Lucy Gitei](#)

*Image: KNA Website*

## 9. Training for Trainers in Mali

In February, ROCA Mali successfully conducted two one-week Trainings for Trainers. Participants learned how to safely handle future-friendly natural refrigerants such as CO<sub>2</sub>, butane and propane and, more importantly, how to pass on their knowledge.

11 men and 3 women took part in the first training, while the second session had 11 men and 4 women. These workshops aimed to equip trainers with skills to handle natural



refrigerants in refrigeration and air conditioning systems. The project, co-financed by the European Union and the German Federal Ministry for Economic Cooperation and Development, was implemented by GIZ in Burkina Faso, Mali, Senegal, and Cameroon.

Oumar Touré, the Coordinator of the ROCA project in Mali, emphasized the purpose of the training, stating, **"The objective of our training today is to support training centers. We train trainers, who can then handle natural refrigerants such as CO<sub>2</sub>, butane, propane, or other natural gases, because these gases are generally flammable and safety measures are needed."**

Aïssata Cisse, the Deputy National Director of Sanitation, Pollution, and Nuisance Control, highlighted the project's alignment with international frameworks such as the Montreal Protocol, stating, **"This project is to allow Mali to have air conditioning to make it cold, but meanwhile respecting the new conditions, which is the protection of the environment and, in particular, the ozone layer."**

Key stakeholders, including Brehima Timboliba, the Director of the Central School for Industry, Commerce, and Administration (ECICA), and Chaka Traore, the President of the Malian Association of Refrigeration and Air Conditioning Operators (AMARC), expressed their support for the initiative.

Timboliba explained, **"At the end of this training, these players will be able to handle the new refrigerants with respect for the environment because the aim is to protect the environment from pollution by these fluids, which we know were very pollutant in the past."**

Traore acknowledged the contribution of GIZ, stating, **"I would like to thank GIZ for its ROCA project. We've been trained very well by GIZ."**

The training sessions were also the subject of two reports on Malian television.

[Green Cooling Initiative \(GCI\), 5 June 2023](#)

*Image: GCI Website*

## WEST ASIA

### 10. Iraq and Jordan National Ozone Unit staff trained in Montreal Protocol Implementation



**Amman, Jordan, 23 May 2023** – The [UNEP OzonAction Compliance Assistance Programme](#) (CAP), West Asia Office, organized a training workshop for new National Ozone Officers (NOOs) and staff of the National Ozone Units (NOUs) in Iraq and Jordan as part of the Regional Network service it provides to Article 5 countries in the West Asia region, and in its role as an Implementing Agency of the Multilateral Fund for the Implementation of the Montreal Protocol (MLF).

The three-day workshop held in Amman, Jordan from 21 to 23 May 2023, brought together 10 NOOs and staff (8 male, 2 female) who were provided with the needed information, knowledge, skills, key techniques, and contacts to manage the MLF approved projects and to ensure the effectiveness of their NOUs as well as their contribution to the fulfillment of their countries' obligations under the Montreal Protocol and its amendments.

In addition to enhancing the capacity of staff who recently joined the NOUs in the two countries and enabling them to carry out their duties in an effective manner, the workshop also provided a valuable opportunity to highlight the Montreal Protocol's most important developments and updates. It provided an opportunity to discuss the challenges faced by NOUs in implementing projects under the Protocol and to develop proposals for appropriate solutions, exchange experiences on good practices when dealing with specific issues under the Protocol and enhance communication and cooperation among the NOUs in West Asia.

UNEP has over the years implemented several programmes to build the capacity of NOUs either directly or through South-South cooperation initiatives, in order to enrich and sustain training activities at the regional level.

UNEP has also published a guide for new NOOs that serves as a quick reference tool providing comprehensive knowledge of the key issues and topics that new ozone officials and assistants should be aware of to enable them to carry out their duties effectively.

**Contact:** [Khaled Klaly](#), UNEP OzonAction Montreal Protocol Regional Coordinator for West Asia

Image: [OzonAction Website](#)

## 11. Saudi Arabia Prepares for HCFC Phase-out Management Plan Stage II



**Al-Khobar, Saudi Arabia, 17 May 2023** – The **UNEP OzonAction** Compliance Assistance Programme (CAP), West Asia Regional Office, jointly organized with the United Nations Industrial Development Organization (UNIDO), a two-day stakeholders’ consultation workshop to discuss the implementation of the preparatory project for Stage II of the HCFC Phase-Out Management Plan (HPMP) in the Kingdom of Saudi Arabia (KSA), as approved by the Executive Committee (ExCom) at its 86<sup>th</sup> Meeting.

The workshop took place in Al-Khobar, KSA on 16-17 May 2023 and brought together representatives of the National Ozone Unit (NOU) in the Kingdom of Saudi Arabia, as well as key stakeholders and representatives from the industry in KSA using ozone depleting substances (ODS).

The meeting offered an opportunity to discuss and agree upon the best approaches and arrangements to ensure sound implementation and completion of activities under the preparatory project and for the timely submission of a proposal for the HPMP Phase II project to ExCom-93.

On this occasion, UNEP and UNIDO provided the KSA’s NOU with the required support for the implementation of the project, in order to meet KSA’s upcoming phase-out targets under the Montreal Protocol.

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

Image: [OzonAction Website](#)

## 12. Snapshot of air conditioning in the MENA region and Türkiye

*The Cool Up programme monitors the status, developments, insights, and good practice examples regarding sustainable cooling in the MENA region.*

Many countries in the MENA (Middle East and North Africa) region are facing rising temperatures and rapid urbanisation, leading to fast-growing demand for cooling. According to the Cool Up programme status report, air conditioning consumes up to 70% of the total residential and commercial electricity in the region. There were 60 million air conditioning units installed in 2018, with Variable Refrigerant Flow (VRF) systems representing the dominant technology. The stock is forecast to reach 210 million units by 2050, and energy demand for air conditioning is expected to increase by 50% by 2040 in the region.

With such a market growth, there is a risk for a strong increase in refrigerant demand and direct emissions. It is imperative that the region takes action to effectively reduce HFC consumption. To date,



six countries in the region have ratified the Kigali Amendment to the Montreal Protocol: Jordan, Lebanon, Morocco, Syria, Tunisia, and Turkey. Furthermore, funding programmes exist to promote access to energy-efficient air conditioning solutions.

Learn more about [the Cool Up programme](#)

[The International Institute of Refrigeration \(IIR\), 12 June 2023](#)

Image: [Cool Up Website](#)

## NORTH AMERICA

### 13. The urgency of cooling access: Ensuring resilience and promoting equity in the U.S.

While access to cooling is taken for granted by many in countries like the U.S., where most households have some form of air-conditioning appliance, roughly 1,500 people in the country still die each year from the impacts of extreme heat.

In fact, heat waves claim more lives in the U.S. than any other weather-related event.



In June 2021 alone, around 800 deaths were attributed to the record-breaking heat wave in the Pacific Northwest and British Columbia. More than 3,500 people in the U.S. were also admitted to emergency rooms for heat-related illnesses.

And the implications of heat extend beyond health and well-being, with heat exposure impacting students' ability to learn and workers' ability to work safely. In addition to creating dangerous conditions for workers, extreme heat is also known to destabilize the economic output of entire industries, like agriculture.

As with many aspects of the climate crisis, extreme heat disproportionately affects low-income households, who tend to live in areas where ambient temperatures are typically higher and access to cooling solutions is limited – exacerbating and perpetuating existing inequities.

As the world continues to warm and extreme heat events become more frequent and severe, it's essential that we take urgent action to increase access to affordable [clean cooling solutions](#), particularly for those who face the most significant risks.

#### The built environment

In the U.S., [cities can be up to 7° F \(3.9° C\) hotter than surrounding areas](#) due to the urban heat island (UHI) effect. Even within cities, some neighborhoods are hotter than others, with disparities often falling along racial and economic lines. Neighborhood-level hot spots tend to be in communities with higher population densities, more buildings, and less green space.

A legacy of discriminatory race-based land-use policies and practices – such as redlining in the U.S. – has resulted in disinvestment in neighborhoods where people of color live. While this has led to many harmful systemic socioeconomic effects, it has also impacted the built environment of these communities and has contributed to the exacerbation of the UHI effect.

#### Heat and income

The effect of UHIs permeates indoors too when buildings are not designed with energy efficiency in mind, thus leading to higher temperatures for occupants. This is particularly unsafe for low-income households because they are less likely to have air conditioning in their homes.

Even for residents who might have air conditioning, the cost of running it – particularly with rising energy prices – makes thermal comfort unaffordable to many. Before the pandemic, [one-third of U.S. households faced challenges in paying their energy bills](#), meaning that switching on the AC, even in the height of summer, becomes a difficult financial decision for millions of low-income Americans, even when health and safety are at risk.

### **The impacts of AC**

While we need more cooling to adapt to our warming world, conventional ACs unfortunately contribute significantly to the warming of our planet. This is particularly true if they are inefficient and contain super-polluting refrigerants, which is largely typical of today's appliances.

The amount of energy ACs use also creates a challenge for our energy grids, with electricity blackouts becoming increasingly common during extreme heat events due to spikes in energy demand from cooling.

The good news is that sustainable cooling solutions (both passive and mechanical) exist. To make efficient, climate-friendly cooling affordable and accessible to all, we need policymakers and other key stakeholders to implement various policies and programs that can help get rid of disparities.

### **Clean cooling for all**

While ensuring country-wide access to sustainable cooling may seem like an impossible challenge, several solutions can help protect both people and the planet.

To begin, cities can limit the UHI effect and reduce neighborhood temperatures by adopting local policies and ordinances that set targets and requirements for enhanced green space and the use of reflective materials.

Making buildings more energy efficient and designing them with thermal comfort in mind can ensure they are also naturally cooler. This means that when air conditioning is needed, achieving, and maintaining a comfortable and safe indoor temperature will take less energy.

Financial assistance programs can help low-income households purchase energy-efficient, climate-friendly cooling appliances (like efficient air conditioners or heat pumps) that cost less to operate due to reduced energy consumption. Similar programs can also provide low-income households with utility bill assistance during the heat season to cover cooling costs.

Clean Cooling Collaborative is working with a number of organizations across the U.S., including the [New Buildings Institute](#), the [Building Decarbonization Coalition](#), and the Center for Energy Poverty and Climate to roll out a variety of these solutions.

### **A resilient future**

Without action, the impacts of extreme heat will only worsen as temperatures continue to climb. Under a high-emissions scenario, it's estimated that [heat-related deaths in the U.S. could rise by 57%](#).

Policymakers, businesses, and other stakeholders must collaborate to urgently implement sustainable and inclusive cooling solutions, including energy-efficient technologies and programs to support access.

Investing in accessible cooling is not just about protecting the well-being of individuals and communities, it's also about ensuring a more resilient and sustainable future for the entire U.S. – and beyond. By ensuring resilience and promoting equitable access to cooling, we can protect public health and safety, and reduce energy demand.

[Clean Cooling Collaborative, 7 June 2023, by Axum Teferra](#)



Image: Clean Cooling Collaborative website

#### 14. Refrigerators have become a climate-change hot topic

When it comes to climate change, refrigerators are a hot topic. Project Drawdown, an organization that models the impact of climate change solutions, has named refrigerant management and transition as the #1 way to fight climate change. Inspired by this recommendation, Youthpower, a student-led organization with members in Alameda, Oakland, Albany, and more, set their sights on improving grocery store refrigerators in Alameda (<https://alamedasun.com/letters/16938>,” May 25).



They started their campaign by gathering data, enlisting classmates and family members to take pictures of grocery store refrigerators. With the help of Climate Friendly Supermarkets, a program run by the Environmental Investigation Agency, they mapped out whether local grocery stores had climate-friendly systems or not.

“Unfortunately, what we were seeing was lots and lots of HFCs,” said Bella Goldwasser, one of the leaders of the project and a junior at Alameda High School.

Hydrofluorocarbons (HFC) are the most common refrigerant gas used in the United States, and they are potent greenhouse gasses, trapping 2,000 to 4,000 times more heat than carbon dioxide. HFCs became widespread after Chlorofluorocarbon (CFC) refrigerant gases were phased out under the Montreal Protocol, which took effect in 1989.

The Montreal Protocol sought to protect the ozone layer, as CFCs were associated with its destruction. However, HFCs came with problems of their own, namely their unfathomably powerful heat-trapping abilities.

Even worse, refrigerator systems leak HFCs at an alarming rate, with approximately 25 percent of the gas entering the atmosphere. In a year, American grocery stores emit the same amount of greenhouse gasses as the electricity associated with 12 million California homes, which is equivalent to 49 billion pounds of coal.

Luckily, alternatives exist. Propane, ammonia, and carbon dioxide are all effective coolants with a much lighter impact on the climate. And Alameda has some already!

Youthpower was delighted to locate two local grocery stores that already had a few climate-friendly fridges. On Sunday, March 21, they presented the two businesses, Alameda Natural Grocery in Marketplace and Jazeera Market on Webster Street, with awards for their refrigerators.

“I knew that these refrigerators were more energy efficient and now I know that they are also better for the environment. Acquiring such equipment is a win-win situation!” said Saleem Saleh, the manager of Jazeera Market.

At Alameda Natural Grocery, Youthpower and students from Alameda High School’s AP Environmental Science class hosted an informational booth and a raffle, raising awareness about the issue and celebrating Alameda Natural Grocery’s accomplishments so far.

In terms of next steps, Youthpower is looking to support small local grocery stores in transitioning all of their refrigerators to climate-friendly models. They are actively partnering with Alameda Natural Grocery to pursue community fundraising, state grant programs, and other funding opportunities.

If you are an owner of an interested local grocery store, part of a service organization, or have any experience in grant-writing, community organizing, or publicity do not hesitate to reach out to [youthpower4climate@gmail.com](mailto:youthpower4climate@gmail.com). They are still building their team and partnerships!

“Replacing refrigerants is a fast track to cutting our collective emissions in half by 2030. We plan to mobilize community support to help the smaller stores, who have fewer financial resources,” said Heather MacLeod, the adult advisor of Youthpower. “But the larger stores – Safeway, Nob Hill, Trader Joe’s, Target – have massive amounts of refrigeration, and the worst kind. When they transition to natural refrigerants it will make the biggest impact.”

**Alameda Sun, 9 June 2023**

*Image: [california.com](https://www.california.com) website*

## EUROPE & CENTRAL ASIA

### 15. Payan’s video wins Women in Cooling competition

FRANCE: Léana Khaled Payan, a refrigeration engineer with Axima Refrigeration in France, has been named as the winner of the first European Women in Cooling Video Competition.

The competition, organised by European contractors group AREA and World Refrigeration Day, was designed to highlight women exhibiting best practice and innovative thinking when performing cooling tasks.



The organisers requested entrants to provide a video of not more than 10 minutes in length and to speak in their local language to promote inclusiveness and provide a lasting resource that could be used to encourage more women into the sector.

Léana Khaled Payan’s entry was chosen from 12 finalists – three from Spain, two from France, two from Turkey, and one each from Ireland, Poland, Italy, Norway, Slovakia.

An after-sales service technician with Axima Refrigeration for the last five years, Payan received her prize – a cheque for €1000 – at last week’s 20th European RACHP Conference in Milan, which she attended as a guest of the organisers.

Léana’s [entry](#), along with the 11 other entries can be viewed on [AREA’s YouTube channel](#)

**CoolingPost, 13 June 2023**

*Image: [CoolingPost](https://www.coolingpost.com) website*

## 16. Heat pumps - action plan to accelerate roll-out across the EU

The use of efficient heat pumps in buildings, industry & local heat networks is 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 07 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](#).

### [Refrigeration Industry, 13 June 2023](#)

*Image: Refrigeration Industry*

## 17. Policy makers experience Cool Training with all senses

A week-long training programme in Germany in May provided policy makers from around the world with a unique learning experience focused on ozone and climate protection.

The training programme struck a balance between technical content and thematic input to suit the diverse backgrounds of the participants. It aimed to improve their understanding of the technical aspects of Green Cooling while providing relevant knowledge for their policy role.

The participants work as National Ozone Unit Officers (NOU) or climate focal points within ministries and governmental bodies of their respective countries from around the world. 13 countries from South America, the Caribbean, Africa, Europe and Asia were represented in the training at the vocational training center Bundesfachschule Kälte-Klima-Technik (BFS) in Maintal, close to Frankfurt, Germany.

During the training, participants had the opportunity to use their senses in various activities such as smelling, hearing, and feeling to enhance their understanding of natural refrigerants in the cooling sector.

### **Smelling ammonia**

A visit to the Wilhelm Brandenburg sausage factory taught participants the importance of detecting even the smallest leaks in ammonia-based cooling systems. The participants discovered that leaks can be recognized by the distinct smell of ammonia long before the amount of gas gets dangerous. This hands-on experience highlighted the importance of early detection to avoid accidents. Another trick to avoid dangers: the cooling system of Wilhelm Brandenburg consists of two parts. An ammonia system is installed outside the production halls. It cools down a harmless liquid that runs through the production halls and cools the meat. This two-part system avoids that the meat gets poisoned in the case of a leak.



### **Listening to CO<sub>2</sub>**

In another activity, participants encountered an air conditioning system filled with R744 (CO<sub>2</sub>). They were instructed to start the process slowly to prevent the CO<sub>2</sub> from turning into dry ice that could clog the hose. By listening carefully, the participants, were able to hear the sound of the flowing gas, highlighting the importance of careful monitoring during the operation of cooling systems.



### **Touching propane cooling**

In another lesson, the trainer, Reiner Mayers of BFS, showed how to fill a refrigerator model with propane. The participants tested by touching if it was successful: the refrigerator components, including the hoses, became extremely cold, illustrating the effectiveness of propane as a refrigerant.



By incorporating these sensory experiences, the training programme provided a comprehensive and immersive learning environment. The NOU and climate focal points gained a deeper understanding of the practical aspects of refrigeration systems so that they can make informed decisions and develop effective measures to protect the climate and the ozone layer.

The technical expertise was complimented with policy-oriented presentations. The Cool Training thereby contributed to the development of a well-rounded approach to ozone and climate protection at the government level.

### **Supported by...**

Due to the diverse origins of the participants, the training was financed in different parts by different projects commissioned by the Federal Ministry for Development and Cooperation (BMZ), the Federal Ministry for the Environment and Consumer Protection (BMUV) and the Federal Ministry for Economic Affairs and Climate (BMWK) of the Republic of Germany (in the context of the International Climate Initiative), and by the European Union (EU).

### **Green Cooling Initiative (GCI), 5 June 2023**

*Image: GCI website*

## 18. German Life Cycle Assessment finds Ammonia more environmentally friendly than synthetics or hydrocarbons for residential heat pumps

A life cycle assessment (LCA) of residential air-to-water heat pumps found that ammonia (R717)-based units are more environmentally friendly than those using synthetics or hydrocarbon refrigerants.

The assessment was conducted by the Institute for Energy Efficiency Buildings and Indoor Climate at RWTH Aachen University in Aachen, Germany.

Hannah Romberg, Research Associate, E.ON Energy Research Center and the Institute for Energy Efficiency Buildings and Indoor Climate at RWTH Aachen University, presented the findings at the International Energy Agency (IEA) Heat Pump Conference held in Chicago, Illinois, May 15–18.

Heat pumps offer “huge” greenhouse-gas-emission-reduction potential, depending on the refrigerant, Romberg said. “However, they could increase the impact on other environmental categories, which is why we need an LCA to avoid burden shifting from one environmental category towards others.”

Under the LCA definition, unit operation had the largest impact on environmental categories. “Therefore, the electrical demand has the highest influence on the environmental impact,” said Romberg.

“Across all refrigerants, R717 causes the lowest environmental impacts in all categories due to high efficiencies,” the Institute says in a [paper](#) submitted for the IEA conference, despite the refrigerant being used more often in the commercial and industrial heat pump markets than the residential one.

“The system boundaries [of the LCA] include the production of refrigerant and heat pump, the operation of the heat pump, any leakage of refrigerant, and upstream processes, e.g., materials and energy,” says the paper. The LCA did not include unit or refrigerant recycling due to a lack of data.

The LCA found the environmental impact of refrigerant production and leakage was negligible for the hydrocarbons and ammonia refrigerants. There was a slight impact on climate change from HFC refrigerant leaks and a bigger effect on ozone depletion for synthetic refrigerant production due to leakages in the production chain, Romberg said.

In heat pump production, the largest environmental impact was in the human toxicity and resource consumption categories. “[However], it is also noticeable that the impact of ammonia heat pump production is comparatively low in these categories, which can be attributed to the absence of copper,” Romberg added. Copper is not approved for use with R717 since ammonia “attacks” copper and copper alloys.

Compared to gas heating, the Institute found heat pumps reduced environmental impacts in four of the 16 categories, significantly reducing greenhouse gas emissions. However, “in the remaining 12 environmental categories, a heat pump causes higher environmental impacts,” such as on resource and water consumption, the Institute said, describing this as “burden shifting.” Further research has to assess the relevance of the identified burden shifting, the Institute added. Increasing heat pump efficiency could further reduce environmental impacts.

### Assessment scope

The assessment evaluated seven refrigerants in a “simple” air-to-water heat pump cycle to provide residential space heating in a Western German climate through a 20-year life span across 16 environmental impact areas. The operating ambient temperature profile ranged from roughly -10 to 30°C (14 to 86°F) with an indoor air temperature set at 21°C (70°F), the Institute said.



The refrigerants assessed included two HFCs: R410a and R32; an HFO: R1234yf; three hydrocarbons: R290, R1270 and R600a; and ammonia. Not included in the assessment was the natural refrigerant CO<sub>2</sub> (R744).

For the natural refrigerants, primary resources for the LCA came from the commercial database ecoinvent, allowing direct modeling. Such data sets do not exist for synthetic refrigerants, so the modeling was based on the literature data outlined in the submitted paper, Romberg said.

Based on the data sheets, the LCA used a specific heat pump size of 18kg/kW (141.5lbs/TR). "We made the assumption of the specific weight being constant because we could not find any refrigerant-dependent data," Romberg said.

"Using a TEASER framework for the simulation of a two-story single-family house, we have a heat demand of about 20,000kWh with a maximum heat output of 7.5kW [2.1TR]," she added. The paper lists the specific refrigerant charges for the refrigerants as 0.3kg/kW (2.5lbs/TR) of R410a, 0.25kg/kW (2.0lbs/TR) of R32, 0.35kg/kW (2.8lbs/TR) of R1234yf, 0.15kg/kW (1.2lbs/TR) of R290, R1270 and R600a and 0.1kg/kW (0.8lbs/TR) of R717.

The heat pump model, having fluid-dependent efficiency, determined the optimal SCOP of each refrigerant by varying the pressure levels accordingly, Romberg said, giving R410a a SCOP of 3.71; R32 – 3.99; R1234yf – 3.82; R290 – 4.2; R1270 – 4.19; R600a – 3.81; and R717 – 4.27. The researchers calculated the electrical input required for each refrigerant based on the results.

With R410a as the reference refrigerant, ammonia gave up to a 20% lower impact on climate change, Romberg said. Ammonia also had the lowest impact across the remaining 15 environmental areas in all four system boundaries.

### **Grid influence**

"If we want to reduce the operational emissions, we basically have two options," Romberg said. "We could either increase the efficiency of the heat pump or have a look at the environmental impact of the grid electricity."

The German electricity (GE) mix of 2018 was used for the heat pump LCA, Romberg said. Using available data from ecoinvent, the Institute looked at four other grid electricity possibilities: GE transitioning to sustainable development scenario (SDS), SDS, wind energy and photovoltaic (PV).

Using heat pumps with static SDS reduces nine out of the 16 environmental impact categories and GHG emissions by 79% over gas heating, the report said. Wind power reduces GHG emissions by 89% with reductions in 11 categories. PV reduces GHG emissions by 81% with reductions in 8 categories.

Using heat pumps reduced environmental impact in climate change, ozone depletion, photochemical ozone formation and energy resource consumption in all five electricity mixes, the report says. "However, eutrophication, freshwater and human toxicity; the environmental impacts of carcinogenicity; and resource and water consumption all increase when switching to a heat pump for all five electricity mixes."

### **Future research**

"This work is intended to provide a basis," the Institute said, adding that future work should consider the following:

- other parts of the building energy system, such as the distribution system, the buffer tanks, or the building envelope based on each refrigerant's volumetric refrigerant capacity;
- using dynamic LCA for improvements in the supply chains of materials and refrigerants;
- unit and refrigerant recycling; and
- analyzing the causes associated with increased environmental impact in the 12 affected categories due to burden shifting.

[Ammonia21, 7 June 2023, by Jae O. Haroldsen](#)

Image: Ammonia21



26<sup>E</sup> CONGRÈS  
INTERNATIONAL  
DU FROID

26<sup>TH</sup> INTERNATIONAL CONGRESS  
OF REFRIGERATION

development. [Learn more >>>](#)

To be organised by the French Association of Refrigeration (AFF) under the theme “[Towards Efficient, Controlled and Smart Refrigeration](#)”, the 26<sup>th</sup> 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

## FEATURED



**Summary of the 34<sup>th</sup> 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](#)



### **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 at 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:**

- [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 93<sup>rd</sup> 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 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)

Substance ID	Quantity ODP Allowed (t)	Quantity GWP Allowed (t)	Inventory (t)	Ratio (t)	Quota (t)	Ratio (t)
100000	100000	100000	100000	100000	100000	100000
100000	100000	100000	100000	100000	100000	100000
100000	100000	100000	100000	100000	100000	100000
100000	100000	100000	100000	100000	100000	100000

**HCFC Quota and Licence Tracker** - a new desktop application to assist with HCFC licenses 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 licenses. 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 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)

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](#)

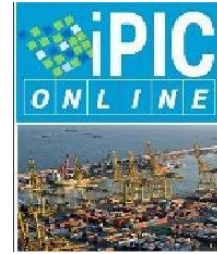
 The videos are also available for download by request from UNEP OzonAction: [unep-ozonaction@un.org](mailto:unep-ozonaction@un.org)



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](#).

**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 field and follow in their footsteps. **Read/download the publication**

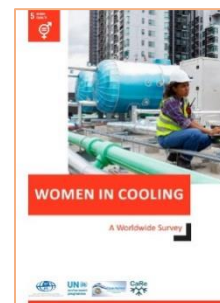


As part of IIR and UNEP OzonAction's partnership, a set of Cold Chain Technology Briefs was released over the past few years, which includes in-depth summaries about the cold chain in different key sectors. They include descriptions of technology, refrigerant options and trends and conclude with prospects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

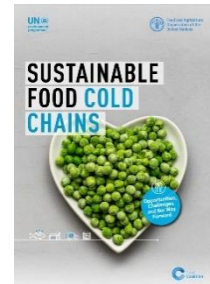


## PUBLICATIONS

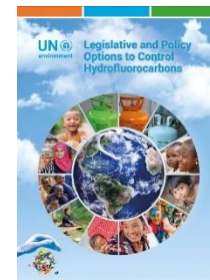
**Results of a Worldwide Survey about Women in Cooling Released by IIR and UNEP OzonAction** - Refrigeration, Air-Conditioning, and Heat-pumps (RACHP) are crucial for our health, nutrition, comfort, and well-being. It is one of the sectors that crosscuts many of the UN sustainable development goals and 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:

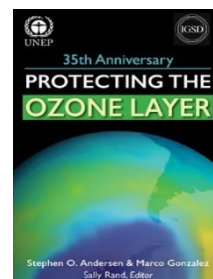
- Safety hazards and health considerations
- Emergency shutdown procedures
- Addressing deviations from system operating limits
- Risks and costs of non-compliance with regulatory standards

Request free Download [here](#)



[Protecting the Ozone Layer - 35<sup>th</sup> Anniversary Edition](#) - a new book celebrating the 35<sup>th</sup> 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 (N<sub>2</sub>O), feedstock exemptions for plastics production, and dumping of obsolete cooling appliances.

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



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