

# OzoNews

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

**Volume XXIV | 30 September 2024**

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## 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

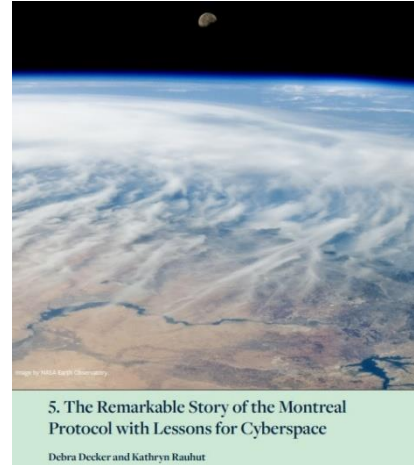
*Image: UN Treaty Collection website*

### 2. The Remarkable Story of the Montreal Protocol with Lessons for Cyberspac

Learning from the large-scale global effort that helped reverse atmospheric ozone depletion.

#### What do ozone layer depletion and cyber threats have in common?

One of the most profound success stories of international climate action, the Montreal Protocol is a testament to how effective a mix of incentives and penalties, commonly known as “carrots and sticks,” can be in driving responsible behavior, even when states have vastly different priorities and resources.



Faced with the rapid depletion of the stratospheric ozone layer, policymakers and environmental experts relied on a combination of binding commitments and regular reporting/program monitoring, along with incentives and penalties, to motivate compliance based on objective and realistic criteria. This approach made the mechanism a success story filled with many examples for forging effective collective action in shared domains, such as the Earth’s atmosphere—or cyberspace.

On September 16, the International Day for the Preservation of the Ozone Layer, we discuss those aspects of the Montreal Protocol that made it successful, and extract lessons for accountability in the cyber domain. [...]

Important lessons for cyberspace can be taken from studying the development and implementation of global efforts to reduce the risks from stratospheric ozone. [...]

#### Relevance to Cyber

The upper atmosphere and cyberspace are both areas where collective action is needed to address cascading effects, the transboundary nature of threats, and the potential harm to the global commons. The long-persistent effects of ODS on the ozone layer made that issue clearly urgent, whereas the harmful scenarios in cyberspace are not universally accepted or always seen as urgent. Although conditions in the world have changed from when the Vienna Convention discussions began, today’s fractured state relations need not stymie progress on cooperation. Even in 1991 when it was a time of difficult transition for the former Eastern Bloc, the former Soviet Union, and the United States, they found they could cooperate to monitor the ozone layer.

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Who can have, and who can afford safer and more secure technologies? The global South and many others at first expressed their basic need for affordable refrigeration and were reluctant to address issues related to ODS. Some, even in developed states, doubted the true effects of ODS and viewed the short-term effects on the economy of disrupting existing industrial practices as too costly. Likewise in cyberspace, the global South and even some in the industrialized North value low-cost, less secure information communications technologies (ICTs) as potentially worth the gains that are possible through quicker, cheaper digitization. Scientists, technologists, and industry experts are critical players in developing solutions to issues in both areas. For ODSs, those discussions and the latitude for compliance are still evolving, even after many decades, given the advances in science and technology—including in monitoring. In cyberspace, that process is still nascent.

### **Key Takeaways and Recommendations**

#### **Consider Developing New Technological/Control Approaches**

The depletion of stratospheric ozone is a singular well-defined risk that has required new technologies and approaches to be developed and updated as new risks and threats are discovered. Science and investments in research and development supported the transition from agreeing to a framework treaty and protocol to implementation of those instruments. Society, including the private sector, benefited as has the environment.

Unlike ozone, cyberspace presents a multiplicity of problems that largely stem from the underlying risks posed by anonymity. While benefits abound—free, fast information flows with protections for privacy and free speech—cyber anonymity facilitates dis/misinformation and allows shielding of malicious and criminal conduct. As cyber threats have increased with the advent of artificial intelligence (AI) and malware as a service, the risks and threats have multiplied. Artificial intelligence can be applied to help protect individuals, businesses, and governments but that level of sophistication is not widely available.

*Recommendation:* New approaches for cybersecurity are needed and should continue to be explored, particularly as cyberspace evolves and new technologies generate new threats.

If the digital world could be reinvented today, what would we want it to look like in terms of technologies, access, and controls to better manage cyberspace issues? Could/should new technological approaches and regulations better strike the balance between allowing the benefits of anonymity while finding more ways to ensure accountability as needed?

#### **Define the Problem and its Relative Risks**

Although the issue of ozone depletion was clear, it was valued differently among stakeholders engaged in the Montreal Protocol process. Negotiation and incentives were needed to reach agreement on common valuations and approaches. The work of international panels of scientists, technologists, and economists informed discussions. Obtaining and measuring data and outcomes from initiatives were all key.

*Recommendation:* The value placed on privacy versus wrongful use of ICTs differs among and within states and is changing. Reaching agreement on threats and overall risks is challenging. Although discussions at the United Nations (UN) on a broad cybercrime treaty have stalled, important UN discussions on norms and laws for state behaviors continue to help build agreement. Independent panels could perform a more structured analysis of cyber threats and risks, as was done by the expert panels of the Montreal Protocol, to develop a deeper common understanding and definition of incidents and categories of harms. For example, this effort could include estimating the broader societal harms stemming from a state's actions and inactions in relation to ICT use, such as the potential cascading effects from attacks occurring in their and other countries. Obtaining data and establishing metrics in a consistent fashion are critical. Threat and risk assessments would evolve as information

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on threats and risks increases and as science, technology, and values change. Policymakers could then weigh conditional risks and their different valuations of harms and trade-offs, then consider collaborative approaches to managing specific risks.

### **Develop Agreed Approaches to Monitoring and Managing Cyber Risks**

UNEP was the original hub for assessing and managing ODS risks and *systematically* involved other organizations in measuring and reporting on the ODS risks—from how the environment was changing to what actions could and might be taken to mitigate risk. Monitoring actions and capacity-building were integral parts of the framework, with an approach that was supportive rather than confrontational. The organizational responsibilities and relationships were complex but clear and mapped out, with supportive accountability mechanisms for managing risks.

*Recommendation:* In a 2023 policy brief published as part of the process leading to the Summit of the Future to be held later in 2024, the UN Secretary-General called for the establishment of “an independent multilateral accountability mechanism for malicious use of cyberspace by States to reduce incentives for such conduct.”

Such a mechanism could not only support accountability and call out malicious uses of cyberspace, but it could also assess and develop recommendations for managing cyber threats as well as monitor implementation and adherence to agreed commitments, including international law and the behavioral norms that comprise the UN Framework for Responsible State Behavior in Cyberspace. It could help develop a structured and consistent approach to collecting data and assessing approaches. This mechanism could also support capacity-building (without duplicating existing efforts) and collectively and systematically evaluate outcomes as is done for ODS projects. The proposed UN Programme of Action (UN PoA) on state use of ICTs could help carry such efforts forward, making current efforts more efficient and effective. The possible harms that pose local, as well as systemic and international risks, could be assessed and should be prioritized to be addressed through capacity-building, regulations, and other approaches. Incentives for compliance are key, especially positive ones with assistance in developing the ability to comply.

### **Support Multilateral Leadership in Developing Agreements With Defined Roles and Responsibilities**

The beginnings of agreement on ODS came from like-minded states banding together to take leadership—the Toronto Group. Some usual allies of these states were hesitant to support efforts at first, but with strong leadership from individuals in this group and others, as well as pressures from NGOs, scientists, and eventually the public, more states and businesses came onboard. Informal consultations and workshops outside formal meetings were key to forging relationships and agreements. Clear reporting structures, with separations between governance and implementation, were established among existing and new institutions. Regional networks were established to facilitate greater sharing of expertise and reporting.

*Recommendation:* In addressing malicious cyber activity, some states have required leadership to address particular challenges through like-minded coalitions, such as the U.S. initiative on ransomware. Required coordination and leadership goes beyond states however, with cybersecurity firms and others partnering to advance security efforts. However, states and the UN could help focus the efforts of technology firms and others on what they collectively determine to be high-priority needs. Such efforts could lead to developing advisory panels similar in focus to the ODS Technology and Economic Assessment Panel with regional representation. A cyber mechanism could more precisely define what actions demonstrate

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compliance with agreed norms and international laws. Civil society could help with support as it has in monitoring ozone and other areas.

### **Recognize the Need for Adaptability and Flexibility**

The Montreal Protocol demonstrated the importance of adaptability and flexibility in responding to new scientific advancements and emerging challenges—with new solutions and approaches developed. Its negotiation process also recognized that countries with lower socioeconomic development would not be able to adapt as quickly as developed countries. Schedules were modified for those countries and programs were instituted to build their capabilities and positive incentives for compliance—with potential trade restrictions being the penalty for noncompliance.

*Recommendation:* The development and strengthening of cybersecurity norms will likewise require an adaptive process in which all stakeholders will have to continue to be flexible to keep pace with rapid technological advances such as AI and quantum computing. Any new mechanism to address cyber accountability needs to acknowledge this reality.

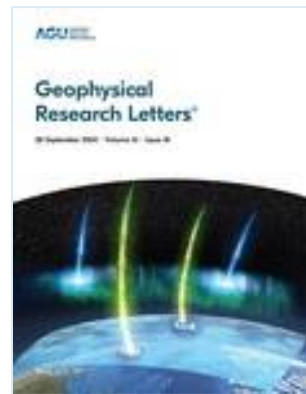
[The Multilateral Fund](#) | The Stimson Center, 18 September 2024, By: Allison Pytlak Author, Editor, James Siebens Author, Editor, Debra Decker Author, Kathryn Rauhut Author, Shreya Lad Author, Research Emerging Technology

*Image: NASA Earth Observatory*

### **3. Record High March 2024 Arctic Total Column Ozone**

#### **Abstract**

Observations of March 2024 Arctic (63°N–90°N) total column ozone set a record high of 477 Dobson Units (DU) against the 1979–2023 satellite era time series. It was about 60 DU higher than average and 6 DU higher than the previous March 1979 471 DU record. Daily Arctic ozone was above average for every day in March 2024, and set record highs from 11–26 March 2024. Microwave Limb Sounder data show this record ozone anomaly was concentrated in the lower stratosphere (10–30 km). These record values developed over the 2023–2024 winter and can be associated with vertically propagating planetary-scale wave events that caused significant stratospheric warmings. These wave events forced poleward and downward ozone advection into the lower stratosphere, leading to record column ozone levels. The above average levels persisted through August 2024 and across the northern hemisphere.



#### **Key Points**

- Arctic total column ozone in March 2024 set a record high for the 1979-present period
- Polar lower stratosphere temperatures also set a record high in March 2024 in the MERRA-2 reanalysis data
- A record amount of Rossby waves propagating upward from the troposphere caused the record total ozone and lower stratospheric temperature [...]

**Authors:** Paul A. Newman, Leslie R. Lait, Natalya A. Kramarova, Lawrence Coy, Stacey M. Frith, Luke D. Oman, Sandip S. Dhomse

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## [American Geophysical Union \(AGU\), 25 September 2024](#)

Image: AGU

**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.



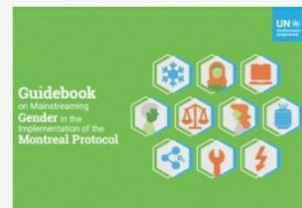
**Visitors to Chillventa are encouraged to visit INWIC at Stand 9-125 in Hall 9 to learn more about how they can join INWIC and how they can support INWIC events.**

### Learn more about

>>> [Chillventa](#) and register to attend.

>>> [INWIC](#) activities and how it is inspiring women worldwide to become engaged in RAC.

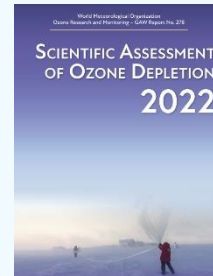
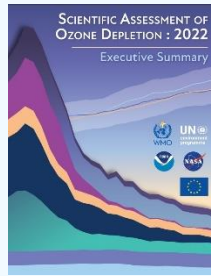
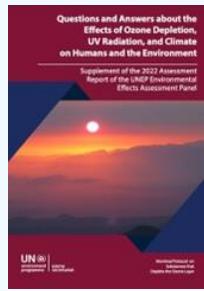
**Guidebook on Mainstreaming Gender in the Implementation of the Montreal Protocol** - OzonAction, in consultation with UN Women and a gender expert, has developed this [Guidebook on Mainstreaming Gender in the Implementation of the Montreal Protocol](#) to advance the agenda of gender equality and women's 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](#)**



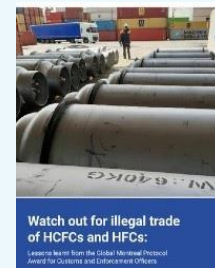
**Upcoming 2024 World Cold Chain Symposium (WCCS)** - Less food waste. Reduced greenhouse gas emissions. Greater food security. This is the path to addressing hunger and a better future. It takes a more sustainable cold chain to get us there. The WCCS is a global conference organized by The Global Food 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

### Categories

<p>1 exhibits On site post-harvesting and/or precooling applications</p>	<p>6 exhibits Storage of product, e.g., large warehouses / Distribution centers</p>	<p>6 exhibits Storage on board ships, aircraft, and containers</p>
<p>4 exhibits Food processing plants</p>	<p>1 exhibits Transport (large and smaller trucks, smaller containers)</p>	<p>8 exhibits Supermarkets (wholesale markets &amp; Retailers)</p>
<p>1 exhibits Food services (Restaurants, cafes, tourism facilities, etc)</p>	<p>2 exhibits Vaccines and other pharmaceutical products</p>	<p>0 exhibits Game-changing and systemic approaches</p>



**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

### 4. Mozambique: Govt Bans Refrigeration Equipment Harmful to Ozone Layer

Maputo – The Mozambican Ministry of Land and Environment has introduced a decree which bans ozone-destroying gases, and has called on those involved in the import, inspection and sale of refrigeration equipment to ensure that they do not use such gases.



According to Emilia Fumo, the permanent secretary of the Ministry of Land and Environment, interviewed by AIM, during a seminar in the southern province of Maputo, "all sectors must work together to implement decree 26/2024, recently approved by the government with a view to regulating the import of refrigeration equipment.'

"The government will ban the entry of refrigerators, freezers, air conditioners and other equipment that work with gases that are harmful and dangerous to the ozone layer, particularly the R22 gas', she said.

The technical name of R22 is dichlorodifluoromethane, which used to be widely used as a propellant and refrigerant. Under the Montreal Protocol on substances that deplete the ozone

layer, R22 and similar gases were phased out in developed countries in 2020. In developing countries, including Mozambique, the phase-out should be completed by 2030.

Fumo explained that the ozone layer can be damaged by greenhouse gases "that we have in our equipment.' R22 is a powerful greenhouse gas, which is 1,810 times as powerful as carbon dioxide.

"That's why the import of equipment that uses these gases, which are hydrochlorofluorocarbons, will be banned. The R22 gas has a compressor that carries mineral oil, a non-biodegradable chemical substance that, when disposed of inappropriately in soil and water, is an attack on public health', Fumo said.

Decree 26/2024 aims to control the production, export, import, transit, trade and consumption of hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs) and refrigeration and air conditioning equipment in Mozambique.

For this reason, she said, there is every need to equip people working in this field with technical skills in order to avoid unpleasant situations for national health and the economy.

For her part, Leonardo Sulila, the focal point for the implementation of the Montreal Protocol, said that as of January 2025, R22 can only be imported for scientific research, military, defense and security, and health purposes.

"At the moment, the country is using refrigerators, freezers and air conditioners that work with R134a, R404A, R406A, R407c, R408A and R410A, which are considered to be destructive gases and harmful to climate change [...]

With the destruction of the ozone layer, the sun's ultraviolet rays fall directly on the earth, and are responsible for damage such as skin cancer, eye damage, cataracts, premature ageing, dehydration, vulnerability to infectious diseases, deep sunburn, and weakening of the immune system.

"The consequences also include a reduction in harvests of some crops, a reduction in fish species, a reduction in forest productivity and the destruction of marine food chains. As an alternative, the government will only allow the import of refrigerators, freezers and air conditioners that work with R290 and R744 gases', she said. The industrial sector, Sulila added, will use R717 gas, which is considered climate friendly.

[AllAfrica, 9 September 2024](#)

*Image: Wikipedia*

**WEST ASIA**

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## 5. Oman ratifies Kigali amendment to combat global warming

**Muscat** – Environment Authority (EA) has announced that the Royal Decree ratifying the Kigali Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer underscores the significance of the amendment in curbing the production and consumption of hydrofluorocarbons (HFCs) and addressing global warming.



HFCs are organic compounds commonly used as refrigerants in air conditioners and other devices, serving as alternatives to ozone-depleting substances regulated under the Montreal Protocol. While they do not harm the ozone layer directly, HFCs are potent greenhouse gases with a global warming potential significantly higher than that of carbon dioxide.

The ratification of the Kigali Amendment by the Sultanate of Oman will initiate necessary legislative and technical measures to comply with the amendment and support the national goal of reducing greenhouse gas emissions.

The Environment Authority also noted that the Kigali Amendment offers financial mechanisms and technical support for ratifying countries. This includes technology transfer, institutional strengthening, import and export licensing, quota systems, and the development of national strategies for phasing down HFCs, thereby avoiding trade controls.

Furthermore, the amendment will regulate trade in HFCs between parties and non-parties, promoting the adoption of energy-efficient technologies that reduce energy consumption and greenhouse gas emissions, ultimately contributing to Oman's commitments under the Paris Climate Agreement.

The Kigali Amendment, adopted in 2016 in Rwanda, represents the fifth and most recent amendment to the Montreal Protocol, which was originally established in 1987. The amendment entered into force on January 1, 2019, and has been ratified by over 137 countries, including Oman, following the issuance of the Royal Decree.

[Muscat Daily, 24 September 2024](#)

*Image: Muscat Daily website*

## NORTH AMERICA

### 6. EPA Finalizes Rule to Accelerate American Leadership in Cutting Climate-Damaging Hydrofluorocarbons Used in Refrigeration and Air Conditioning Equipment

**WASHINGTON** – Today, Sept. 23, the U.S. Environmental Protection Agency announced a final rule to establish a new program to better manage, recycle, and reuse climate-damaging hydrofluorocarbons (HFCs) under the American Innovation and Manufacturing (AIM) Act. The final rule includes provisions that will reduce



wasteful leaks from large refrigeration and air conditioning equipment and will support American leadership and innovation in the development of clean solutions to tackle these dangerous heat-trapping emissions.

Today's final rule, establishing the Emissions Reduction and Reclamation (ER&R) program, addresses the third part of the bipartisan AIM Act, and comes less than two years after President Biden signed the U.S. ratification of the Kigali Amendment to the Montreal Protocol, an international agreement to phase down climate-damaging HFCs and help avoid up to 0.5 degrees Celsius of global warming by 2100. By reducing leaks and promoting innovative reuse of existing HFCs, this final rule will help the nation achieve an 85% HFC phasedown by 2036 while boosting American leadership and competitiveness.

"American companies are leading the world in developing and innovating clean solutions to reduce climate-damaging HFCs," **said EPA Administration Michael S. Regan.** "This rule is the final foundational step in our strategy to address HFCs, building on programs to reduce HFC production and imports, and to guide technologies to safer alternatives. Our HFC programs embody the Biden-Harris Administration's strong belief that climate action opens up new opportunities for American technology and innovation."

"The Biden-Harris Administration has moved with urgency and ambition since Day One to implement the bipartisan AIM Act and deliver the massive climate benefits and American manufacturing opportunities of a rapid HFC phasedown," **said White House National Climate Advisor Ali Zaidi.** "Today's final rule will support a growing American industry for HFC recycling and reclamation, building on the Administration's successful implementation of a 10% HFC reduction step on production and imports in 2022 and 2023 and ongoing implementation of the 40% reduction step that started this year – major results that we have delivered while working in partnership with industry to create good-paying jobs and strengthen American leadership on innovative HFC alternatives."

"Alliance members welcome the completion of the Refrigerant Management and Reclaim rule," **said Kevin Fay, Executive Director of the Alliance for Atmospheric Policy.** "We look forward to reviewing the details of the final rule, which establishes a formal baseline for a unified Federal approach to refrigerant management. We recognize that much work remains to fulfill the implementation requirements and to grow the program to achieve refrigerant emission controls that are environmentally and economically effective."

"In AHRI's view, this Final Rule, which is an important part of the ongoing transition from hydrofluorocarbons (HFCs) to next-generation refrigerants, is the first, but important, step in refrigerant management policy for the HFC transition," **said Air-Conditioning, Heating, and Refrigeration Institute President & CEO Stephen Yurek.**

"EPA has taken an important step today in setting up the third leg of the American Innovation and Manufacturing Act. There are many measures necessary to effectively manage super pollutant hydrofluorocarbons (HFCs) and EPA will now require several of the most impactful. With this rule, EPA has laid the foundation for reducing leaks and increasing recovery and reuse of HFCs from equipment," **said Richie Kaur, Senior Advocate, Natural Resources Defense Council.**

"This landmark rule solidifies a strong regulatory foundation to drastically cut emissions - curbing demand for new super pollutant HFCs by incentivizing the reuse of HFCs already in circulation and penalizing their leaks. In addition to real emissions reductions at home, this provides a powerful example for other countries looking to regulate climate pollution from the cooling sector, especially as we push for robust refrigerant management globally, including at the Montreal Protocol," **said Avipsa Mahapatra, Climate Campaign Director, Environmental Investigation Agency (EIA US).**

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The ER&R program will help minimize releases of HFCs from equipment by addressing leaks across the lifespan of refrigerant-containing equipment, such as air conditioners and refrigeration systems, while also maximizing the reuse of existing HFCs – supporting a growing American industry for recovering HFCs from existing equipment and reclaiming them to be used again, all while reducing lifecycle emissions. Earlier this year, EPA [announced](#) grant recipients for funding from President Biden’s Inflation Reduction Act to support American innovation on HFC reclamation.

The final ER&R program includes requirements for repairing leaking equipment, the installation and use of automatic leak detection systems on large refrigeration systems, using reclaimed HFCs to service certain existing equipment, minimizing HFC releases from fire suppression equipment, fire suppression technician training, and removal of HFCs from disposable cylinders before they are discarded. The regulations also establish a standard that limits the amount of new, or virgin, HFCs that can be contained in reclaimed HFC refrigerants. Additionally, the EPA is establishing alternative standards under the Resource Conservation and Recovery Act for ignitable spent refrigerants when recycled for reuse.

EPA estimates that in addition to the benefits from prior HFC actions, from 2026 through 2050, this rule will provide additional cumulative greenhouse gas emissions reductions of approximately 120 million metric tons of carbon dioxide equivalent, an incremental net benefit of at least \$6.9 billion.

Earlier this month, EPA also published another action regarding HFCs. The proposed rulemaking concerns the eligibility of the six applications listed in the AIM Act to continue to receive priority access to HFC allowances beyond 2025, and, among other things, includes targeted revisions to the methodology for allocating these application-specific allowances. This proposal builds on extensive EPA engagement with stakeholders, including manufacturers of semiconductors and metered dose inhalers, which can be used to deliver potentially life-saving medications, to support continued availability of critical devices. EPA will accept comments on the proposed rulemaking, “Phasedown of Hydrofluorocarbons: Review and Renewal of Eligibility for Application-specific Allowances,” through October 31.

The AIM Act authorizes EPA to address HFCs in three main ways, and EPA has now issued final rules to implement all three of these pillars: phasing down their production and consumption through an allowance allocation program – through which EPA is implementing a 40% reduction of HFCs that started this year; facilitating the transition to next-generation technologies through sector-based restrictions; and promulgating regulations for purposes of maximizing reclaiming and minimizing releases of HFCs from equipment and ensuring the safety of technicians and consumers.

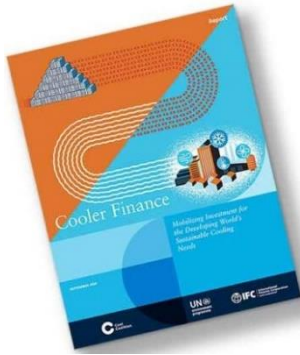
More [information on the rule and HFCs](#).

US EPA Press Office, 23 September 2024

*Image: USEPA logo*

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## 7. Financing the push to sustainable cooling

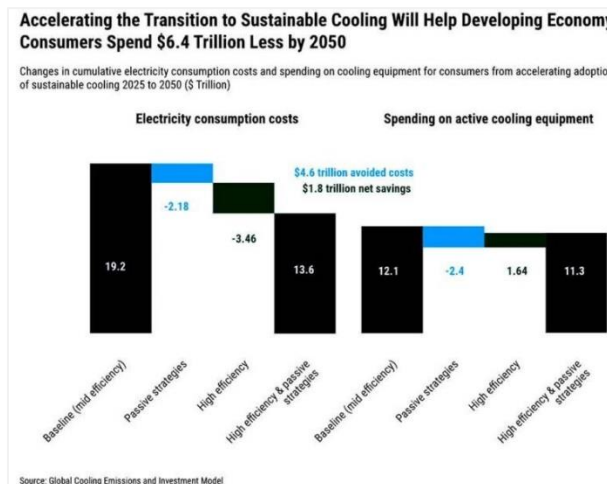
A new report aims to help investors and providers of cooling solutions, as well as private, public and international financiers, identify the commercial potential in sustainable cooling.

Led by the UN Environment Programme's Cool Coalition and International Finance Corporation (IFC), the report builds on the United Nations Environment Programme's (UNEP) *Global Cooling Watch*, released in 2023, that highlighted the urgency of adopting "accessible, affordable and scalable" cooling solutions that do not harm the planet.

The cooling market in developing economies is expected to double to at least \$600bn per year by 2050, but the fastest growth, however, is expected in Africa, which will see the market multiply by a factor of seven, and South Asia, which will quadruple in size.

Entitled, *Cooler Finance: Mobilising Investment for the Developing World's Sustainable Cooling Needs*, the report finds developing economies – currently generating two-thirds of global cooling-related emissions – are set to double their cooling demand by 2050 due to population growth, economic expansion, and urbanisation.

The report highlights the need for significant upfront investments. Closing existing shortfalls in access to cooling for households and SMEs in developing countries will require \$400bn to 800bn, in addition to future increases in demand.



Adopting sustainable cooling solutions, as opposed to inefficient equipment that uses more power, could cut emerging economy consumers' electricity bills by as much as \$5.6 trillion over the next 25 years, the report says. It would also reduce the amount of new investment needed in additional power generation to meet peak electricity demand by \$1.8 trillion.

This would require prioritising passive cooling strategies like insulation, reflective materials, enhancing green areas and energy-efficient technologies, enforcing minimum energy performance standards and new building energy codes and a faster phase down of climate warming refrigerants.

The report also calls for a systems approach to cold chains and large cooling infrastructure services, and incentives to promote innovation.

“The sustainable cooling market represents at least a \$600bn opportunity for the private sector, which could generate more than \$8 trillion in benefits for developing countries,” said IFC MD Makhtar Diop.

“These nations are especially vulnerable to the deadly effects of rising temperatures and are urgently in need of cooling solutions.”

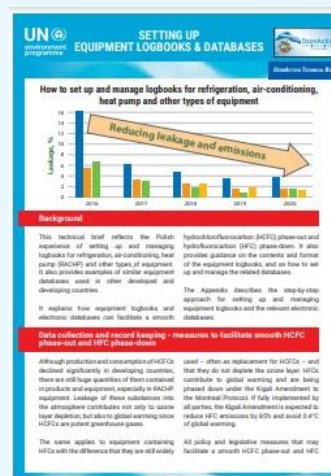
Key recommendations include improving data on cooling, capital costs, and financing; raising awareness; expanding use of best practice business models and financing tools; increasing seed and high-risk funding for pilot technologies; leveraging blended and concessional finance; and building on the Global Cooling Pledge to create a Sustainable Cooling Finance Partnership.

[Cooling Post, 27 September 2024](#)

Image: Cooling Post

### How to set up and manage logbooks for refrigeration, air-conditioning, heat pump and other types of equipment - Background

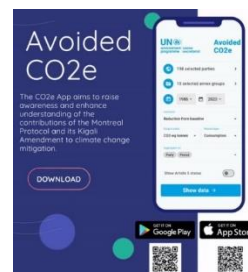
This technical brief reflects the Polish experience of setting up and managing logbooks for refrigeration, air-conditioning, heat pump (RACHP) and other types of equipment. It also provides examples of similar equipment databases used in other developed and developing countries. It explains how equipment 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](#)**



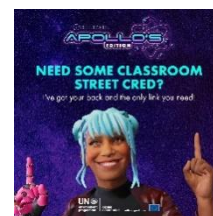
FEATURED

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

**Avoided CO<sub>2</sub>e** - The CO<sub>2</sub>e 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.



#### 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](#)

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### **Pioneering environmental change: the Multilateral Fund's impact**

Over the past three decades, the Multilateral Fund (MLF) has clearly demonstrated how international cooperation, innovative financial mechanisms, and a well-planned strategic approach can deliver far-ranging benefits. Through its global initiatives, MLF phased out ozone depleting substances, mitigated climate change, contributed to the Sustainable Development Goals (SDGs) and funded projects with positive impact on people's lives.

[Visit the newly launched Multilateral Fund's website and learn more about its mission, activities, events ...etc.](#)

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[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
- Liazat 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 Bénin



[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 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 Card web-based tool

- The Gas Card 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	Quantity (HPM)	Quantity (Licence)	Status	Value	Unit
HCFC-22	100	100	Approved	100,000	kg
HCFC-123	100	100	Approved	100,000	kg
HCFC-124	100	100	Approved	100,000	kg
HCFC-141b	100	100	Approved	100,000	kg

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



**What’s new in the app:**

- An updated more user-friendly interface
- Multilingual interface: English, French and Spanish
- A new **Kigali Amendment mode** - in this mode the GWP values used to calculate the refrigerant blends/mixtures only include GWP contributions from components that are controlled HFCs
- Latest updated ODP and GWP values from the recent reports from the Montreal Protocol technology and scientific expert panels as well as the Intergovernmental Panel on Climate Change (IPCC) reports
- References added for sources of all values
- New refrigerant mixtures (with ASHRAE -approved refrigerant designations)

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 weld and follow in their footsteps. **Read/download the [publication](#)**

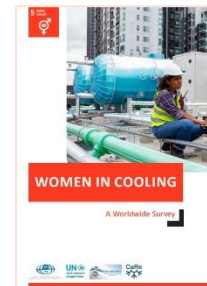


As part of IIR and UNEP OzonAction's partnership, a set of Cold Chain Technology Briefs was released over the past few years, which includes in-depth summaries about the cold chain in different key sectors. They include descriptions of technology, refrigerant options and trends and conclude with prospects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





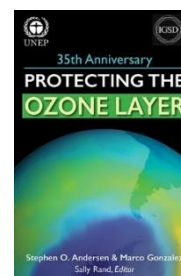
**Legislative and Policy Options to Control Hydrofluorocarbons** - In order to follow and facilitate the HFC phase-down schedules contained in the Kigali Amendment, the Parties, including both developed and developing countries, will have to implement certain measures. This booklet contains a recommended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



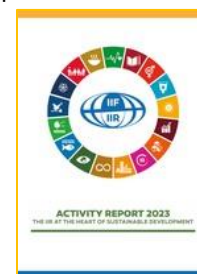
**Green Cooling in public procurement** How to advance the procurement of climate-friendly and energy-efficient cooling equipment in the public sector? Air conditioning in public buildings is often responsible for around 50% of total electricity consumption. Switching to climate-friendly cooling technologies ("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 - 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 International Institute of Refrigeration (IIR) [IIR Activity Report 2023](#) | [Rapport d'activité de l'IIR - 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

If you wish to submit articles, invite new subscribers, please contact:

Samira Korban-de Gobert, [samira.degobert@un.org](mailto:samira.degobert@un.org)



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