

# OzoNews

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

**Volume XXIII | 15 November 2023**

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## GLOBAL

1. Kigali Amendment latest ratifications
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Congratulations to the latest countries which have ratified the Kigali Amendment:

**Belize, 3 October 2023**  
**Kenya, 22 September 2023**  
**Republic of Moldova, 22 September 2023**

At the Twenty-Eighth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, held in Kigali from 10 to 15 October 2016, the Parties adopted, in accordance with the procedure laid down in paragraph 4 of article 9 of the 1985 Vienna Convention for the Protection of the Ozone Layer, a further amendment to the Montreal Protocol as set out in Annex I to the report of the Twenty-Eighth Meeting of the Parties (Decision XXVIII/1).

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

### United Nations Treaty Collection

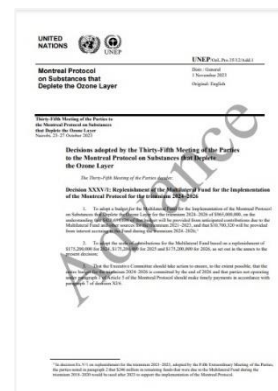
Image: UN Treaty Collection website

## 2. ADVANCE-Decisions adopted by the Thirty-Fifth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer Nairobi, 23–27 October 2023

Decisions adopted by the Thirty-Fifth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer Nairobi, 23–27 October 2023

### The Thirty-Fifth Meeting of the Parties decides:

- **Decision XXXV/1:** Replenishment of the Multilateral Fund for the Implementation of the Montreal Protocol for the triennium 2024–2026
- **Decision XXXV/2:** Extension of the fixed-exchange-rate mechanism to the 2024–2026 replenishment of the Multilateral Fund
- **Decision XXXV/3:** Potential areas of focus for the 2026 quadrennial reports of the Environmental Effects Assessment Panel, the Scientific Assessment Panel and the Technology and Economic Assessment Panel
- **Decision XXXV/4:** Stratospheric aerosol injection and protection of the ozone layer
- **Decision XXXV/5:** Destruction technologies for controlled substances
- **Decision XXXV/6:** Updated information on very short-lived substances
- **Decision XXXV/7:** Emissions of HFC-23
- **Decision XXXV/8:** Feedstock uses
- **Decision XXXV/9:** Abating emissions of carbon tetrachloride



- **Decision XXXV/10:** Energy efficiency
- **Decision XXXV/11:** Life-cycle refrigerant management
- **Decision XXXV/12:** Further strengthening Montreal Protocol institutions, including for combating illegal trade
- **Decision XXXV/13:** The import and export of prohibited cooling equipment
- **Decision XXXV/14:** Enhancing the global and regional atmospheric monitoring of substances controlled by the Montreal Protocol on Substances that Deplete the Ozone Layer
- **Decision XXXV/15:** Critical-use exemptions for methyl bromide for 2024
- **Decision XXXV/16:** Addressing the impacts of the coronavirus disease (COVID19) pandemic on Hydrofluorocarbon baseline consumption for certain parties
- **Decision XXXV/17:** Data and information provided by the parties in accordance with Article 7 of the Montreal Protocol
- **Decision XXXV/18:** Non-compliance in 2021 with the provisions of the Montreal Protocol governing consumption and production of the controlled substances in Annex C, Group I (hydrochlorofluorocarbons) by the Democratic People's Republic of Korea
- **Decision XXXV/19:** Status of the establishment of licensing systems under Article 4B, paragraph 2 bis, of the Montreal Protocol
- **Decision XXXV/20:** Options for the organization of the Technology and Economic Assessment Panel and its technical options committees
- **Decision XXXV/21:** Membership changes on the Scientific Assessment Panel, the Environmental Effects Assessment Panel and the Technology and Economic Assessment Panel
- **Decision XXXV/22:** Membership of the Implementation Committee
- **Decision XXXV/23:** Membership of the Executive Committee of the Multilateral Fund
- **Decision XXXV/24:** Co-Chairs of the Open-ended Working Group of the Parties to the Montreal Protocol
- **Decision XXXV/25:** Status of ratification of the Kigali Amendment to the Montreal Protocol
- **Decision XXXV/26:** Thirty-Sixth Meeting of the Parties to the Montreal Protocol
- **Decision XXXV/27:** Financial reports and budgets for the Montreal Protocol on Substances that Deplete the Ozone Layer

**Read / download the full [advance report](#) from the UNEP Ozone secretariat.**

*Image: Ozone Secretariat*

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### 3. Summary of the 35<sup>th</sup> Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer (MOP35), 22–27 October 2023

In the collegial spirit that the Montreal Protocol on Substances that Deplete the Ozone Layer is known for, delegates at the thirty-fifth Meeting of the Parties (MOP35) committed firmly to address threats to both the ozone layer and the global climate, designating a significant portion of funding to bring down global temperatures. In an historic decision, parties adopted the largest ever replenishment of the Multilateral Fund (MLF) for the implementation of the Protocol. The replenishment, just shy of USD 1 billion, will assist developing countries in implementing their obligations under the Protocol and its Kigali Amendment, with a strong focus on shifting away from harmful greenhouses gases and substances with high global warming potential (GWP).

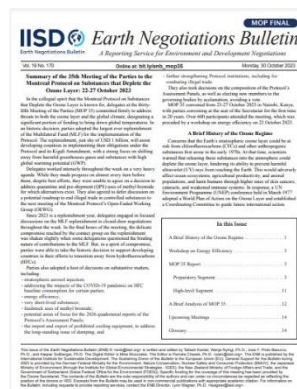
Delegates worked intensely throughout the week on a very heavy agenda. While they made progress on almost every item before them, despite best efforts, they were unable to agree on a decision to address quarantine and pre-shipment (QPS) uses of methyl bromide for which alternatives exist. They also agreed to defer discussion on a potential roadmap to end illegal trade in controlled substances to the next meeting of the Montreal Protocol’s Open-Ended Working Group (OEWG).

Since 2023 is a replenishment year, delegates engaged in focused discussions on the MLF replenishment in closed-door negotiations throughout the week. In the final hours of the meeting, the delicate compromise reached by the contact group on the replenishment was shaken slightly when some delegations questioned the binding nature of contributions to the MLF. But, in a spirit of compromise, parties were able to take the historic decision to support developing countries in their efforts to transition away from hydrofluorocarbons (HFCs).

Parties also adopted a host of decisions on substantive matters, including:

- stratospheric aerosol injection;
- addressing the impacts of the COVID-19 pandemic on HFC baseline consumption for certain parties;
- energy efficiency;
- very short-lived substances;
- feedstock uses of methyl bromide;
- potential areas of focus for the 2026 quadrennial reports of the Protocol’s Assessment Panels;
- the import and export of prohibited cooling equipment, to address the long-standing issue of dumping; and
- further strengthening Protocol institutions, including for combating illegal trade.

They also took decisions on the composition of the Protocol’s Assessment Panels, as well as electing new members to the governing bodies by acclamation, avoiding a vote. MOP 35 convened from 23-27 October 2023 in Nairobi, Kenya, with parties convening at the seat



of the Secretariat for the first time in 20 years. Over 600 participants attended the meeting, which was preceded by a workshop on energy efficiency on 22 October 2023. [...]

[IISD, Earth Negotiations Bulletin \(ENB\), Vol. 19 No. 170, 30 October 2023](#)

*Image: IISD*

**See also >>>**

- [Ozone Secretariat website related to the Thirty-Fifth Meeting of the Parties](#)
- [The Montreal Protocol: multilateralism done right](#), Speech delivered by Inger Andersen, UNEP Executive director for the Opening of high-level segment, 35<sup>th</sup> Meeting of the Parties to the Montreal Protocol (MOP35), 26 October 2023, Nairobi, Kenya



#### **4. Montreal Protocol, Advancing Climate Action, COP28, United Arab Emirates (UAE)**

The Montreal Protocol pavilion at COP28 will offer a platform for the Montreal Protocol and the cooling community to enhance their visibility and promote climate action.

The Ozone to Cool Zone pavilion intends to capitalise on its side events and networking opportunities to spread awareness, scale current efforts, and increase ambition for more solutions that minimize the cooling sector's negative climate impacts, advance its sustainability goals, and unlock innovation for more effective solutions.

The pavilion will be open from 1 to 11 December 2023 allowing partners and stakeholders to organize events

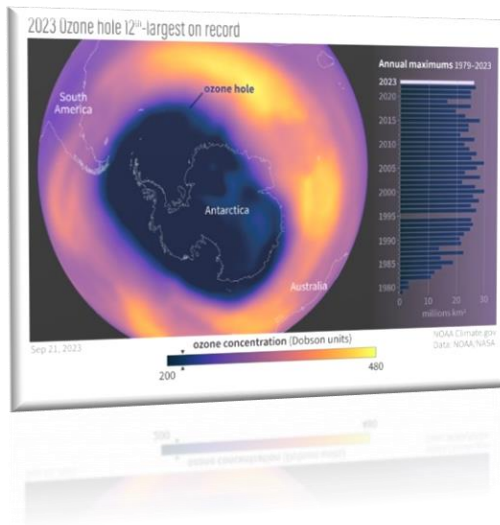
and activities to attract visitors to the pavilion throughout the duration of COP28.

Click [here](#) for the Programme of Events >

[UNEP Ozone secretariat](#)

*Image: Ozone Secretariat*

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## 5. Antarctic ozone hole yearly maximum extent 12<sup>th</sup>-largest on record

This year's ozone hole in the stratosphere over Antarctica reached its maximum extent on September 21, 2023, with an estimated area of 10 million square miles (26 million square kilometers), making it the 12<sup>th</sup>-largest\* daily ozone hole extent since satellite records began in 1979. Averaged over the period from September 7-October 13, the broad peak of the ozone hole season, the hole was the 16<sup>th</sup>-largest on record. Scientists define the ozone hole as the total area where ozone amounts drop below 200 Dobson

Units. In this map, places where satellites detected ozone amounts below that threshold are colored dark blue.

Not a literal hole, the area of ozone depletion is more like a thin spot that develops each spring in the Southern Hemisphere ozone layer, a thin layer of triplet oxygen molecules, which absorb harmful ultraviolet radiation that can cause sunburns, skin cancer, and other cellular damage in people and other living things. The ozone hole is caused by now-banned CFCs—short for chlorofluorocarbons—and related chemicals that were once widely used in refrigerators, air conditions, and spray cans.

According to NOAA and NASA scientists, this year's ozone hole was "modest" in size. Ozone thinning ramped up earlier than usual, probably linked to the 2022 submarine eruption of Hunga-Tonga volcano, which shot a massive plume of water vapor into the stratosphere. Water vapor can help speed up ozone-destroying chemical reactions. But the early start was balanced by active stratospheric weather, which mixes in air from lower latitudes that has higher ozone amounts. (Note the areas of pink and orange in the map, where ozone amounts are double those found in the ozone hole). As a result, the final extent was not as large as it likely would have been otherwise.

The bar chart to the right of the map shows how 2023 (light purple) compares to the size of each year's annual daily maximum ozone hole since 1979. Ozone holes began appearing in the mid-1980s and grew in size up through the mid-2000s, peaking in area at close to 30 million square kilometers. (The U.S. land area is about 9 million square kilometers). But thanks to the Montreal Protocol, amounts of CFCs and related chemicals are no longer increasing, and no new record-large ozone holes have occurred. CFCs are extremely long-lived, so it will be many decades before the ozone layer fully recovers, but twice since 2015, the ozone hole has been smaller than 20 million square kilometers—a size not seen since 1988—offering a preview of future recovery.

*Correction:* Nov. 1, 1:35 pm Eastern. Due to an error in the press release, this story's title, image title, and the first paragraph text originally said this year was the 16<sup>th</sup>-largest ozone hole on record based on daily maximum extents. The 2023 maximum daily extent was the 12<sup>th</sup>-largest on record. Averaged over the period September 7- October 13 the 2023 hole was 16<sup>th</sup> largest.

**NOAA Climate.gov, 1 November 2023, By Rebecca Lindsey - Reviewed by Laura Ciasto**



Image: NOAA Climate.gov image, based on NOAA TOAST data (map) and NASA Ozone Watch data (graph).

## 6. From Ozone Depletion to Ozone Recovery: Path Forward

The International Day for the Preservation of the Ozone Layer, observed on September 16 each year, honours a journey of global collaboration and scientific advancement. It serves as a reminder of our efforts as a community to protect the Earth's atmosphere and a call for action for a sustainable future. In this blog, I will cover the journey from ozone depletion to ozone recovery.



### Ozone Depletion and Recovery

Ozone or O<sub>3</sub> is an essential element of Earth's atmosphere. The molecule O<sub>3</sub> is made up of three oxygen atoms. It creates a protective layer in the stratosphere and serves as a shield against the harmful UV rays from the sun. The release of man-made chemicals, particularly the use of Chlorofluorocarbons (CFCs), halons and ozone-depleting substances (ODS), led to a severe environmental problem i.e., Ozone Depletion. Usually found in refrigerants, aerosol propellants, and fire extinguishers, these substances fly upward into the stratosphere where they react with UV radiation to produce chlorine and bromine atoms. Ozone concentration decreases as a result of these reactive atoms destroying ozone molecules.

The effects of ozone loss are serious and extensive. Increased UV radiation directly endangers living beings by causing skin cancer, cataracts, and even impaired immune systems. High exposure to UV rays can cause melanoma which is said to be the most fatal skin cancer. Additionally, it damages ecosystems by interfering with phytoplankton growth and development, which is the basis of aquatic food chains. Terrestrial plants are also negatively impacted, especially those in delicate ecosystems like high altitudes and polar regions.

### Scientific Understanding of Ozone Depletion

CFCs and Halons contain chlorine and bromine atoms, stable in the lower atmosphere but reactive in the stratosphere due to UV radiation. These atoms initiate "catalytic" cycles, leading to ozone depletion. Scientific monitoring, facilitated by instruments like TOMS and OMI, revealed the ozone hole over Antarctica in the early 1980s, enabling the quantification of ozone depletion rates. Lab experiments and computer models simulate stratospheric reactions and compound effects on the ozone layer. This scientific understanding was pivotal in addressing environmental issues through the Montreal Protocol.

### International Agreements and Protocols

The International community responded decisively to this worldwide catastrophe in 1987 by enacting the Montreal Protocol. By gradually ending the manufacturing and consumption of ODS, this historic accord aimed to prevent additional ozone layer harm.

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The Montreal Protocol has proved to be effective over time, with the parties to the protocol phasing out 98% of ODS globally compared to the 1990 levels (UNEP). These combined efforts have resulted in the ozone layer beginning to heal. Interestingly, the Montreal Protocol is one of the "rare treaties" as it achieved universal ratification.

However, there have been difficulties in putting the Montreal Protocol into action. Economic limitations and the need for alternative technologies made it challenging for developing countries to move away from ODS. This was acknowledged in the Protocol, which also included provisions to provide financial and technical support to help poorer nations phase down ODS. The Multilateral Fund was established in 1991, under Article 10 of the Montreal Protocol. The major goal of this fund is to provide the developing countries that are party to the Montreal Protocol with financial and technical assistance, and whose per capita annual consumption & production of ODS is less than 0.3 kg.

The **Kigali Amendment**, which was introduced in 2016 to address Hydrofluorocarbons (HFCs), a new environmental concern, built on the success of the Montreal Protocol. HFCs are strong greenhouse gases with high potential for global warming, even though they do not destroy the ozone layer. The Kigali Amendment pushes for the adoption of more ecologically friendly substitutes in air conditioning, refrigeration, and other applications while attempting to gradually reduce the production and consumption of HFCs. This modification highlights the Protocol's flexibility in responding to changing environmental concerns and the crucial role that international collaboration plays in reducing climate change.

### **Ozone Recovery: Current Status and Progress**

The Montreal Protocol and its following revisions have been implemented as a result of international efforts to reduce the atmospheric concentration of ozone-depleting chemicals. This agreement required the gradual phase-out of ODS, such as Chlorofluorocarbons (CFCs), halons, and other dangerous substances that were the cause of ozone depletion. The production and use of ODS dramatically fell as nations followed the Protocol's rules, which resulted in a decrease in their atmospheric release.

There is growing evidence of ozone recovery, especially in particular areas and at particular altitudes. The Antarctic ozone hole, where the depletion was most severe, is one famous example. Ozone levels have been observed to stabilise and even slightly increase during the spring in the Southern Hemisphere, indicating the start of recovery. Improvements have also been noticed in some other regions of the earth, such as the mid-latitudes, where the depletion of ozone was less severe. The latest edition of the quadrennial assessment report of the UN-backed "Scientific Assessment Panel to the Montreal Protocol on Ozone Depleting Substances" has confirmed the phase-out of approx 99% of banned ozone-depleting substances. This report is published every four years. If the existing policies remain unchanged, it is anticipated that the ozone layer will return to its 1980 levels (prior to the ozone hole's emergence) approximately by 2066 in the Antarctic region, by 2045 in the Arctic, and by 2040 globally.

Technology breakthroughs, regulatory changes, and international cooperation have all been instrumental in promoting ozone recovery. The achievement of the Montreal Protocol provides evidence of the effectiveness of international cooperation in resolving environmental issues. Concurrently, advances in science and technology made it easier to

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manufacture and use environmentally preferable ODS substitutes, which decreased their use and emissions.

### **Challenges and Roadblocks**

Tracking and evaluating ozone recovery presents difficulties due to complex atmospheric systems, including natural events like volcanic eruptions and solar activity. The 2022 Hunga Tonga-Hunga Ha'apai eruption is a potential contributor to ozone depletion. Distinguishing short-term variations from long-term trends requires meticulous data analysis, hindered by logistics, especially in remote areas. Shifting to ozone-friendly replacements, such as Hydrofluorocarbons (HFCs), is crucial but may exacerbate climate change due to their high greenhouse gas potential. Legal manufacturing and distribution of ODS remain problematic despite international agreements like the Montreal Protocol. Addressing these challenges requires stricter regulations, improved enforcement, and international cooperation.

### **The Way Forward for Ozone Recovery**

The preservation of the ozone layer depends critically on ongoing international cooperation and information exchange. It requires teamwork and knowledge sharing because it is a global challenge. To stop additional ozone depletion, sustainable production, use, and disposal methods are essential. This entails careful waste management as well as the responsible handling of compounds like Hydrofluorocarbons. Public awareness and education are also very important. It is, thus, essential to encourage a culture of environmental stewardship by educating communities about the value of ozone preservation, assuring ongoing efforts towards a healthier, more resilient planet.

### **Lessons for Addressing Other Environmental Issues**

The knowledge gained from combating ozone depletion is invaluable when dealing with other worldwide environmental issues. It has emphasised how crucial global collaboration is. The achievement of the Montreal Protocol serves as evidence that significant advancement may be made when countries band together with a shared commitment to a common goal. This collaborative approach can be used as a model for dealing with other urgent problems including pollution, biodiversity loss, and climate change. The ozone hole incident also emphasises the vital importance of science-policy collaboration. The solution to complicated environmental problems depends on well-informed decision-making based on solid scientific knowledge. For policymakers to create successful regulations and programmes, they must have access to the most up-to-date scientific evidence. In the same way, scientists must actively interact with politicians to guarantee that their discoveries are turned into practical recommendations.

### **Conclusion**

The progression from ozone depletion to ozone recovery is evidence of the strength of global collaboration and operations. Nations banded together under the Montreal Protocol and subsequent accords to phase out ozone-depleting compounds, marking a crucial turning point in environmental protection. Over time, real advancements, with noteworthy signs of recovery in the Antarctic Ozone hole have been made. However, there is still a long way to go in dealing with other environmental problems. Continued work, strict adherence to regulations, and active scientific investigation are still essential. The overarching

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message is clear: When the whole of humankind works together, and when the nations are willing, there is hope.

**Drishti The Vision Foundation, 3 November 2023**

*Image: Drishti The Vision Foundation*

## **7. Clean Refrigeration Technology Rapidly Increasing in Supermarkets Around the World**

Ratification of the Kigali Amendment, local regulations, and energy efficiency concerns are driving widespread uptake of clean cooling technology.



A warming atmosphere will necessitate growth and expansion in the use of cooling technologies – primarily refrigeration and air conditioning. Unfortunately, these two technologies are also outsized drivers of atmospheric warming, due to their high energy consumption and use of super-polluting hydrofluorocarbon gases (HFCs). The most abundant HFCs warm the atmosphere thousands of times more powerfully than carbon dioxide (CO<sub>2</sub>).

There are, however, technological alternatives which can achieve benefits not only in having a lower warming impact, but also in reducing food waste, and running costs. One of the most important cooling subsectors – commercial refrigeration – is rapidly shifting to transcritical refrigeration systems which use carbon dioxide (CO<sub>2</sub>) instead of hydrofluorocarbon gases.

Unlike common refrigerant HFCs R-134 and R-404A – which have Global Warming Potentials (GWP) of 1400 and 3260 respectively – CO<sub>2</sub> has a GWP of 1. GWP is the unit of measurement which assesses the potency of climate warming compounds. The design of transcritical refrigeration systems can also be used to recover waste heat from the system to heat water, further increasing the system's energy efficiency.

Between 2014 and 2018 the CCAC supported pilot projects for commercial scale transcritical cooling systems in Chile and Jordan. Since then, investment in transcritical cooling in developed countries such as Japan, Europe and the United States has increased mass production of the technology, bringing down production costs and enabling its uptake in middle income countries.

Even in the early stages of technology roll-out, one of the primary advantages of transcritical cooling has been that the systems are much more energy efficient than older cooling technologies, creating large energy cost savings for operators of at least 20%.

According to a 2020 report by cooling industry specialists AtmoSphere (formerly Shecco) adoption of transcritical cooling systems increased from only 140 systems in 2008 to more than 35,500 in 2020 – the majority of which are in Europe. The growth trends tracked by the study show exponential growth in transcritical CO<sub>2</sub> refrigeration, with most regions experiencing 75% or more growth between 2018 and 2020, reflecting the impact of both

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widespread Kigali Amendment ratification and implementation, as well as energy efficiency concerns becoming mainstream.

Transcritical cooling systems are now nearly equalling the cost of HFC cooling systems according to Pier Zeccheto, technical advisor to the CCAC-supported cooling project in Chile. In Chile, early CCAC support helped bring the cost of transcritical cooling down from over 30% more expensive to less than 20% more expensive than HFC systems. The input gases (mostly CO<sub>2</sub>) for transcritical cooling systems are also much cheaper than HFC systems, with CO<sub>2</sub> costing \$1 per 500 grams and common HFCs between \$6 and \$8 per 500 grams.

According to Professor Armin Hafner of the Department of Energy and Process Engineering at the Norwegian Institute of Science and Technology who has led low-GWP cooling projects in multiple countries cooling systems with natural low-GWP fluids are preferred by vendors worldwide if they can access them.

“Informed end-users understand that the transition towards clean cooling solutions will give them an economic benefit and the possibility to report their actions with the developing carbon credit regimes,” said professor Hafner.

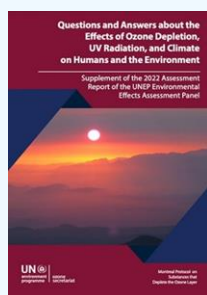
Combined with the economic advantages of transcritical cooling, developed nations’ progress on regulations to completely eliminate HFCs and other harmful substances used in cooling and foaming agents is advancing the potential to outlaw new production of F-gas equipment by 2030.

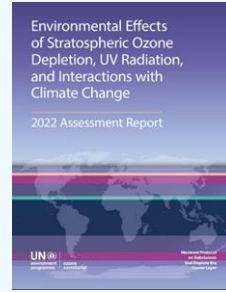
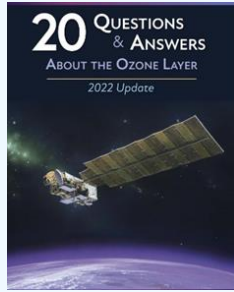
“It should be understood by authorities that from 2030 onwards new systems must be made only with natural [low-GWP] fluids. That would be a significant signal which can be given by lawmakers and funding agents,” said Professor Hafner.

### CCAC Secretariat, 10 November, 2023

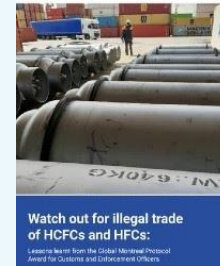
Image: CCAC Secretariat

See also >>> "[Cooling with a Conscience: Supermarkets Transition to Environment-Friendly Refrigeration Systems](#)", article in International Supermarket News, 6 November 2023





**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 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>11 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>6 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>

**ASIA AND THE PACIFIC**

## 8. Cambodia expresses its commitment to join the international community in controlling and reducing the use of HFCs

Pak Sokharavuth, Undersecretary of State for the Ministry of Environment has reaffirmed Cambodia's commitment to the international community in implementing the Montreal Protocol and its amendments, particularly the Kigali Amendment, which introduced the monitoring and reduction of the use of hydrofluorocarbons in line with the obligations of the parties to the Montreal Protocol and in line with the Pentagon strategy.



During the meeting, Sokharavuth met with a number of development partners, including the United Nations Environment Programme, the United Nations Industrial Development Programme, the Climate Change Coalition, and senior officials of the Multilateral Budget Secretariat, to seek technical assistance and funding for the implementation of the Montreal Protocol and to participate as a speaker at two Side Events to share experiences.

In addition, Cambodia has been selected as a member of the Executive Committee with China and India to co-organise the 93<sup>rd</sup>, 94<sup>th</sup>, and 95<sup>th</sup> Executive Committee Meetings to be held in Montreal, Canada, in 2023 and 2024.

[Khmer Times, 30 October 2023.](#)

*Image: Khmer Times*

**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 >>>](#)

[UN Environment Programme, OzonAction, July 2023](#)



**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 >>> UN Environment Programme, OzonAction, July 2023](#)

## NORTH AMERICA

### 9. The Latest in the HFC Crusade

On October 6, 2023, the EPA announced two regulations in the continued crusade to phase down the use of super-polluting hydrofluorocarbons (HFCs).

The first new action is a final rule to accelerate the ongoing transition to more efficient and climate-safe technologies in new refrigeration, heating, and cooling systems and other products by restricting the use of HFCs where alternatives are already available.

The second action is a proposed rule to better manage and reuse existing HFCs, including by reducing wasteful leaks from equipment and supporting a growing American industry for HFC recycling and reclamation.

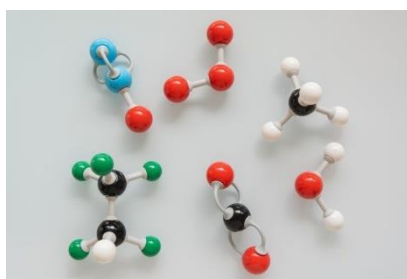
HFCs are potent greenhouse gases (GHGs) that were developed for use in refrigeration, air conditioning, aerosols, fire suppression, and foam blowing. They were developed to replace ozone-depleting substances (ODSs) such as chlorofluorocarbon (CFC) refrigerants. At the time of their introduction, HFCs were considered an improvement because, although they do contribute to global warming, they don't affect the ozone layer directly. However, their global warming potential (GWP) is hundreds to thousands of times more harmful than carbon dioxide (CO<sub>2</sub>).

“Super pollutants, like HFCs and methane, are the low-hanging fruit in the fight to slow climate change,” said Congressman Scott Peters, D-Calif. 52, in an EPA news release.

#### AIM Act

Congress enacted the American Innovation and Manufacturing (AIM) Act on December 27, 2021, which gave the EPA authority to:

1. Phase down production and consumption of HFCs.
2. Maximize reclamation and minimize HFC releases from equipment.
3. Facilitate the transition to next-generation technologies through sector-based restrictions on HFCs.





“Under the AIM Act, the Biden-Harris Administration is phasing down HFCs to achieve a 40% reduction of HFCs starting in 2024 and an 85% reduction by 2036,” states the Agency news release. “Today’s actions will support the national phasedown, including through an additional \$4.5 billion in estimated savings for industry and consumers, while supporting good-paying American manufacturing jobs to produce the next generation of equipment and HFC alternatives.”

“Today’s actions embody President Biden’s leadership on the climate crisis by tackling these planet warming chemicals while investing in American technology and innovation,” said EPA Administrator Michael S. Regan in the October 6, 2023, Agency news release. “This final rule supports our transition away from HFCs and positions our nation to be competitive on the global stage, while the proposed emissions reduction and reclamation program will help ensure we achieve our national HFC phasedown.”

### **Kigali Amendment**

The U.S. Senate ratified the Kigali Amendment to the Montreal Protocol on September 21, 2022. At that time, the United States joined 137 other nations in a global agreement to phase down HFCs. Under the amendment, participating countries committed to cut the production and consumption of HFCs by more than 80% over the next 30 years. This schedule avoids more than 80 billion metric tons of CO<sub>2</sub> equivalent (CO<sub>2</sub>e) emissions by 2050, which prevents up to 0.5° Celsius warming by the end of the century.

Under the amendment, developed countries began reducing HFC consumption in 2019. Most developing countries will freeze consumption in 2024, with a small number of developing countries with unique circumstances freezing consumption in 2028.

Signing the agreement commits participating countries to a legally binding contract that creates rights and obligations under international law.

### **Technology Transitions Rule**

The final Technology Transitions Rule, announced October 6, 2023, will help guide the overall phasedown by accelerating the transition away from HFCs in areas where substitutes are already available or being introduced—a key prong of the bipartisan AIM Act.

This final rule addresses petitions from companies, industry associations, environmental groups, and state governments that were granted in October 2021 and September 2022 and restricts the use of certain HFCs in over 40 types of:

- Foams
- Aerosol products
- Refrigeration, air conditioning, and heat pump equipment

The rule bans HFCs in certain equipment and sets a limit on the GWPs of the HFCs that can be used in each subsector, with compliance dates ranging from 2025 to 2028.

The Technology Transitions Rule applies to both imported and domestically manufactured products, which will help ensure a level playing field for American businesses that are already transitioning to HFC alternatives.

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“The Technology Transitions provisions of the AIM Act are critical to ensuring an orderly transition from higher GWP refrigerants to lower GWP refrigerants while creating American jobs and protecting the environment,” said Stephen Yurek, president and CEO of the Air-Conditioning, Heating, and Refrigeration Institute (AHRI), in the Agency news release. “AHRI has appreciated the opportunity to participate in this rulemaking and looks forward to continuing to work constructively with the EPA to assist American manufacturers in developing and deploying economical, efficient and affordable new refrigerant technologies.”

The EPA estimates that the Technology Transitions Rule would provide additional cumulative GHG emissions reductions of at least 83 million metric tons of CO<sub>2</sub>e (MMTCO<sub>2</sub>e) from 2025 to 2050—a benefit of at least \$3 billion. In addition to climate benefits, this final rule is estimated to provide \$4.5 billion in savings for industry and consumers through 2050, largely from improved energy efficiency and lower-cost refrigerants.

### **Management of certain HFCs and substitutes**

The proposed program to manage emissions reduction and reclamation of HFCs and their substitutes would help minimize HFC leaks across the life span of existing 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.

The proposed rule includes requirements for repairing leaky equipment, use of automatic leak detection systems on large refrigeration systems, use of reclaimed HFCs for certain applications, recovery of HFCs from cylinders before their disposal, and a container tracking system.

The proposed rule on an HFC emissions reduction and reclamation program is estimated to prevent at least an additional 142 MMTCO<sub>2</sub>e of HFC emissions over the same time—an incremental net benefit of at least \$6.1 billion.

The Final Technology Transitions Rule and the proposed Management of Certain Hydrofluorocarbons and Substitutes Program are expected to help unlock additional climate benefits and savings in addition to the national phasedown program, which is estimated to provide approximately \$270 billion in benefits.

“Alliance members commend the timely release of the technology transitions rule to implement the AIM Act, and the proposed rule on HFC Refrigerant Management,” said Kevin Fay, executive director of the Alliance for Responsible Atmospheric Policy, in the Agency news release. “These actions are the two important remaining policy legs of the AIM Act phasedown of HFC compounds. U.S. industry has invested several billion dollars in development and introduction of low-GWP compounds and technologies, and the Biden Administration’s timely action reflects the value attributed to this investment and these important implementing actions.”

“We welcome EPA’s continued action to phase down HFCs, speed the transition to cost-effective alternatives, and ensure these harmful pollutants are reclaimed and recovered,” said Casey Katims, executive director of the U.S. Climate Alliance, in the Agency news release. “These rules build on the strong foundation Alliance states established and we

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look forward to working with EPA to continue to maximize the benefits for consumers and communities.”

### **Delivering progress on the national HFC phasedown**

The EPA also recently issued 2024 HFC allowances, which allow companies to produce or import bulk HFCs for calendar year 2024.

### ***Defining allowance units***

An allowance is the unit of measure the EPA uses to control production and consumption. An HFC allowance is equal to 1 metric ton of exchange value equivalent (i.e., 1 metric ton CO<sub>2e</sub>). HFCs with higher GWPs require more allowances to produce or import than lower-GWP HFCs. The AIM Act specifies that an allowance allocated by the EPA is a limited authorization for the production or consumption of a regulated substance and doesn’t constitute a property right.

To understand how allowances translate to quantities of various HFCs intended for production or import, see the [EPA HFC Allowance Calculator](#).

### ***The allowance program***

Allowances are used to produce or import bulk HFCs. There are three types of HFC allowances:

1. Production
2. Consumption
3. Application-specific allowances

For industry producing HFCs, it’s necessary to use both production and consumption allowances. The importation of HFCs only expends consumption allowances.

### ***2024 HFC allowances***

In 2024, the overall number of allowances will be significantly lower than in 2023, as Congress has directed a reduction to 60% of the historic baseline levels of HFCs—down from 90% available this year. “Allowances are issued consistent with the methodology laid out in the final rule,” states the [Allowance Allocation Methodology for 2024 and Later Years](#) the EPA published in July.

### ***Illegal HFC trade task force***

In August, the Interagency Task Force on Illegal HFC Trade, co-led by the EPA and the Department of Homeland Security and comprising the Departments of Defense, Justice, and State, held its semiannual meeting along with the White House and participants from the Environmental Investigation Agency. The task force reported that because the allowance program went into effect on January 1, 2022, it has prevented over 1.1 MMTCO<sub>2e</sub> of illegal HFC shipments—equivalent to the GHG emissions from nearly 250,000 gasoline-powered cars in a year.

“The Task Force is working diligently to continue to improve real-time monitoring of our borders to prevent illegal HFC trade, especially leading up to the 2024 reduction in HFC imports,” the EPA news release continues. “EPA also continues to issue administrative consequences, retiring or revoking allowances from companies that misreport or import

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HFCs without expending the proper number of allowances. Retired allowances are no longer available to be used, providing additional climate benefits.”

### Proposed rule

The EPA will accept comments on the proposed rulemaking, “Management of Certain Hydrofluorocarbons and Substitutes under Subsection (h) of the American Innovation and Manufacturing Act of 2020,” for 60 days after publication in the *Federal Register* and hold a public hearing. The Docket number is EPA-HQ-OAR-2022-0606. See the [pre-publication version of the proposed rule](#).

**EHS Daily Advisor Newsletter, 26 October 2023, By Lisa Whitley Coleman**

*Image: EHS Daily Newsletter*

## 10. ‘Cooling Glass’ Blasts Building Heat Into Space

New Coating Can Be Applied to Exterior Surfaces to Reduce AC Use, Fight Climate Change

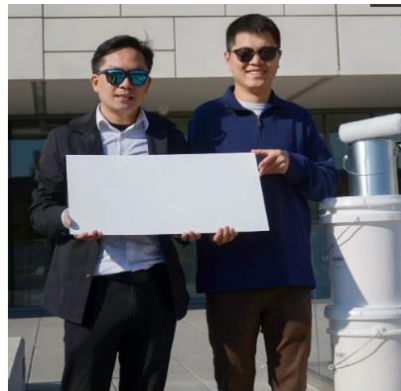
University of Maryland (UMD) researchers aiming to combat rising global temperatures have developed a new “cooling glass” that can turn down the heat indoors without electricity by drawing on the cold depths of space.

The new technology, a microporous glass coating described in a [paper](#) published Thursday in the journal *Science*, can lower the temperature of the material beneath it by 3.5 degrees Celsius at noon, and has the potential to reduce a mid-rise apartment building’s yearly carbon emissions by 10%, according to the research team led by Distinguished University Professor Liangbing Hu in the Department of Materials Science and Engineering.

The coating works in two ways: First, it reflects up to 99% of solar radiation to stop buildings from absorbing heat. More intriguingly, it emits heat in the form of longwave infrared radiation into the icy universe, where the temperature is generally around -270 degrees Celsius, or just a few degrees above absolute zero.

In a phenomenon known as “radiative cooling,” space effectively acts as a heat sink for the buildings; they take advantage of the new cooling glass design along with the so-called atmospheric transparency window—a part of the electromagnetic spectrum that passes through the atmosphere without boosting its temperature—to dump large amounts of heat into the infinite cold sky beyond. (The same phenomenon allows the earth to cool itself, particularly on clear nights, although with much less intense emissions than those from the new glass developed at UMD.)

“It’s a game-changing technology that simplifies how we keep buildings cool and energy-efficient,” said Assistant Research Scientist Xinpeng Zhao, the first author of the study.



Hu (left) and Zhao display a panel of steel coated with their new radiative cooling glass. (Photo courtesy of A. James Clark School of Engineering)

“This could change the way we live and help us take better care of our home and our planet.”

Unlike previous attempts at cooling coatings, the new UMD-developed glass is environmentally stable—able to withstand exposure to water, ultraviolet radiation, dirt and even flames, enduring temperatures of up to 1,000 degrees Celsius. The glass can be applied to a variety of surfaces like tile, brick and metal, making the technology highly scalable and adaptable for wide use. [...]

[The University of Maryland \(UMD\), 13 November 2023, By Daniela Benites](#)

Image: UMD

## 11. USEPA’s Latest Rulemakings and Upcoming GreenChill Webinars

On October 5, EPA announced two actions to phase down climate-damaging hydrofluorocarbons (HFCs) under the bipartisan American Innovation and Manufacturing (AIM) Act, building on the Biden-Harris Administration’s progress in accomplishing an initial 10% reduction and helping achieve an 85% reduction by 2036. These actions are:

1. A final rule to accelerate the ongoing transition to more efficient and climate-safe technologies in new refrigeration, heating and cooling systems and other products by restricting the use of HFCs where alternatives are already available.
2. A proposed rule to better manage and reuse existing HFCs, including reducing wasteful leaks from equipment and supporting a growing American industry for HFC recycling and reclamation.



Review [EPA’s media release](#) or the [HFC webpage](#) for more information, or join the upcoming GreenChill webinar

### **November 17 Webinar: Final Technology Transitions Rule under the American Innovation and Manufacturing Act**

Friday, November 17 | 1 - 2 PM Eastern

**Register now >>> [Final Technology Transitions Rule under the American Innovation and Manufacturing Act](#)**

Presenters from EPA will provide an overview of the final Technology Transitions rule. The Technology Transitions Program sets limits on the use of climate damaging HFCs in specific technology sectors and subsectors. This webinar will focus on the retail food sector.

[USEPA GreenChill, 13 November 2023](#)

Image: USEPA GreenChill

# EUROPE & CENTRAL ASIA

## 12. Addressing fluorinated gases under the Montreal Protocol

[...] The Montreal Protocol [MP] has led to the widespread elimination of ozone-depleting substances and expanded its mandate with the Kigali Amendment to phase down potent greenhouse gas HFCs by 85% by 2047.

While significant progress has been made, the Kigali Amendment currently only addresses a phase down, not a full phase out of HFCs. In some cases, Parties are taking steps beyond the Kigali Amendment, addressing a complete phase out of F-gases and their replacement with environmentally friendly substances which are completely F-gas free.

This includes the position of the EU Parliament on the proposed revision of the European Regulation on F-gases<sup>10</sup>, and the position of the California Legislature in the state of California<sup>11</sup>.

The MP could consider a full phase out of HFCs and alternative low GWP F-gases, many of which have harmful environmental impacts. This would build on the momentum of the Kigali Amendment and further the Protocol's mission of protecting the ozone layer, mitigating climate change and environmental protection.

With leadership from progressive Parties, the MP has the potential to drive an ambitious worldwide F-gas phase out.

*Excerpt from the International Climate Negotiations, pages 33-34, "Issues at stake in view of the COP28 UN Climate Change Conference in Dubai and beyond".*

<sup>10</sup> [Fluorinated gases: reinforced EU action to cut emissions](#)

<sup>11</sup> [California Legislature: Senate Bill SB-1206 Hydrocarbon gases: sale or distribution \(September 2022\)](#)

[The European Parliament, Study Requested by the ENVI Committee, November 2023](#)

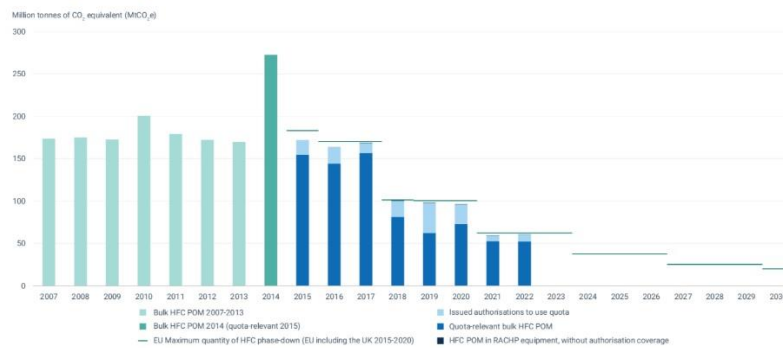
Image: EP



## 13. Hydrofluorocarbon phase-down in Europe

Following two decades of fluctuation, EU emissions of fluorinated greenhouse gases (F-gas) peaked in 2014. They have since fallen by about 25%. This can be partly attributed to the EU-wide hydrofluorocarbon (HFC) phase-down set out in the F-gas Regulation, which aims to reduce F-gas emissions and mitigate global warming. HFCs account for the majority of F-gas emissions and the EU is on track to meet targets and phase down HFC use by 2030. It is also on track to meet its international obligation to reduce HFC consumption, in effect since 2019, under the Montreal Protocol.

**Figure 1. EU progress under the hydrofluorocarbon phase-down set out in the EU F-gas Regulation**



**Note:**

- Hydrofluorocarbons (HFC); Placed on the market (POM); Refrigeration, air conditioning and heat pump (RACHP).
- Data shown for 2022 are preliminary and subject to further validation by the European Commission. Values from 2007 to 2013 are based on the reporting obligations of the old **F-gas Regulation (EC) No 842/2006** and are therefore not fully comparable with data from 2014 onwards (based on obligations under the current F-gas Regulation (EU) No 517/2014).
- The geographical scope of presented POM data: EU-27 for 2007-2012, EU-28 for 2013-2019, EU-27 + UK for 2020 and EU-27 for 2021 (Croatia is included in the entire time series except for the period 2007-2008). The maximum quantities of the EU HFC phase-down shown for 2015-2019 apply to EU-28, for 2020 to EU-27 and UK, and to EU-27 for 2021 onwards.

Fluorinated greenhouse gases (F-gases) – which include hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), Sulphur hexafluoride (SF6) and nitrogen trifluoride (NF3) – contribute to global warming. These gases are used in a range of applications, but the refrigeration, air conditioning and heating sector account for the majority of F-gas use in the EU. Between 1990 and 2014, emissions of F-gases in the EU increased by around 70% overall and accounted for about 3% of all greenhouse gas (GHG) emissions (see EEA GHG data viewer). This increase was largely caused by the substitution of ozone-depleting hydrochlorofluorocarbons (HCFCs) with HFCs in the refrigeration, air conditioning and heat pump sector and the growth of this sector as a whole. The F-gas Regulation aims to reduce F-gas emissions by two thirds of 2010 levels by 2030, by improving the leak-tightness of equipment, promoting the use of more environmentally friendly alternatives to F-gases and capping sales of HFCs on the EU market through an HFC phase-down.

The EU-wide HFC phase-down is, in particular, expected to result in large reductions in F-gas use and emissions, as HFCs account for the vast majority of F-gas emissions. To place bulk HFC gases on the market, companies must hold sufficient quotas, which are expressed in tonnes of CO<sub>2</sub> equivalents to create an incentive to use gases with lower global warming potential. The maximum quantities of quotas are set to progressively decrease from 2015 until 2030 (Figure 1). The quantity of HFCs placed on the market in the EU was particularly high in 2014 before the phase-down began, but since then has

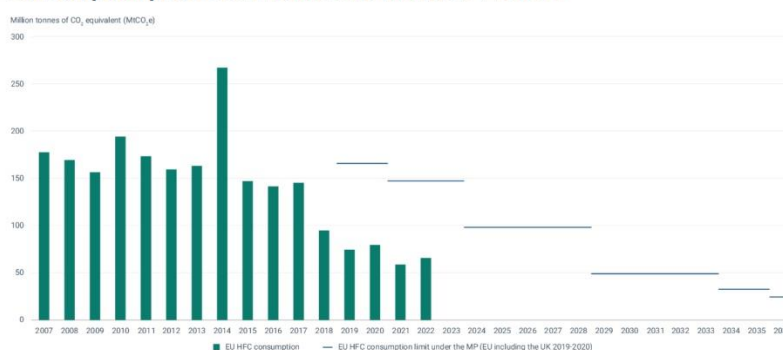


declined markedly, and was below the maximum quantity set by the F-gas Regulation in 2015 and in each year since. Thus, the EU is on track to meet its HFC phase down targets.

Since 2017, HFCs in imported refrigeration, air conditioning and heat pump equipment have also been included in the quota system by means of quota authorisations that equipment importers acquire from quota holders. While the HFC phase-down under the F-gas Regulation jointly applied to the EU-27 and the UK until 2020, the maximum quota quantities for 2021 onwards have been adjusted to the EU-27 scope.

Additional efforts have been undertaken at EU and Member State levels to reduce HFC leakage from refrigeration and air conditioning equipment, encourage the recovery of gases at the end of equipment lifetime, promote the use of non-HFC refrigerants and ban the use of HFCs for certain applications. Along with those efforts, the HFC phase-down process has, after two decades of increases, had an impact on F-gas emissions, which peaked in 2014 and have since fallen by about 25%.

**Figure 2. EU progress towards the worldwide hydrofluorocarbon consumption phase-down under the Montreal Protocol**



**Note:**

- Hydrofluorocarbons (HFC)
- The geographical scope of presented HFC consumption data is EU-28 except Croatia for 2007-2008, EU-28 for 2009-2019, EU-27+UK for 2020 and EU-27 from 2021 onwards.
- The HFC consumption limit under the Montreal Protocol is shown for EU-27 + UK for 2019 and 2020 and for EU-27 from 2021 onwards.

At international level, HFC consumption is regulated under the Kigali Amendment to the Montreal Protocol. In accordance with the 2016 amendment, which came into effect in 2019, developed and developing countries have committed to an HFC phase-down by meeting progressively decreasing HFC consumption targets. The phase-down schedule for the EU and the group of developed countries starts at 90% of the baseline going down to 15% by 2036. The EU is well on track to comply with its obligations under the Montreal Protocol: In 2022, EU-27 HFC consumption was 55% below the Montreal Protocol target recalculated to the EU-27 geographical scope.

For explanations on the differences between the 'consumption' metric used under the Montreal Protocol and 'Placing on the Market' used under the F-gas regulation, as well as more information on underlying trends in the EU supply of HFCs and other fluorinated gases please refer to the [ETC CM Report 2023/4](#), available on the [ETC CM website](#).

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1. UN, 1987, Montreal Protocol on Substances that Deplete the Ozone Layer, Secretary-General of the United Nations.<sup>4</sup>

2. EC, 2018, '[EU ratifies Kigali Amendment to the Montreal Protocol](#)', accessed October 25, 2020. <sup>4</sup>

## The European Environment Agency (EEA), 8 November 2023

Image: EEA

**See also >>> [ETC CM report 2023/04: Fluorinated greenhouse gases 2023](#)**. Data reported by companies on the production, import, export and destruction of fluorinated greenhouse gases in the European Union, 2007-2022, Publication date: 23 October 2023. Authors: Sylvie Ludig (Öko-Institut), Wolfram Jörß (Öko-Institut), Victoria Liste (Öko-Institut). EEA project manager: Peder Gabrielsen.

### 14. Upcoming 14<sup>th</sup> IIR Conference on Phase-Change Materials and Slurries for Refrigeration and Air Conditioning - [Call for abstracts still open!](#)



Submit your abstracts for the 14<sup>th</sup> IIR Conference on Phase Change Materials and Slurries in Refrigeration and Air Conditioning (PCM 2024) to be held **on May 29-31, 2024, in Paris, France**.

#### [Submit your abstract](#)

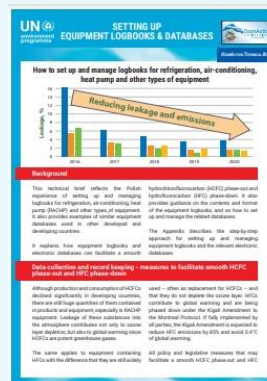
The call for abstracts is open now and **the deadline for submission of abstracts is January 15, 2024**, don't miss this opportunity to present your research. **Conference scope:**

- Thermophysical properties of PCMs and slurries
- Transport phenomena of PCMs and slurries: mass, momentum, and heat transfer
- Processing of PCMs and slurries
- Numerical and experimental methods dedicated to PCMs and slurries
- Materials Science and innovation of PCMs and slurries
- Industrial (food, transport...) and building applications of PCMs and slurries
- Energy storage and savings
- Economic and environmental assessments.

Learn more from the [International Institute of Refrigeration \(IIR\)](#)

Image: International Institute of Refrigeration

**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. UN Environment, OzonAction, August 2023**



## FEATURED



Summary of the 45<sup>th</sup> meeting of the Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer: 2-7 July 2023. Read/Download the full [Summary Report](#)

See also >>>

- [IISD daily reporting/highlights](#)
- [UNEP Ozone Secretariat/OEWG-45](#)

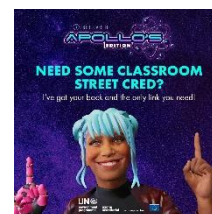
**Overview for the meetings of the ozone treaties** - Click [here](#) for upcoming and past Montreal Protocol Meetings dates and venues.

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



The theme and other related materials available [here](#) in the six UN official languages.

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



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



[United Nations Environment Programme \(UNEP\), Ozone Secretariat](#)

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

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



Read/download >>> [Ozone Secretariat's education platform](#)

## The UN Environment Assessment Panels

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

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

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

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

**Scientific Assessment of Ozone Depletion: 2022 - [Executive Summary](#)**

[United Nations Environment Programme \(UNEP\), Ozone Secretariat](#)



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

The Fund is dedicated to reversing the deterioration of the Earth's ozone layer. It was established by a decision of the Second Meeting of the Parties to the Montreal Protocol (London, June 1990) and began its operation in 1991. The main objective of the Fund is to assist developing country parties to the Montreal Protocol whose annual level of consumption of the ozone depleting substances (ODS) chlorofluorocarbons (CFCs) and halons is less than 0.3 kilograms per capita to comply with the control measures of the Protocol. Currently, 147 of the 197 Parties to the Montreal Protocol meet these criteria. They are referred to as Article 5 countries.

The Multilateral Fund is managed by an Executive Committee with equal membership from developed and developing countries. Since the inception of the Fund, the Executive Committee has

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held 91 meetings. The Fund Secretariat, located in Montreal, assists the Executive Committee in its tasks. Projects and activities supported by the Fund are implemented by four international implementing agencies and a few bilateral agencies.

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

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

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

**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](#)**

**Upcoming events:**

- The **93<sup>rd</sup> meeting** is scheduled for 11 to 15 December 2023, in Montreal, Canada
- Click [here](#) for the Executive Committee upcoming and past Meetings and related documents.



**OzonAction Compliance Assistance Programme** produces and outreaches a wide variety of information and capacity building materials and tools that support the implementation of the Montreal Protocol programs and assist Article-5 countries in meeting the

compliance targets. These include publications, technology briefs and factsheets, mobile applications, videos, e-Learning, modelling, and database programs and special educational or certification programs.

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

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

*Images in this section are by OzonAction*

**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 Gard web-based tool**

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

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

Substance ID	Quantity (kg)	Quantity (kg)	Quantity (kg)	Quantity (kg)	Quantity (kg)	Quantity (kg)
1	100	100	100	100	100	100
2	100	100	100	100	100	100
3	100	100	100	100	100	100

**HCFC Quota and Licence Tracker** - a new desktop application to assist with HCFC licences and quotas

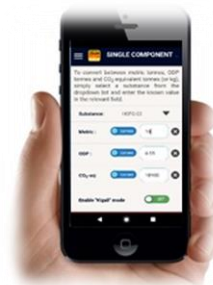
National Ozone Officers have the great responsibility of managing the allocation and monitoring of quotas for substances controlled under the Montreal Protocol. This process can be complex with many

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](#)

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### 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 for 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](#).

**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**

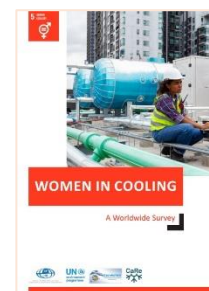


As part of IIR and UNEP OzonAction's partnership, a set of Cold Chain Technology Briefs was released over the past few years, which includes in-depth summaries about the cold chain in different key sectors. They include descriptions of technology, refrigerant options and trends and conclude with prospects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

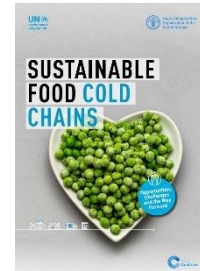


## PUBLICATIONS

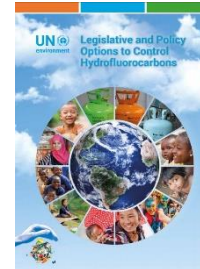
**Results of a Worldwide Survey about Women in Cooling Released by IIR and UNEP OzonAction** - Refrigeration, Air-Conditioning, and Heat-pumps (RACHP) are crucial for our health, nutrition, comfort, and well-being. It is one of the sectors that crosscuts many of the UN sustainable development goals and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



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

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

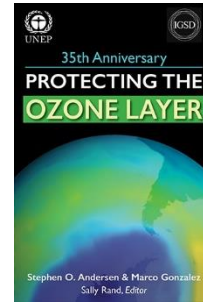
**Request free Download [here](#)**





**Protecting the Ozone Layer - 35<sup>th</sup> Anniversary Edition** - a new book celebrating the 35<sup>th</sup> Anniversary of the Montreal Protocol. **The electronic version (Kindle Edition) of the book has become available for purchase \$3.03 on Amazon.** The book highlights successes and documents innovation during the first 35 years and inspires new ambition to strengthen protection of stratospheric ozone and climate before Earth passes tipping points. The book tells the story of the Montreal Protocol, revealing a model of cooperation, collaboration, universal ratification, record of compliance with over 99 per cent of controlled ozone-depleting substances (ODSs) phased out, the ozone layer on the path to recovery, the 2007 Montreal Adjustment, and the 2016 Kigali Amendment moving the Montreal Protocol further into environmental protection. Unfinished business includes: HCFC phase out, ODS bank management, HFC phase down, uncontrolled ozone-depleting greenhouse gas nitrous oxide (N<sub>2</sub>O), feedstock exemptions for plastics production, and dumping of obsolete cooling appliances.

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



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