Volume XXIV | 30 August 2024

In this issue:

GLOBAL

1. Kigali Amendment latest ratifications

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

Bahrain, 1 July 2024
United Arab Emirates, 19 April 2024
Thailand, 3 April 2024
Djibouti, 8 March 2024
Guatemala, 11 January 2024

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. World Ozone Day 2024 - Montreal Protocol: Advancing Climate Action

The Montreal Protocol is rightly hailed as a multilateralism success story. It united the world to phase out ozone-depleting substances putting the ozone layer on the path to recovery and protecting all life on Earth. On this World Ozone Day, we also celebrate its climate action.

Phasing out ozone-depleting substances has proven to be a powerful tool for climate action that has helped slow global warming, for example, postponing the first ice-free Arctic summer by up to 15 years.

Through the Kigali Amendment, climate action is being further accelerated. Countries commit to phase down the production and consumption of hydrofluorocarbons (HFCs) – powerful climate-warming gases that replaced ozone-depleting substances in the various sectors. If the Amendment is fully ratified and implemented, up to 0.5°C of warming could be avoided by 2100.

Cooling equipment represents 20 per cent of total electricity consumption today and is expected to more than double by 2050. Kigali Amendment implementation alongside a switch to energy efficient cooling equipment could potentially double these gains!

Work has already begun to deliver on these climate action gains. Nearly 80 per cent of Parties have ratified the Kigali Amendment, including the US, China and India – all major producers or consumers of HFCs. Developed countries began phasing down HFCs in 2019 with many developing countries starting this year.

So, on this World Ozone Day, we not only celebrate the achievements to date but also look to the future for deeper and faster action under the Montreal Protocol. Deeper and faster for the ozone layer but above all, for people, for climate and for the planet.

UNEP Ozone Secretariat, World Ozone Day 2024
Image: UNEP Ozone Secretariat

World Ozone Day 2024 "Montreal *Protocol: Advancing Climate Action*"
> **Theme in** Arabic Chinese English French Russian Spanish
> **Graphic visualisation:** Posters for printing: Arabic Chinese English French Russian Spanish

3. Guidance on Sustainable Cooling Approaches for Enhanced nationally determined contributions (NDCs)

Addressing HFCs, Energy Efficiency, and Equitable Access

The Basis for Addressing Cooling in your NDC

In 2023, the world experienced the hottest summer on record, and 2024 is breaking similar records for both air and ocean temperatures. [1] Elevated temperatures lead to dangerous conditions for human health, trigger wildfires, and aggravate droughts, among other challenges. These, in turn, impact food production and storage, as well as access to water and food security.
As global temperatures continue to rise due to climate change, so will these challenges. Awareness-raising, education, well designed policies, planning and investments are all necessary to reduce the risks and impacts.

There are many solutions, ranging from passive cooling initiatives in cities and building design, to national labelling and import regulations; but most require careful planning and capacity for implementation.

“Cooling” refers to a spectrum of practices, equipment, and technologies, ranging from refrigeration to air conditioning and heat pumps (RACHP), that provide comfort for living and working spaces, as well as reduce the temperature of products and equipment to maintain their freshness, viability, and function. Refrigeration is used for a wide range of purposes, including personal use, food and medicine production, storage, transport, and sale. Air conditioning, once used primarily to keep people comfortable in homes, workspaces, and buildings with public use, like schools and hospitals, is increasingly being used to cool spaces for other uses, like data centres and product storage, among others.

Cooling can also refer to non-equipment practices that reduce temperatures, like building design, insulation, tree planting, and others, often referred to as “passive cooling”.

“Sustainable cooling” refers to climate friendly cooling solutions that reduce emissions, are more energy efficient, and take into consideration equity in proving access and advancing sustainable development benefits for all.

Most cooling equipment demands high levels of energy to function, especially during peak hours, leading to greater emissions from energy production and increasing the burden on individual households and energy systems.

Most cooling technologies have historically used fluorinated gases (f-gases) to reduce temperatures. Due to the damage they cause to the ozone layer, these gases, including chlorofluorocarbons (CFCs), were eliminated through the Vienna Convention to Protect the Ozone Layer and its Montreal Protocol. Their replacement gases – hydrochlorofluorocarbons (HCFCs) were less harmful to the ozone layer but like CFCs are very potent greenhouse gases (GHGs). The gases developed to replace HCFCs, called hydrofluorocarbons (HFCs), do not harm the ozone layer but are highly potent GHGs. HFCs are industrial chemicals used worldwide in air conditioners, refrigerators, aerosols, foams, and other products. They have high global warming potential (GWPs) ranging from 12 to 14,800 times more than CO_2 emissions. HFC emissions are growing at a rate of 8% per year, and annual emissions are projected to continue rising due to increased demand.

Global efforts towards reducing HFCs is currently underway thanks to the Kigali Amendment to the Montreal Protocol. Securing these emissions reductions and associated co-benefits of the Kigali Amendment is an extraordinary opportunity for countries that NDCs can help deliver.

The Climate and Clean Air Coalition (CCAC), 19 August 2024

Image: CCAC

4. Effective realization of abatement measures can reduce HFC-23 emissions

Abstract

HFC-23 is a potent greenhouse gas, predominantly emitted as an undesired by-product during the synthesis and processing of HCFC-22 (ref. [1]). Previously, the Clean Development Mechanism and national efforts called for the implementation of abatement technology for reducing HFC-23 emissions[2,3].

Nevertheless, between 2015 and 2019, a divergence was found between the global emissions derived from atmospheric observations and those expected from reported abatement[1,2].

Primarily, this points to insufficient implementation of abatement strategies[2,4], calling for independent verification of the emissions at the individual chemical facility level.

Here we use regional atmospheric observations and a new, deliberately released tracer to quantify the HFC-23 emissions from an HCFC-22 and fluoropolymer production facility, which is equipped with waste gas destruction technology.

We find that our inferred HFC-23/HCFC-22 emission factor of 0.19% (0.13–0.24%) broadly fits within the emission factor considered practicable for abatement projects[5,6].

Extrapolation to global HCFC-22 production underscores that the operation of appropriate destruction technology has the potential to reduce global HFC-23 emissions by at least 84% (69–100%) (14 (12–16) Gg yr^{-1}). This reduction is equivalent to 17% CO_2 emissions from aviation in 2019 (ref. [7]).

We also demonstrate co-destruction of PFC-318, another by-product and greenhouse gas. Our findings show the importance of the 2016 Kigali Amendment to the Montreal Protocol, which obligates parties to destroy HFC-23 emissions from facilities manufacturing hydrochlorofluorocarbons and hydrofluorocarbons “to the extent practicable” from 2020 onwards[8].

***Authors**: Dominique Rust, Martin K. Vollmer, Stephan Henne, Arnoud Frumau, Pim van den Bulk, Arjan Hensen, Kieran M. Stanley, Renato Zenobi, Lukas Emmenegger & Stefan Reimann*

Nature, 21 August 2024

Image: Nature

5. Potential Assessment of Hydrofluoro Refrigerant-Based Adsorption Cooling Systems
Summary

To contribute to the climate goals set by the Kigali amendment, the present study explores the potential of hydrofluoro refrigerants for adsorption cooling applications.

A performance analysis is carried out in the present study using Maxsorb III activated carbon for the commercial hydrofluoro refrigerants of R134a, R32, R410A, and R1234ze(E) for an air-conditioning application.

The distinct advantage of avoiding additional components and heat exchangers of such a commercial hydrofluoro refrigerant-based adsorption system when cascaded with a commercial vapor compression refrigeration (VCR) system is explored in the present study, through various cascaded configurations.

The working pair of Maxsorb III–R1234ze(E) is seen to yield the best cooling performance among the considered pairs, in terms of both Coefficient of Performance (COP), specific cooling energy (SCE), and lower regeneration temperatures. Furthermore, a COP enhancement of over 60% is estimated for the VCR system with an appropriate cascaded configuration with the working pair of Maxsorb III–R1234ze(E).

The present study identifies the potential of the upcoming low-GWP (global warming potential) hydrofluoroolefins (HFOs) for their deployment in the adsorption cooling systems for load reduction.

Authors: *Sai Yagnamurthy, Md. Amirul Islam, Bidyut Baran Saha, Dibakar Rakshit*

Wiley, 23 August 2024

Image: Wiley

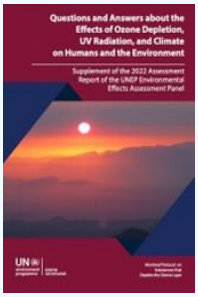
UNEP OzonAction supports women in cooling at Chillventa - UNEP OzonAction is joining other international organizations to promote opportunities for women in the refrigeration, air conditioning, and heat pump (RACHP) sector at the INWIC stand in Hall 9 at Chillventa. INWIC, the International Network for Women in Cooling, will be one of the 900-plus exhibitors represented at **Chillventa, the biennial trade fair in Nuremberg, Germany, that takes place this year from 8 to 10 October**. UNEP OzonAction is one of the INWIC founding partners.

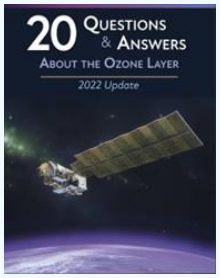
Visitors to Chillventa are encouraged to visit INWIC at Stand 9-125 in Hall 9 to learn more about how they can join INWIC and how they can support INWIC events.

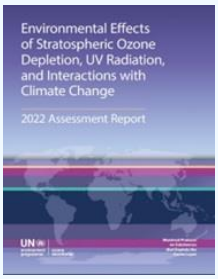
Learn more about
>>> **Chillventa** and register to attend.
>>> **INWIC** activities and how it is inspiring women worldwide to become engaged in RAC.

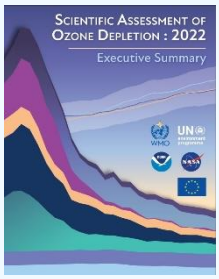
Guidebook on Mainstreaming Gender in the Implementation of the Montreal Protocol - OzonAction, in consultation with UN Women and a gender expert, has developed this **Guidebook on Mainstreaming Gender in the Implementation of the Montreal Protocol** to advance the agenda of gender equality and women's empowerment through the implementation of Montreal Protocol activities. The Guidebook is designed to assist National Ozone Officers with addressing gender issues through their daily work and operations. **Read/download English | Russian**

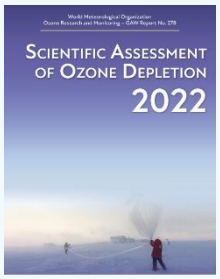
Upcoming 2024 World Cold Chain Symposium (WCCS) **-** Less food waste. Reduced greenhouse gas emissions. Greater food security. This is the path to addressing hunger and a better future. It takes a more sustainable cold chain to get us there. The WCCS is a global conference organized by The Global Food Cold Chain Council (GFCCC) in partnership with the United Nations Environment Programme (UNEP) and sponsored by Carrier. **The 2024 World Cold Chain Symposium, Bangkok, Thailand, on Saturday, 26 October 2024. Register now** to join the Global Food Cold Chain Council and experts worldwide, as we come together for an in-person, complimentary event focused on the benefits of building efficient and sustainable business models for the development of the cold chain around the globe.











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.

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

Vanuatu's Case Study on Integrating ODS/HFC Module into the National Single Window System - The National Single Window is a centralized system that links all relevant government approving authorities and acts as a 'one-stop-shop' where importers and exporters may submit applications electronically including information and all required paperwork to support the application and approval process. **Read/Download the Factsheet >>>**

Recognition of Prior Learning Scheme for Refrigeration and Air-Conditioning Servicing Technicians in Mongolia - The Recognition of Prior Learning (RPL) process can help those in the industry acquire a formal qualification that matches their knowledge and skills and thereby contributes to improving their employability, mobility, and lifelong learning. RPL can make a significant contribution to providing the relevant learning framework necessary for the present and ongoing maintenance of a quality workforce, especially in the RAC servicing sector. In Mongolia, the RPL process has been rolled out in over 30 TVET trades in the construction, mining, and other sectors, including apparel and culinary etc. Mongolia initiated the RPL scheme for RAC servicing technicians as part of their implementation of the HPMP in cooperation with various national stakeholders. **Read/ Download the Factsheet >>>**

AFRICA

6. Refrigerator technicians warned against releasing gas (Zimbabwe)

Refrigeration technicians have been warned against releasing refrigerant gas into the atmosphere during maintenance as this is harmful to the ozone layer.

The use of hydrofluorocarbons (HFC) is now regulated under the Montreal Protocol, and Zimbabwe is adopting lower global warming alternatives such as hydrocarbons, carbon dioxide or ammonia.

The head of the Ozone Layer Unit, Mr George Chaumba told delegates at a workshop recently held in Bindura that the Montreal Protocol, which was amended in Rwanda, seeks to reduce the production and consumption of HFCs by more than 80 percent.

Mr Chaumba said in a bid to support refrigerant technicians, Zimbabwe acquired 120 recovery machines using funds from the Montreal Protocol.

The Herald, 21 August 2024

Image: The Herald - Fungau Lupande

7. Advanced Training for Cooling Technicians in Nigeria with Centro Studi Galileo and UNDP

As part of a project carried out with the Nigerian Ministry of Environment, Centro Studi Galileo has launched an intensive training program for cooling technicians aimed at enabling the implementation of the European certification model. This project, which includes both Training of Trainers (ToT) and technical training, is conducted under the aegis of the United Nations Development Programme (UNDP).

In 2023, a group of Nigerian professionals was hosted in Italy for advanced training as part of the Training of Trainers project. They then returned home to contribute to the development of local skills.

For the training of technicians in Nigeria, Max Vanderhenst, an expert trainer from Centro Studi Galileo, was hosted in Nigeria. He conducted two sessions in July, with another two sessions in August.

The sessions in Nigeria were held at Cool Plus, managed by Ade Awujoola, a long-standing collaborator of Centro Studi Galileo. The project was made possible thanks to effective communication and continuous support from the Nigerian Ministry of Environment and the local National Ozone Unit (NOU).

The training program is structured to provide a combination of theory and practice, with a particular focus on RACHP (Refrigeration, Air Conditioning, and Heat Pumps) best practices, energy efficiency, and new flammable refrigerants.

The primary objective of this project is to transfer advanced knowledge and skills to Nigerian technicians, enabling them to improve energy efficiency and operational practices in the refrigeration and air conditioning sector. Additionally, the initiative aims to create a sustainable certification framework that the country can adopt independently in the future.

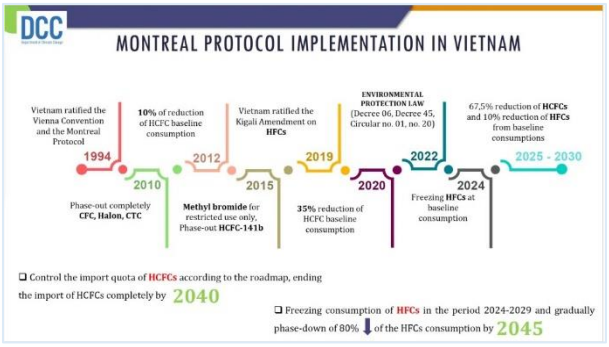
The training also focused on the use of new flammable refrigerants, a crucial area for reducing environmental impact and improving operational safety.

Industria e Formazione, 2 August 2024

Image: Industria e Formazione

ASIA AND THE PACIFIC

8. Vietnam developing best-practice HFC lifecycle management systems



As Vietnam's GDP grows, so is demand for cooling appliances, particularly air-conditioners, many of which contain super-polluting hydrofluorocarbons (HFCs) with global warming potentials many thousands of times higher than carbon dioxide.

The Government of Vietnam has been steadily working towards meeting its commitments to the Kigali Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer by committing to phasing out the use of HFCs by 80% by 2045 – equivalent to 2.7 million tonnes of carbon dioxide. If fully supported the Kigali Amendment will avoid up to 0.4°C of global warming this century while continuing to protect the ozone layer.

The phase out of HFCs does not however solve the problem of existing HFCs in circulation at different stages of their lifecycle. Used equipment containing HFCs is often disposed of inadequately by dumping onto poorer country markets or in regular landfill or recycling, without properly processing the remaining HFCs, which eventually enter the atmosphere.

In 2022 the government of Vietnam introduced new regulations mandating user responsibility for the proper processing of HFCs in banks to prevent them released into the atmosphere. Article 24 Decree No. O6 on Mitigation of GHG Emissions and Protection of Ozone Layer. places registration and reporting requirements on organisations manufacturing, exporting, importing, and taking part in the disposal of controlled substances. The law also increases the requirements for technical training of technicians working with controlled substances such as HFCs.

This means that cooling equipment importers and users will be obliged to register their equipment, avoid leakage and also recover and destroy HFCs and other ozone damaging substances. The government of Vietnam now seeks to strengthen its regulatory system for the cooling sector by introducing an electronic system to register refrigerant users and track the domestic flow of refrigerants with CCAC support.

Registration is crucial in the monitoring, reporting and verification (MRV) of HFC user's obligations under Vietnam's environmental laws mandating the safe processing of used cooling equipment. MRV systems are also important for supporting the emergence of value chains for private sector investment in adequate HFC disposal facilities. While some private companies already track their HFCs, they need to connect their data systems to government platforms.

In developed countries, proper implementation of user-responsibility systems has led to the emergence of circular economy networks for the re-use of valuable metals and other materials used in cooling equipment. Examples include systems which tax the importer, while others require the consumer buy coupons to dispose of the old equipment properly.

Vietnam's process for developing electronic MRV systems has benefitted from long-standing cooperation with the Government of Japan, which has modelled user-responsibility systems for HFC reduction, resulting in a 44% recovery rate for used refrigerants in 2022 – one of the highest rates in the world. "Vietnam is able to leapfrog many years of paper-based systems and different models trialed globally in places such as Australia and Japan," said Kato Makoto, from Japan's Overseas Environmental Cooperation Center, Japan and the Initiative on Fluorocarbons Life Cycle Management (IFL).

According to the Institute for Governance and Sustainable Development, without a robust lifecycle refrigerant management regime, approximately 90 billion metric tons of CO_2-equivalent of ozone-depleting and HFC refrigerants will be released by the end of this century. This includes refrigerant already in use today, and refrigerant expected to be produced through 2100 under the current phasedown schedule of the Kigali Amendment to the Montreal Protocol. IGSD have identified that thoroughly implemented Lifecycle Refrigerant Management schemes could prevent fluorocarbon emissions equal to nearly three full years of global energy-related carbon dioxide emissions today.

Vietnam's work on the cooling sector includes its membership of the Initiative on Fluorocarbons Lifecycle management (IFL), which forms part of the Vietnam-Japan Cooperation Plan Toward Carbon Neutrality by 2050. The IFL supports developing countries in a range of areas, including:

- Climate change mitigation and transparency
- Legislation and policy development
- Capacity development
- Investment in HFC destruction infrastructure

The Climate and Clean Air Coalition (CCAC), 28 August 2024

Image: CCAC

LATIN AMERICA AND CARIBBEAN

9. Moving Towards Sustainable Refrigeration: Training on Safe Handling of Flammable Refrigerants

One hundred refrigeration and Air Conditioning technicians participated in two trainings held in Honduras. They improved their skills on natural refrigerants and gained knowledge on sustainability in the cooling sector.

The training 'Safe Handling of Flammable Refrigerants' was successfully executed following a strategic partnership between the Secretariat of Natural Resources and Environment (SERNA), Honduras, via its Ozone Technical Unit of Honduras (UTOH) and the Green Cooling Initiative III, a project under the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

This training marks a significant advancement in promoting the adoption of eco-friendly refrigeration technologies and adhering to Honduras's commitments under the Montreal Protocol. Training sessions were held for two distinct groups across Honduras, reflecting the keen interest among Honduran companies and institutions in adopting more environmentally sustainable and efficient refrigeration practices.

From Gaining Knowledge to Embracing Implementation

One hundred national refrigeration and air conditioning professionals received technical training. In the city of San Pedro Sula, 56 professionals were trained from March 14 to 16, 2024, while in the capital, Tegucigalpa, 45 professionals were trained from March 18 to 20. The College of Mechanical, Electrical, and Chemical Engineers of Honduras (CIMEQH) offered ideal venues for this crucial training, reflecting a solid commitment to specialized technical education.

Participants were predominantly employees from companies and institutions eager to adopt safer and more innovative refrigeration practices across the industrial, commercial, and public sectors. Also, instructors from technical schools took part, gaining crucial knowledge to pass on to their students, thus extending the training's reach and impact.

The curriculum covered theoretical and practical aspects of handling natural refrigerants such as R-290 (propane). The instructor dedicated the first two days to delivering in-depth theoretical instruction, covering relevant concepts and general safety standards for technical personnel, exploring the system and its components, and teaching the proper use of temperature and pressure tables. The significance of preventive maintenance, including leak detection and refrigerant sub-cooling and super-heating assessment, was also emphasized. The final day was devoted to practical exercises, enabling participants to apply their acquired knowledge.

The methodology of continuous assessment through the use of digital tools played an important role. It enabled the instructor to swiftly identify and address areas for improvement, thereby reinforcing learning.

Completion of the Training

This training represented a substantial advancement in developing technical skills nationally. It imparted best practices in handling natural refrigerants, encouraging the adoption of environmentally sustainable refrigeration methods. The knowledge and skills taught are crucial for enhancing workplace safety and efficiency and elevating competitiveness and quality across professional fields.

Furthermore, the course underscored the importance of equipping professionals with the capability to address the challenges of their working environment and provide solutions that are specifically tailored to meet the unique demands of the refrigeration sector.

The awarding of participation diplomas marked the conclusion of this training period, signifying the beginning of a new phase of commitment for the companies and their representatives.

The Green Cooling Initiative, 21 August 2024

Image: The Green Cooling Initiative

WEST ASIA

10. The Future of Cold Storage: Ammonia Cooling Systems and Smart Racking & Shelving Solutions (Lebanon)

Lebanon's cold storage facilities are evolving rapidly, driven by the need for efficient and sustainable solutions. As the demand for temperature-sensitive goods increases, the role of advanced cooling and storage systems has become more crucial than ever. Modern ammonia cooling systems, combined with innovative racking and shelving solutions, are at the forefront of this transformation, offering businesses the tools they need to stay competitive and environmentally conscious. [...]

Ammonia cooling systems are gaining popularity in cold storage facilities due to their efficiency and environmental benefits. Unlike traditional refrigerants, ammonia is a natural compound that doesn't deplete the ozone layer, making it a more sustainable option. These systems provide superior cooling, ensuring that perishable goods like food and pharmaceuticals are stored at optimal temperatures. By adopting them, Lebanese businesses can reduce their carbon footprint while maintaining the quality of their products.

Integrating ammonia cooling systems with advanced racking & shelving solutions provides a comprehensive approach to cold storage. The synergy between these technologies enhances the overall efficiency of storage facilities. For instance, the even distribution of cold air in an ammonia-cooled environment ensures that all stored items maintain consistent temperatures. Meanwhile, the strategic placement of shelves and racks allows for better air circulation, preventing hotspots that could compromise product quality. This integration leads to fewer energy costs and extends the shelf life of perishable goods.

Racking & shelving solutions have also seen significant advancements, particularly in how they are used to maximize storage space in cold storage facilities. In Lebanon, where space is often limited, smart racking & shelving systems offer a way to store more products without expanding the physical footprint of a facility. These systems are designed to withstand low temperatures and are customizable to fit various storage needs. With innovative designs, businesses can improve accessibility and streamline their operations, ultimately leading to cost savings and increased productivity.

As Lebanon's market continues to grow, the demand for reliable and sustainable cold storage solutions will only increase. Combining ammonia cooling systems with innovative

racking & shelving options is set to revolutionize the industry. Businesses that invest in these technologies will not only enhance their operational efficiency but also contribute to a more sustainable future. This shift toward modernized cold storage is essential for meeting the evolving needs of consumers and staying competitive in a global market.

As businesses look to the future, integrating these technologies will be key to achieving sustainability and efficiency. [...] By embracing these advancements, the future of cold storage in Lebanon looks promising, paving the way for a more efficient and environmentally responsible industry. [...]

Farjallah Holding, 13 August 2024

Image: Farjallah holding

See also >>> Tips for Sustainable Air Conditioning in Lebanon: Harnessing Renewable Energy and Ammonia Cooling Systems.

NORTH AMERICA

11. Canada Seeks Feedback on PFAS, Including F-Gases

The deadline for comments on the 'Revised Risk Management Scope' is September 11.

Two Canadian federal agencies, Health Canada and Environment and Climate Change Canada, have invited interested parties to submit comments on the content of the agency's "**Revised Risk Management Scope for Per- and polyfluoroalkyl substances (PFAS)**," which contains proposals for regulating PFAS as a class, including HFOs and HCFOs.

Comments can be submitted via mail to Environment and Climate Change Canada, Gatineau, Quebec K1A 0H3; telephone: 1-800-567-1999 (in Canada) or 819-938-3232; fax: 819-938-5212; or email: **substances@ec.gc.ca**. The deadline for submissions is September 11.

Information sought includes:

- availability of alternatives to PFAS, or lack thereof, in products and applications in which they are currently used;
- socio-economic impacts of replacing PFAS, including costs and feasibility of elimination or replacement; and,
- types, quantities, and concentrations of PFAS in products manufactured in, imported into, and sold in Canada.

The Revised Risk Management Scope report was released in July, along with the **"Updated Draft State of Per- and Polyfluoroalkyl Substances (PFAS) Report**." which proposes treating PFAS as a class of chemicals that "may cause harm to human health and the environment."

Notably, both reports use a definition for PFAS established by the Organisation for Economic Co-operation and Development (OECD): fluorinated substances that contain at least one fully fluorinated methyl or methylene carbon atom. This definition, **widely**

endorsed by PFAS scientists, includes f-gases and trifluoroacetic acid (TFA), an atmospheric degradation product of some f-gases. The EU follows this definition, but the U.S. Environmental Protection Agency (EPA) does not, thereby excluding f-gases and TFA from PFAS regulations. The EPA has also declined to address PFAS as a class **despite calls to do so**.

The Canadian government plans to eventually publish a "Final State of PFAS Report" and an accompanying "Risk Management Approach" document. If the former report confirms that the class of PFAS is toxic, the latter report would outline and seek input on proposed risk management instruments. "At that time and at subsequent stages, there would be further opportunity for consultation," said the Revised Risk Management report.

Meanwhile, as part of the Revised Risk Management Scope report, the Government of Canada is proposing activities to reduce environmental and human exposure to PFAS through a phased approach, which includes:

- as a first step, a regulation under the 1999 Canadian Environmental Protection Act (CEPA) to restrict PFAS not currently regulated in firefighting foams;
- additional instruments under the Canadian Environmental Protection Act to prohibit PFAS in other uses or sectors; and
- possible voluntary risk-management actions to achieve early results to reduce releases of the class of PFAS.

Other ongoing actions on PFAS will continue, such as development of drinking water guidelines and environmental quality guidelines, management of contaminated sites and the continued administration of existing risk management actions.

Prioritization for prohibition may be based on factors such as socio-economic considerations, the availability of feasible alternatives, and the potential for human and environmental exposure. (PFAS meeting the definition of fluoropolymers are not addressed within the Revised Risk Management Scope report and are planned for consideration in a separate assessment.)

The Revised Risk Management Scope report addresses HFOs and HCFOs as part of the PFAS class. The report notes that other f-gases, such CFCs, HCFCs and HFCs, are already controlled in Canada under the Ozone-Depleting Substances and Halocarbon Alternatives Regulations (ODSHAR). Should risk management actions on HFOs and/or HCFOs be required, the report adds, "they would be developed in alignment with, and complementary to, existing regulations with controls on PFAS, such as the Ozone-Depleting Substances and Halocarbon Alternatives Regulations and the Prohibition of Certain Toxic Substances Regulations, 2012."

The Updated Draft State of PFAS Report, which calls TFA a PFAS on the basis of the OECD definition, has extensive information on the proliferation of TFA in the environment and its potential health impacts. "Given the potential for TFA to cause adverse effects and its ubiquitous presence in the environment and organisms alongside other PFAS, the potential for TFA to contribute to cumulative effects of PFAS in organisms is of concern," said the report.

The Updated Draft State of PFAS Report also points out that HFOs and HCFOs (particularly HFO-1234yf) are predicted to become "an increasingly important source of TFA in the environment" as the transition away from other f-gases continues. "As such, HFOs and HCFOs that are PFAS according to the definition of the class of PFAS remain within the scope of this report."

Voluntary risk management actions are being considered to achieve early results to reduce releases of PFAS, as a complement to the proposed regulatory instruments, the Revised Risk Management report noted. Voluntary initiatives under consideration include:

- exploring opportunities to increase disclosure of information (such as labelling) regarding chemicals of concern, that would enable consumers and importers to identify products containing PFAS;
- engaging with interested sectors on options for voluntarily phasing out of PFAS; and
- working with North American trading partners on alternatives assessment and informed substitution of PFAS.

Reducing regrettable substitution

CEPA provides the authority for the Minister of the Environment and the Minister of Health to conduct assessments to determine if substances are toxic to the environment and/or harmful to human health, and if so, to manage the associated risks. In April 2021, the Government of Canada signaled its intent to move forward with activities to address the class of PFAS based on scientific evidence indicating that the PFAS used to replace prohibited PFAS, such as perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA) and long-chain perfluorocarboxylic acids (LC-PFCAs), may be associated with environmental or human health effects.

“Addressing PFAS as a class will help to protect the environment and human health by, among other things, reducing the chance of regrettable substitution (replacing one PFAS with another less-well characterized equally problematic PFAS), supporting improved research and monitoring programs, and reducing future environmental and human exposure to PFAS,” said the Revised Risk Management Scope report.

Well-studied PFAS meet the “persistence criteria” as set out in the Persistence and Bioaccumulation Regulations of CEPA, said the Revised Risk Management Scope report. “Based on available information and structural similarities, it is expected that other substances within the class of PFAS are also highly persistent or transform to persistent PFAS.”

Canada’s previous PFAS regulations include the Prohibition of Certain Toxic Substances Regulations, 2012, which prohibit the manufacture, use, sale, and import of PFOS, PFOA, and LC-PFCAs, along with their salts and precursors, with a limited number of exemptions. On May 14, 2022, the Government of Canada published draft regulations to remove or phase-out most of those exemptions. The publication of the final regulations is expected to take place in fall 2024 and would come into force six months later.

A February 2024 report called “**Canada’s PFAS Problem**” by the Canadian NGO Environmental Defence argues that chemical industry lobbyists have come out “in record numbers” to resist federal government ambition to address PFAS as a class of chemicals. For example, the report said, the Chemistry Industry Association of Canada (CIAC) believes that taking a class-based approach to PFAS is a departure from Canada’s Chemicals Management Plan (CMP) process. The CIAC appears to “want to return to the substance-by-substance approach that led to the current situation where a handful of PFAS were restricted only to be replaced with thousands of lookalike chemicals.” Environmental Defence urges the Canadian government “to take urgent action and tackle this issue in a more comprehensive way, as PFAS researchers have been promoting for years.”

Responding to a request for comment, a CIAC spokesperson said, “Appropriately, the government has identified that not all PFAS substances have the same risk profile – essentially rejecting the notion that there is one giant class. We think the remaining classes can be further subdivided, allowing the government to prioritize substances that may have an unacceptable level of exposure. “

r744, 29 August 2024, By Michael Garry

Image: r744 - Image by OpenClipart-Vectors from Pixabay

12. University of Kansas awarded $26 million for new Engineering Research Center from National Science Foundation

LAWRENCE — The National Science Foundation (NSF) has awarded the University of Kansas $26 million to establish a new Gen-4 Engineering Research Center (ERC) — Environmentally Applied Refrigerant Technology Hub (EARTH) — that will create a sustainable and circular refrigerant economy.

NSF's Engineering Research Centers bring universities and businesses together to strengthen the competitive position of American industry in the global marketplace.

"NSF's Engineering Research Centers ask big questions in order to catalyze solutions with far-reaching impacts," NSF Director Sethuraman Panchanathan said. "NSF Engineering Research Centers are powerhouses of discovery and innovation, bringing America's great engineering minds to bear on our toughest challenges. By collaborating with industry and training the workforce of the future, ERCs create an innovation ecosystem that can accelerate engineering innovations, producing tremendous economic and societal benefits for the nation."

KU's ERC EARTH was selected from among hundreds of proposed centers.

"Working closely with industry partners, EARTH will have the resources and expertise to solve the technical, environmental and economic challenges required to create a sustainable refrigerant lifecycle that will benefit Kansans, the nation and the world. In doing this work, the center is a prime example of how the University of Kansas is driving economic development in Kansas," said Douglas A. Girod, University of Kansas chancellor.

KU is well positioned to lead this effort.

"The University of Kansas has a talented workforce and robust research capabilities," said Kansas Sen. Jerry Moran. "This new research center will allow Kansans to lead the way in developing the next generation of refrigerant technology, increasing U.S. competitiveness in an important technology and industry. Through my leadership role on the Senate Appropriations subcommittee which funds federal scientific priorities, I am pleased to help fund the U.S. National Science Foundation, which is critical to advancing U.S. research and development."

KU is the lead institution and is joined by partners at the University of Notre Dame, University of Maryland, University of Hawai'i, University of South Dakota and Lehigh University.

Mark Shiflett serves as director for ERC EARTH. Shiflett is a KU Foundation Distinguished Professor in the Department of Chemical & Petroleum Engineering and director of the Wonderful Institute for Sustainable Engineering.

"EARTH's operational design will cultivate inclusive, interdisciplinary research collaborations and foster workforce development. The EARTH team will partner with community colleges and technical schools to ensure availability of the needed workforce at all levels," Shiflett said.

At the heart of ERC EARTH's work is reimagining the process for heating, ventilation, air-conditioning and refrigeration (HVACR) systems across the globe. EARTH will develop sustainable, accessible and equitable refrigerant technologies and practices through research, education and innovation that will improve quality of life and combat climate change.

HVACR systems are widespread throughout society, enabling transportation and preservation of fresh foods, storage of medicines and cooling of buildings. Most current refrigerants are hydrofluorocarbons (HFCs), which have high global-warming potential. As

a result of leaks from existing systems and the energy required to operate them, HFCs account for nearly 8% of global greenhouse-gas emissions.

In response, the U.S. and 170 other countries are phasing down HFCs in accordance with domestic and international agreements signed in recent years, which creates a tremendous challenge to responsibly and sustainably replace billions of kilograms of refrigerants.

ERC EARTH will take a multifaceted approach to address this challenge.

“Multidisciplinary research teams will focus on three key areas: promoting the recycling and repurposing of refrigerants, developing transformative refrigerants and creating next-generation cooling and heating technologies with higher energy efficiency,” Shiflett said.

At its core, ERC EARTH will address a critical challenge facing society.

“There is a tremendous need to develop cooling/heating technologies that use less energy and new refrigerants that are safe for the environment. EARTH will be a critical national resource to address these challenges. The University of Kansas School of Engineering is proud to be leading this collaboration, which leverages multiple academic and industrial partners,” said Mary Rezac, dean of the KU School of Engineering.

This is one of the largest federally funded grants in KU history, with the potential to become the largest if the renewal option is successful. The project is renewable after five years for another $26 million dollars, for a total of 10 years and $52 million.

The University of Kansas (KU), 21 August 2024

Image: KU

See also >>> $26M grant fuels UH research on climate-friendly cooling, University of Hawai‘i at Mānoa

EUROPE & CENTRAL ASIA

13. Study Urges Audit of Teflon Plants’ Destruction of HFC-23 Byproduct

Global levels of the super greenhouse gas far exceed reported emissions, suggesting lapses in abatement measures.

A new study by European researchers has found that byproduct emissions of super greenhouse refrigerant gas HFC-23 could be substantially reduced if abatement technology is properly employed during the production of polytetrafluoroethylene (PTFE), also known as Teflon, and refrigerants like HCFC-22. It called for a global audit of these plants’ HFC-23 abatement methods.

Destruction of HFC-23, an extremely potent global-warming gas with a 100-year GWP of 14,600 (IPCC, AR6), is mandatory for parties to the Kigali Amendment to the Montreal Protocol, the 2016 global agreement to phase down HFCs. Since 2020, all Teflon manufacturers are obligated to destroy HFC-23. Appropriate disposal of HFC-23 could cut its emissions by at least 85% –equivalent to 17% of CO_2e emissions from global aviation, said the study.

The study – "Effective realization of abatement measures can reduce HFC-23 emissions" – was published on August 21 in the journal *Nature*. It concluded that many Teflon factories are failing to properly destroy HFC-23, contributing to its outsized presence in the atmosphere.

The study was conducted by Empa, (Swiss Federal Laboratories for Materials Science and Technology), the University of Bristol and the Netherlands Organization for Applied Scientific Research (TNO). It concludes that "abatement measures work – but are not being implemented everywhere," according to **an article on the Empa website**.

According to reports provided by manufacturers, global emissions of HFC-23 in 2020 were 2,000 tons. However, actual global emissions in 2020 as determined in numerous assessments were around 16,000 tons, the study said.

To explain the discrepancy, the researchers looked at HFC-23 emissions from a Teflon factory in the Netherlands. Teflon, used widely in non-stick cookware, is part of the chemical group known as PFAS (per- and polyflouroaklyl substances), which are being scrutinized by regulators for their harmful health effects.

As explained by the Empa article, the researchers used a "novel method" to accurately record the factory's HFC-23 emissions. Next to the factory they released a non-toxic "tracer gas" that does not occur in the atmosphere and decomposes within a few weeks.

At a distance of around 25km (15.5mi), they measured the concentrations of HFC-23 and other byproducts of Teflon production as well as the concentration of the tracer. "Since we knew exactly how much tracer we had released and how much of it arrived at the measuring point, we were able to calculate the emissions of HFC-23 and other gases," said the study's first author, Dominique Rust, a Research Associate at the University of Bristol who worked on the project as part of her doctorate at Empa.

The factory uses abatement measures to curb its HFC-23 emissions, burning the gas before it can escape. The study showed that emissions measured were higher than the ones the factory reported, but the amount emitted was still low, "showing that the abatement measures work well," said Empa researcher Martin Vollmer.

Audits of Teflon factories requested

Given the high measurements of HFC-23 in the atmosphere, the study suggested that other Teflon factories may not be applying adequate abatement measures. The authors of the study call on countries to have their Teflon factories independently audited. "Such independent verification of GHG emissions from the production of fluoropolymers and coolants are needed to help close the gaps in our understanding of emission sources and check that countries are fully compliant under different international climate and environment agreements," said co-author Kieran Stanley, Senior Research Fellow, the University of Bristol..

Empa researchers are planning another study in South Korea in October, when they will use the tracer method to determine the emissions of halogenated substances in the capital, Seoul.

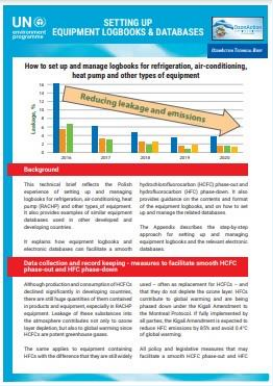
A separate study published in April in the journal *ChemSusChem* also attempted to explain the larger- than-expected concentrations of HFC-23 in the atmosphere. It points to a link between the long-term fate of HFO degradation products in the atmosphere and the formation of HFC-23.

Meanwhile, in July, the Environmental Investigation Agency (EIA) **called for "strengthened controls"** under the Montreal Protocol to reduce fluorochemical greenhouse gas emissions from "unreported, unaccounted for and unexpected" sources.

Natural Refrigerants, 23 August 2024, By Michael Garry

Image: Natural Refrigerants | Production of Teflon for non-stick pans produces HFC-23 as a byproduct. Image by Taken from Pixabay.

How to set up and manage logbooks for refrigeration, air-conditioning, heat pump and other types of equipment - Background: This technical brief reflects the Polish experience of setting up and managing logbooks for refrigeration, air-conditioning, heat pump (RACHP) and other types of equipment. It also provides examples of similar equipment databases used in other developed and developing countries. It explains how equipment logbooks and electronic databases can facilitate a smooth hydrochlorofluorocarbon (HCFC) phase-out and hydrofluorocarbon (HFC) phase-down. It also provides guidance on the contents and format of the equipment logbooks, and on how to set up and manage the related databases. The Appendix describes the step-by-step approach for setting up and managing equipment logbooks and the relevant electronic databases. **This factsheet is available in English and Russian**



FEATURED

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

Avoided CO_2e - The CO_2e App available from the Ozone Secretariat aims to raise awareness and enhance understanding of the contributions of the Montreal Protocol and its Kigali Amendment to climate change mitigation.

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 >>>**

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 93 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.

On 27 October 2023, the Thirty-Fifth Meeting of the Parties to the Montreal Protocol (35thMOP) decided on the replenishment of the Multilateral Fund for the triennium 2024-2026. The Parties agreed on a budget of US $965 million for the triennium, a record amount.

As at 8 November 2023, the contributions received by the Multilateral Fund from developed countries, or non-Article 5 countries, totalled over US$ 4.7 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 (HPMPs), 24 Kigali HFC implementation plans (KIPs), pilot projects to maintain and/or enhance energy efficiency in the context of HFC phase-down, and has funded the establishment and the operating costs of ozone offices in 145 Article 5 countries.

New and updated guides and submission forms for the preparation of project proposals:

- Guide for funding requests for preparation of national inventories of banks of used or unwanted controlled substances and a plan for the collection, transport and disposal of such substances **>>>**
- Updated interim guide for the presentation of stage I of Kigali HFC implementation plans (July 2023) **>>>**

- Updated guide for the presentation of new stages of HCFC phase-out management plans (July 2023) **>>>**

All guides and submission forms are available here

- 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.

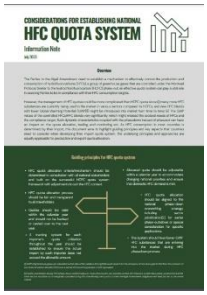
The section below features several of our most recent products.
Visit OzonAction website for more information, discover the entire range of products.

Images in this section are by OzonAction

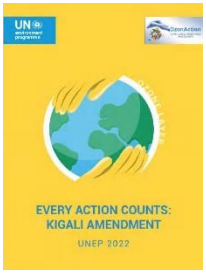
OzonAction: Celebrating International Women's Day, 8 March 2024 - on the occasion of **International Women's Day (IWD)**, UNEP OzonAction would like to express our best wishes and sincere thanks to all our female colleagues working in National Ozone Units for your leadership, outstanding dedication, great intellectual input, and tireless work on the Montreal Protocol! This treaty is often referred to as the most successful multilateral environmental agreement to date, and both women and men take equal credit in making this amazing achievement possible. OzonAction is extremely proud of all the female **Ozone Officers, Assistant Ozone Officers, technical experts, and support staff,** as well the women in national stakeholder groups and partner organizations, notably those in the **refrigeration, air conditioning, and customs**. Through your work, you are providing girls and young women who are interested in pursuing careers in environmental protection with a role model by showing them that there are successful women in Montreal Protocol fields – you are indirectly investing in their future. [...]

- **Miruza Mohamed: A Woman Behind the Maldives' Environmental Transformation**
- **Samira de Gobert: Leading Change in Environmental Communication and Women's Empowerment**
- **Colleen Keyworth - From Family Roots to Industry Beacon: Leading Advocate for Women in HVACR**
- **Laura López: Impulsando la implementación del Protocolo de Montreal y la equidad de género en Guatemala**
- **Marta Pizano: A trailblazer's path from research to global policy**
- **Liazzat Rabbiosi: A Woman Facilitating International Environmental Policy-making**
- **Cecilia Mercado: Breaking Barriers-A legacy of environmental leadership and empowerment**
- **Sarah Nakanyika: A Woman Leading Cooling Advancement in Zambia**
- **Yvette Gauthe Boko: Une femme forte à la tête du Bureau national de l'ozone au Benin**

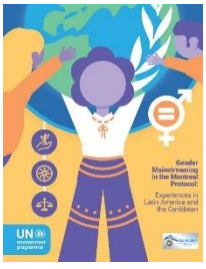
Considerations for establishing national HFC Quota System - As HFC consumption in most countries is determined by their import, this document aims to highlight guiding principles and key aspects that countries need to consider when developing their import quota system. The underlying principles and approaches are equally applicable for production and export quota allocation. **Read/download the full document**



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**

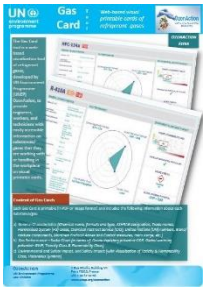


Refrigeration, Air-Conditioning, and Heat Pumps (RACHP) Associations & Organizations: This Knowledge Map provides a global directory of RACHP associations, societies, and organisations around the world. These are key stakeholders for ensuring safe and efficient refrigerant transitions.

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 it 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

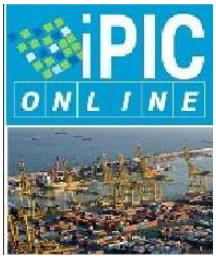
You can watch these videos on the OzonAction YouTube Channel:

- **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**.



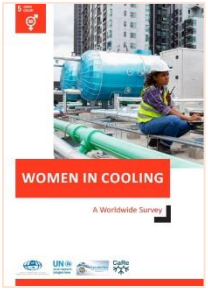
OzonAction's iPIC platform - Updated Collaboration between China and Thailand using OzonAction's informal Prior Informed Consent (iPIC) system has resulted in the prevention of a huge consignment of ozone-depleting and climate damaging hydrochlorofluorocarbons (HCFCs). Those chemicals, which are primarily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

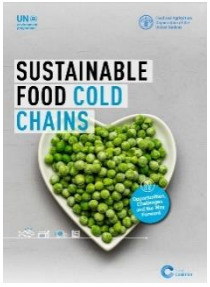
As part of IIR and UNEP OzonAction's partnership, a set of Cold Chain Technology Briefs was released over the past few years, which includes in-depth summaries about the cold chain in different key sectors. They include descriptions of technology, refrigerant options and trends and conclude with prospects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

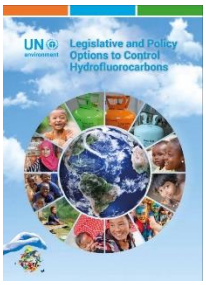
Results of a Worldwide Survey about Women in Cooling Released by IIR and UNEP OzonAction - Refrigeration, Air-Conditioning, and Heat-pumps (RACHP) are crucial for our health, nutrition, comfort, and well-being. It is one of the sectors that crosscuts many of the UN sustainable development goals and can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



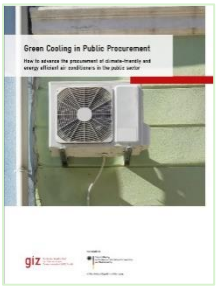
Sustainable Food Cold Chains: Opportunities, Challenges and the Way Forward-This [UNEP-FAO] report explores how food cold chain development can become more sustainable and makes a series of important recommendations. These include governments and other cold chain stakeholders collaborating to adopt a 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.



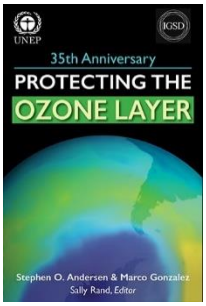
Legislative and Policy Options to Control Hydrofluorocarbons - In order to follow and facilitate the HFC phase-down schedules contained in the Kigali Amendment, the Parties, including both developed and developing countries, will have to implement certain measures. This booklet contains a recommended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



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**

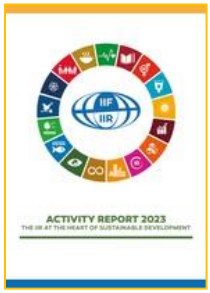


Protecting the Ozone Layer - 35th Anniversary Edition - a new book celebrating the 35th Anniversary of the Montreal Protocol. The electronic version (Kindle Edition) of the book has become **available for purchase $3.03 on Amazon**. The book highlights successes and documents innovation during the first 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.

The International Institute of Refrigeration (IIR) **IIR Activity Report 2023 | Rapport d'activité de l'IIF - 2023** is available online. It is a must-read for everything you need to know about advances in the field of refrigeration! Read/Download the full report to discover the IIR's actions and achievements in 2023 in its quest for a cooler, greener and more sustainable future! **English** | **French**



Navigating New Horizons A global foresight report on planetary health and human wellbeing - To help navigate current and future uncertainty and disruptive change, while effectively delivering on its mandate, UNEP has been implementing an institutionalized approach to strategic foresight and horizon scanning with the view to developing an anticipatory and future-oriented culture. This mirrors the growing interest and demand for foresight that is also reinforced by the United Nations reform agenda and the Secretary-General's report on 'Our Common Agenda', which calls for all UN agencies, as well as all UN member states, to engage foresight practices more deeply and apply the derived insights to address global systemic risks. This process has culminated in the development of the present report.

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Prepared by: Samira Korban-de Gobert
Reviewed by: James S. Curlin

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Samira Korban-de Gobert, samira.degobert@un.org

UNEP, OzonAction, 1, rue Miollis, Bldg. VII – 75015, Paris • France