Volume XXIII | 15 February 2023

In this issue:

GLOBAL

1. Kigali Amendment latest ratifications

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

Eritrea, 7 February 2023
Republic of Korea, 19 January 2023

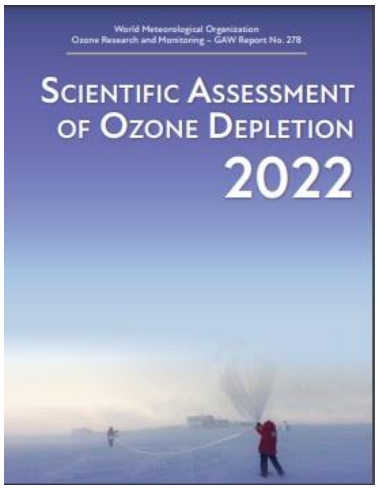
At the Twenty-Eighth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, held in Kigali from 10 to 15 October 2016, the Parties adopted, in accordance with the procedure laid down in paragraph 4 of article 9 of the 1985 Vienna Convention for

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. Highlights of the Scientific Assessment of Ozone Depletion: 2022



Science has been one of the foundations of the Montreal Protocol's success. This document highlights advances and updates in the scientific understanding of ozone depletion since the 2018 Scientific Assessment of Ozone Depletion and provides policy-relevant scientific information on current challenges and future policy choices.

A. Major achievements of the Montreal Protocol
• Actions taken under the Montreal Protocol continued to decrease atmospheric abundances of controlled ozone-depleting substances (ODSs) and advance the recovery of the stratospheric ozone layer. The atmospheric abundances of both total tropospheric chlorine and total tropospheric bromine from long-lived ODSs have continued to decline since the 2018 Assessment. New studies support previous Assessments in that the decline in ODS emissions due to compliance with the Montreal Protocol avoids global warming of approximately 0.5–1 °C by mid-century compared to an extreme scenario with an uncontrolled increase in ODSs of 3–3.5% per year.
• Actions taken under the Montreal Protocol continue to contribute to ozone recovery. Recovery of ozone in the upper stratosphere is progressing. Total column ozone (TCO) in the Antarctic continues to recover, notwithstanding substantial interannual variability in the size, strength, and longevity of the ozone hole. Outside of the Antarctic region (from 90°N to 60°S), the limited evidence of TCO recovery since 1996 has low confidence. TCO is expected to return to 1980 values around 2066 in the Antarctic, around 2045 in the Arctic, and around 2040 for the near-global average (60°N–60°S). The assessment of the depletion of TCO in regions around the globe from 1980–1996 remains essentially unchanged since the 2018 Assessment.
• Compliance with the 2016 Kigali Amendment to the Montreal Protocol, which requires phase down of production and consumption of some hydrofluorocarbons (HFCs), is estimated to avoid 0.3–0.5°C of warming by 2100. This estimate does not include contributions from HFC-23 emissions.

B. Current Scientific and Policy Challenges
• The recent identification of unexpected CFC-11 emissions led to scientific investigations and policy responses. Observations and analyses revealed the source region for at least half of these emissions and substantial emissions reductions followed. Regional data suggest some CFC-12 emissions may have been associated with the unreported CFC-11 production. Uncertainties in emissions from banks and gaps in the observing network are too large to determine whether all unexpected emissions have ceased.

• Unexplained emissions have been identified for other ODSs (CFCs-13, 112a, 113a, 114a, 115, and CCl4), as well as HFC-23. Some of these unexplained emissions are likely occurring as leaks of feedstocks or by-products, and the remainder is not understood.
• Outside of the polar regions, observations and models are in agreement that ozone in the upper stratosphere continues to recover. In contrast, ozone in the lower stratosphere has not shown signs of recovery. Models simulate a small recovery in mid-latitude lower-stratospheric ozone in both hemispheres that is not seen in observations. Reconciling this discrepancy is key to ensuring a full understanding of ozone recovery.
• The existing network of atmospheric monitoring stations provides measurements of global surface concentrations of long-lived ODSs and HFCs resulting from anthropogenic emissions. However, gaps in regional atmospheric monitoring limit the scientific community's ability to identify and quantify emissions of controlled substances from many source regions.
• Several space-borne instruments providing vertically resolved, global measurements of ozone-related atmospheric constituents (e.g., reactive chlorine, water vapor, and long-lived transport tracers) are due to be retired within a few years. Without replacements of these instruments, the ability to monitor and explain changes in the stratospheric ozone layer in the future will be impeded.
• The impact on the ozone layer of stratospheric aerosol injection (SAI), which has been proposed as a possible option to offset global warming, has been assessed following the terms of reference for the 2022 SAP Assessment Report. Important potential consequences, such as deepening of the Antarctic ozone hole and delay in ozone recovery, were identified. Many knowledge gaps and uncertainties prevent a more robust evaluation at this time.
• Heightened concerns about influences on 21st century ozone include impacts of: further increases in nitrous oxide (N2O), methane (CH4), and CO_2 concentrations; rapidly expanding ODS and HFC feedstock use and emissions; climate change on TCO in the tropics; extraordinary wildfires and volcanic eruptions; increased frequency of civilian rocket launches and the emissions of a proposed new fleet of supersonic commercial aircraft.

C. Future Policy Considerations

• If ODS feedstock emissions as currently estimated were to be eliminated in future years, the return of mid-latitude Equivalent Effective Stratospheric Chlorine (EESC) to 1980 abundances could be advanced by almost 4 years, largely due to reductions in CCl4, and thereby reduce total climate forcing from ODSs.
• Eliminating future emissions of methyl bromide (CH3Br) from quarantine and pre-shipment applications currently allowed by the Montreal Protocol would accelerate the return of mid-latitude EESC to 1980 abundances by two years (as noted in previous Assessments).
• Emissions of anthropogenic very short-lived chlorine substances, dominated by dichloromethane (CH2Cl2), continue to grow and contribute to ozone depletion. If CH2Cl2 emissions continue at their current level, they will continue to deplete approximately 1 DU of annually averaged global TCO. Elimination of these emissions would rapidly reverse this depletion.
• A 3% reduction in anthropogenic N2O emissions, averaged over 2023–2070, would lead to an increase in annually averaged global TCO of about 0.5 DU over the same period, and a decrease of about 0.04 Wm–2 in radiative forcing, averaged over 2023–2100.
• Global emissions of long-lived HFC-23, which are largely a by-product of HCFC-22 production, are as much as eight times larger than expected and are likely to grow unless abatement increases during HCFC-22 production or feedstock use of HCFC-22 decreases.
• The current combined GWP-weighted emissions of CFCs plus HCFCs are comparable to those of HFCs. Reductions in the future emissions of CFCs and HCFCs requires addressing

releases from banks and continuing production and use in allowed manufacturing of feedstocks, in by-products, or in unknown uses, depending upon the compound.

World Meteorological Organization Ozone Research and Monitoring – GAW Report No. 278

Image: UNEP, Ozone Secretariat website

3. Green Customs Initiative Partners advance on customs activities under MEAs

Paris, France, 2 February 2023 – **Green Customs Initiative** (GCI) partners gathered in Paris, France for their 17th Annual meeting on 24 and 25 January 2023 to discuss their work plan of activities for 2023. The meeting was hosted and coordinated by the OzonAction Branch at their UNEP office in Paris.

OzonAction's Head of Branch, Mr. James Curlin in his welcome remarks to the GCI Partners said, "OzonAction is a long-standing member of the Green Customs Initiative and we have been supporting it from day one as part of UNEP's mandate as an Implementing Agency of the Montreal Protocol's Multilateral Fund. This is a very tangible, practical form of cooperation that has few peers within the UN system – coordinated delivery of capacity building services on the ground for Member States related to multiple multilateral environmental agreements. This initiative is the embodiment of the UN's Delivering as One and merits more attention and support."

The GCI meeting was opened sequentially by Ms. Patricia Kameri-Mbote, UNEP's Law Division Director and head of the GCI Secretariat, Mr. Rolph Payet, Executive Secretary of the Basel, Rotterdam and Stockholm (BRS) Conventions and Ms. Megumi Seki, Executive Secretary of the Ozone Secretariat. The three officials highlighted and noted the significant role played by customs in advancing compliance with multilateral environmental agreements (MEAs). Additionally, they commended the GCI activities and recognition by the **United Nations General Assembly's resolution on preventing and combating crimes that affect the environment**.

There were a number of key topics discussed during the meeting including the individual and joint customs activities for 2022, the enforcement operations **Thunder 2022**, **Demeter VIII**, and the **Green Customs Global Conference**, the outcomes of the Conference of Parties for MEAs in 2022, the joint customs training and development of customs national curricula and the **Green Customs Guide to MEAs**.

Additional sessions were covered on fostering MEA synergies, particularly between the BRS conventions and the Montreal Protocol to the Vienna Convention, implementing new customs harmonized codes and strengthening the GCI. Furthermore, the sessions'

plenaries provided an opportunity to discuss specific issues such as enhancing voluntary and mandatory reporting for MEAs, promoting Customs' role in a circular economy, enhancing gender integration in the partners' and customs work, deepening linkages between trade and the environment, and understanding environmental terminologies relevant to customs.

The meeting concluded with a commitment to amplify the initiative's impacts through robust resource mobilization, increased collaborative efforts and implementation of a 2023 joint work plan. The agreed upon 2023 GCI activities include joint training workshops; updates of GCI related courses on **CliKC!** (Customs Learning and Knowledge Community) a WCO learning platform for Customs Officers; and a publication on gender and green customs.

Detailed information about GCI activities will be available on the new GCI website, which will be launched soon.

UNEP, OzonAction, 2 February 2023
Image: OzonAction website

4. Opinion: Restoration of the ozone layer is a landmark example of successful global environmental policy

Success of Montreal Protocol can inform climate policy, provide hope for future

Rarely do we ever receive good news about the climate crisis. With this influx of bad news, it can be hard to stay positive. What's worse is that it's difficult to focus on being sustainable when the actions of major actors and corporations cause more and more detriment to the environment every day. But, when possible, it's important to celebrate successes in improving the environment as well as recognize how they were achieved.

One such success that we can celebrate is that of the ozone layer's replenishment. Following decades of chemical phaseouts and global collective action, most of the ozone layer is expected to make a full recovery by 2040.

The ozone layer is an essential part of the planet's atmosphere, responsible for absorbing ultraviolet (UV) radiation from the sun and thus preventing these harmful rays from reaching us and the land around us. Damage to this layer has implications for human and environmental health, with consequences ranging from skin cancer to decreased crop yields. Without adequate protection from the ozone layer, entire food webs and ecosystems are at risk of collapse.

Prior to regulation, the uncontrolled use of chlorofluorocarbons (CFCs) and other ozone-depleting substances was gradually destroying the ozone layer. Commonly used in products such as insulation, spray cans, and air conditioners, these greenhouse gases contribute to increases in temperature while simultaneously damaging the ozone layer. Proper regulations have prevented a raise in temperatures by 1 degree Celsius due to these CFCs — making the issue of battling the climate crisis, and maintaining the target limitation of 1.5 degrees Celsius, even more difficult.

In 1985, Jonathan Shanklin, a researcher at the British Antarctic Survey, discovered a hole in the ozone layer. Its health steadily declined until 2000, when the hole began to slowly repair, and UV radiation in the affected regions became less severe. This shift was monumental, as scientists expected total collapse of the integral ozone layer by 2050, at which point, the planet's ecosystems would have fallen into disrepair, agriculture would have been collapsing, and genetic defects would have become increasingly prevalent.

Montreal Protocol and its outcomes

Using the Montreal Protocol, the United Nations Environment Programme (UNEP) is working toward restoring the ozone layer.

Implemented in 1987, just two years after the initial discovery of the ozone hole, the Montreal Protocol is widely known as the most successful example of international environmental policy. The agreement required 197 countries that signed to stop the production and use of CFCs and other harmful substances and replaced these chemicals with less detrimental alternatives.

Since its implementation, 99 per cent of ozone-depleting chemicals have been phased out and every country worldwide has approved of the Protocol's terms. Almost forty years later, the healing of the ozone layer is a testament to the Montreal Protocol's success. The key is ambitious, global action, and the Montreal Protocol can serve as a framework for such present and future climate action.

Why is the recovery of the ozone layer significant?

The proliferation of negative climate news makes it difficult to foresee a future in which the environment is stable. Mitigation is difficult, but not impossible — the ozone layer is proof of that.

As a form of climate mitigation, protecting the ozone layer is already an important task. But perhaps even more significantly, the success of the Montreal Protocol represents the power of collective action and legislation.

The climate crisis is a multifaceted problem, requiring innovative solutions. When the ozone hole was discovered, scientists, governments, and policymakers quickly began to develop a strategy that would address the problem of CFCs. While the full scale of its impact would be unknown, the protocol adopted a proactive, precautionary approach to ensure that the ozone layer would not suffer any further damage.

Individual solutions are beneficial, and we should all strive to be more mindful of our environmental impact. However, the key to many of today's most striking problems is global action.

Timely, ambitious, coordinated effort toward environmental protection is essential. By drawing on the strategies and successes of the Montreal Protocol, we can inform future legislation. What's important is that action begins now. In 1987, they didn't wait to see what would happen twenty years down the road — they decided that the potential effects of ozone-depleting substances necessitated prohibition of CFCs and development of alternatives. Likewise, an incomplete understanding of the full range of consequences of our current practices that harm the environment should not prevent us from changing those practices.

Moving forward

It's not too late to reverse the effects of the anthropogenic climate crisis. States must maintain their policies, execute their commitments, and continue to find ways to limit

emissions. The observed trends and patterns of inaction to address the climate crisis are still reversible — as the Montreal Protocol demonstrated, collective global regulations brought a quickly disintegrating ozone layer back to life.

As it currently stands, the ozone layer is a success story in the otherwise troubled tale of the climate crisis. The current trajectory of the planet is not permanent. In the midst of climate anxiety and a news cycle dominated by stories of environmental degradation, the success of the Montreal Protocol and subsequent healing of the ozone hole serve as a beacon of hope.

The Varsity, The University of Toronto's Student Newspaper, 4 February 2023, By Chloe MacVicar

Image: The Varsity website

See also >>> "**Healing ozone layer helps prevent global warming by 0.5°C**", Economist-Namibia, 7 February 2023, By Freeman ya Ngulu

5. Q+A: Understanding the UN report on ozone layer recovery

Johns Hopkins University - Assistant professor Scot Miller offers insight on the United Nations' most recent assessment of the Montreal Protocol, which offers good news on the restoration of the ozone layer

The ozone layer is slowly restoring itself and is expected to be on par with 1980 levels by 2066, according to a **United Nations assessment** of the goals set forth in the Montreal Protocol released this month.

Ozone is a naturally occurring gas comprising three oxygen atoms. The stratospheric ozone layer is essential in protecting humans and the environment from the harmful ultraviolet light from the sun.

"Gases like chlorofluorocarbons, or CFCs, destroy stratospheric ozone and are responsible for the ozone hole over Antarctica," says Scot Miller, assistant professor in the Johns Hopkins Department of Environmental Health and Engineering. "The report found that emissions of ozone-depleting substances, or ODS, like CFCs have dramatically declined over the past 30 years, which spells good news for the recovery of stratospheric ozone."

The U.N. report comes out every four years to assess progress on the Montreal Protocol on Substances that Deplete the Ozone Layer, an agreement among United Nations member nations to reduce the consumption and production of man-made ODS and some hydrofluorocarbons, or HFCs.

Miller, who studies greenhouse gases and air pollutants, offers insight on the implications of this report.

Do the U.N. findings mean the threat of global warming and its attendant harms are diminishing?

Unfortunately, no.

Many ozone-depleting substances are also greenhouse gases, so a reduction in ODS emissions is beneficial for climate. For example, the U.N. assessment states that global action to reduce ODS has prevented about 0.5–1 °C in global temperature rise.

However, the overall climate impact (radiative forcing) of ozone-depleting substances is generally much less than that of other greenhouse gases like carbon dioxide or methane. The climate impact of ODS could have been more severe if countries had not moved so swiftly to curb emissions starting in the 1990s. But we are still contending with a host of greenhouse gases that are heating up the planet.

What is the time frame for the ozone layer to be restored?

Although emissions of ODS have dramatically declined, it will still take many more years for the ozone layer to recover. Globally, the ozone layer is expected to return to average 1980 levels by 2040. The Antarctic ozone hole will persist until 2066 or so. Many ODS can remain in the stratosphere for a long time after they're emitted by human activity. In addition, ODS can still be present in old refrigerators, fire extinguishers, and foam insulation. These "banks" of ODS can continue emitting well into the future, even though many of these chemicals have been completely phased out of newer appliances and materials. Hence, the ozone layer did not immediately recover as these chemicals were banned. Rather, emissions that occurred many years ago are still impacting stratospheric ozone and appliances that were manufactured decades ago are still leaking ODS.

What impact does a depleted ozone layer have on human health and the environment?

The ozone layer blocks harmful ultraviolet rays from reaching Earth's surface. This harmful radiation can damage skin and lead to skin cancer and cataracts. It can also harm marine life and some crops.

After years of no improvement, do we know why this reversal is happening now?

Steve Montzka, a colleague of mine at National Oceanic and Atmospheric Administration, published a scientific paper in 2018 showing that CFCs were not decreasing in the atmosphere as expected, and the authors hypothesized that this problem was due to illegal emissions from East Asia. A *New York Times* investigation later found that these emissions were likely from factories in eastern China making foam insulation. The Chinese government quickly cracked down on these emissions, and the emissions have disappeared. This new U.N. report finds that these rogue emissions only delayed recovery of the ozone layer by about a year.

How is the ozone layer recovering now that it has been depleted?

Ozone is produced in the stratosphere through natural chemical reactions, so the ozone layer can, in a sense, heal itself. These reactions are referred to by atmospheric scientists as the Chapman Cycle. By contrast, a single ODS molecule can lead to the destruction of many ozone molecules through repeated chemical reactions.

Historically, ODS were used in refrigeration systems, in insulation, and in fire extinguishers, among other uses. Once ODS are emitted at the Earth's surface, it can take many months for those ODS to make their way into the stratosphere, but once there, these compounds often persist for years.

Emissions of ODS have dramatically declined over the past 30 years, and concentrations of ODS in the stratosphere are slowly declining. As ODS disappear, the natural chemical

reactions in the stratosphere should be able to restore ozone levels to normal, historical levels.

What should the average non-scientist take away from these findings?

I think that the ozone layer is a remarkable story of global cooperation to successfully tackle an environmental problem. The Antarctic ozone hole appeared in satellite ozone measurements as far back as the late 1970s, but scientists initially thought the measurements were an error because they were so low. The first paper to report on the ozone hole was published in 1985, and by 1987 countries around the world had agreed on the Montreal Protocol. Emissions of ODS have plummeted since that time.

By contrast, global action on climate change has been more complicated and fraught. Most countries signed on to the 1997 Kyoto Protocol and subsequently to the 2015 Paris Agreement—treaties that target global reductions of greenhouse gas emissions. However, those emissions continue to climb year after year, except for a short-lived reduction during the early months of the COVID-19 pandemic.

Arguably, the ozone layer was an easier cause to rally around; ozone destruction was an immediate threat to global health, ODS were only being emitted by a limited number of industries, and there were chemical alternatives to many ODS. By contrast, climate change is arguably a more long-term, existential threat, and greenhouse gases are emitted by countless human activities.

I think the most important aspect of this report is that it presents a cogent synthesis of current science around stratospheric ozone, and it is critical for benchmarking how successful global efforts have been at reducing emissions of ODS.

Johns Hopkins University, 31 January 2023, By Danielle Underferth
Image: Johns Hopkins University website

6. Women in science that Innovate. Demonstrate. Elevate. Advance. Sustain (I.D.E.A.S)

For International Day of Women & Girls in Science, celebrated each year on 11 February, we honour female scientists who are at the forefront of climate action, that Innovate. Demonstrate. Elevate. Advance. Sustain (I.D.E.A.S) to protect the ozone layer and the environment.

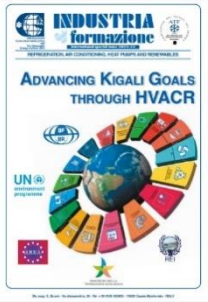
Dr. Andrea Hinwood is an environmental scientist with expertise in environmental exposures and impacts on human health and currently the Chief Scientist at the United Nations Environment Programme. Prior to joining the UN, Dr Hinwood served as the first Chief Environmental Scientist at the Environment Protection Authority (EPA) in Victoria, Australia. During her extensive career, one of her highlights was working for the Montreal Protocol: **"I got to see how science was used in policy making and the interaction between a range of stakeholders such as non-government organizations, industries, and the scientists."** **Read more**

Our second distinguished female scientist, **Dr Helen Walter-Terrinoni**, is Vice-President of Regulatory Affairs at the Air-Conditioning, Heating, and Refrigeration Institute (AHRI). Since 2010, Dr Walter-Terrinoni has been a member of the Technical and Economic Assessment Panel (TEAP) and co-chair of the Flexible and Rigid Foams Technical Options Committee providing technical advice to the parties to the Montreal Protocol. On women and girls pursuing a career in science: **"There are many, many people that want to help you succeed! We are interested in your thoughts and helping you to find opportunities."** **Read more**

UNEP, Ozone Secretariat, 8 February 2023

Image: Ozone Secretariat website

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



*The **International Special Issue 2022- 2023** was officially launched during a side event at the Thirty-Fourth Meeting of the Parties to the Montreal Protocol in Montreal, (MOP34), 31 October – 4 November 2022 | Montreal, Canada*

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

AFRICA

7. Empowering Female Refrigeration and Air-conditioning Technicians in Anglophone Africa

Cairo, Egypt, 19 January 2023 – There is a growing need for females to join the ranks of air- conditioning and refrigeration (RAC) technicians. A training workshop recently organized by the Government of Egypt and the United Nations OzonAction Compliance Assistance Programme (CAP) better prepared women for advancement in the field and revealed the unique challenges women face.

Over the next three decades, use of air conditioners and refrigerating systems is set to soar globally, driven by population growth, expanding middle class, boom in international trade of perishable commodities, and demand from the life science and pharma industries. This growth will spur a corresponding need for qualified technicians who can install and service

systems, so they run efficiently and meet environmental regulations. Attracting more women is one of the steps the sector is taking to meet its workforce challenge.

The workshop, held in Cairo, 17 to 19 January with support from the Montreal Protocol's Multilateral Fund, provided an interactive forum for female RAC technicians from countries in the Anglophone Africa Network to learn and network in support of gender mainstreaming. The women exchanged experiences, developed skills, shared ideas, and in general built their capacities to enable transitioning towards low-GWP technologies. With an objective of increasing participation of women in the field and supporting equal opportunities for men and women, the workshop aimed to promote access to economic resources and to empower women and girls at all levels.

"The refrigeration and air-conditioning sector have become a vital and essential issue for all civilized nations which are working on the sustainable economic development and prosperity of its people," said Engineer Ayman El- Refaie, Head of the Carbon Credits Department, Egyptian Environment Affairs Agency, when he opened the workshop. "Air conditioning is not a luxurious requirement anymore."

At the Cairo workshop, eighteen enthusiastic female technicians identified similar obstacles to their entry to and rise in the RAC sector:

- Family members not believing that the RAC sector is suitable for females.
- A lack of equal opportunities for women and men, leading to the lack of employment for qualified female technicians and discouraging other women to pursue paths in the field.
- Girls facing culture pressure in many countries that discourage them from developing the skills needed to join the technology field.
- Some employers believing that women are fragile, and in the event that they became pregnant would find it difficult to carry out laborious tasks hence a need to employ an assistant increasing cost.

In general, the women believed they had to perform three times better than men to receive comparable recognition.

OzonAction is committed to achievement of the United Nation's Sustainable Development Goal (SDG) 5 which concerns gender equality and empowering women and girls. It actively promotes the opportunities available to women in its training and capacity-building programmes, encouraging women already in the RAC sector and promoting opportunities to those considering the variety of interesting and fulfilling careers in this fast-growing sector.

During the workshop's opening session, James Curlin, Head of OzonAction, UNEP Law Division, said while there had been progress over the last decades with more girls going to school, fewer girls forced into early marriage, more women serving in parliament and in positions of leadership, and laws being reformed to advance gender equality, more is needed. "Many challenges remain, such as discriminatory laws. Social norms remain pervasive," Curlin said. "Women continue to be under-represented at all levels of political leadership, and 1 in 5 women and girls report experiencing physical or sexual violence. SDG 5 states that gender equality is not only a fundamental human right, but a necessary foundation for a peaceful, prosperous and sustainable world."

In 2019, **UNEP OzonAction** in partnership with **UN Women** jointly launched the publication **Women in the Refrigeration and Air-conditioning Industry: Personal Experiences and Achievements** to raise awareness of the opportunities available to women and recognise their successes. The booklet identifies the challenges faced by women in

the industry and presents the inspiring stories of women who met these challenges, and which serve as motivating experiences for others.

Refrigeration, air conditioning and heat pumps also are essential for the success of many of the other SDGs. Besides being an avenue for gender equality, it also positively impacts, directly or indirectly, goals ranging from food security to public health, quality of life, technological development, environmental protection notably including climate action, and education and employment. Similarly, refrigeration and air conditioning are integral parts of the Montreal Protocol.

The training workshop presented a varied agenda consisting of presentations, discussions, practical demonstrations and working groups as well as interactive exercises that considered overall challenges in the region and good practices in the RAC sector.

The female RAC technicians each had the opportunity to present the work they do in their respective countries and comment on the challenges they face as women in a field mainly composed of men. Have they experienced gender bias in employment practices? Have they suffered from a lack of employment opportunities? Have they experienced prejudice and discrimination by business owners? Have they been victims of sexual harassment? Or been deprived of recognition of their accomplishments? The women shared how each of them addressed roadblocks such as these in their career development.

The workshop also identified barriers that both male and female technician's encounter

- Lack of proper professional recovery and reclaiming centers to recycle used refrigerants.
- Use of low-quality and inappropriate tools which compromises performance and safety.
- Technicians who do not adopt recommended practices no matter how much training is offered to them.
- Low compensation.
- No apprenticeship.

But the workshop did not stop at identifying problems. Organizers also focused on solutions.

On the last day, the women received practical hands-on training at the NASSER Secondary Technical Schools for Girls where they learned about the latest refrigeration and air-conditioning technology developments. Also, speakers presented updates on contributions being made by UNEP and industry groups. For instance, all Montreal Protocol projects have a gender dimension, and those resources can be used to organize meetings and training workshops for female technicians at the national level. OzonAction has produced a series of gender mainstreaming tools to assist countries to advance gender mainstreaming in their Montreal Protocol activities, including in the HVACR sector. Global and regional

HVACR associations, such as ASHRAE and U-3ARC, are addressing the issue. Further, the International Network of Women in Cooling (INWIC) initiative will help with networking and capacity building for women in the sector.

The workshop was part of the 2023 work plan of UNEP OzonAction CAP to support countries in implementing their Montreal Protocol commitments and which includes promoting UN gender mainstreaming objectives.

The eighteen women are role models for Africa who are inspiring change and the acceptance of female technicians. They are breaking down of gender barriers not only in the RAC sector but in other sectors as well. The women left Cairo having made new connections and empowering one another, demonstrating to themselves and others that there is not only room in the RAC for females, there are opportunities for them to thrive.

Contact:

Patrick Salifu, Montreal Protocol, Regional Network Coordinator, Anglophone Africa
Florence Asher, Montreal Protocol, Programme Management Officer
Sonja Wagner, Montreal Protocol, Programme Management Officer, Gender Focal Point

UNEP, OzonAction, 19 January 2023
Image: OzonAction Website

ASIA AND THE PACIFIC

8. Australia Day 2023 Honours List

The Australia Day 2023 Honours List recognises and celebrates recipients, including in the General Division of the Order of Australia and awards for meritorious, distinguished, and conspicuous service.

Among the Awardees:

Dr Helen Tope was invested as an Officer of the Order of Australia (AO) for her distinguished service to environmental protection, particularly of the ozone layer, through leadership, research, and policy development. Dr Tope has over 30 years' experience in environmental policy development and scientific, technical, and analytical studies. Since 1995, she has been a member of the Montreal Protocol's Technology and Economic Assessment Panel, co-chair of the Aerosols, Sterilants, Miscellaneous Uses and Carbon Tetrachloride Options Committee, the Medical Technical Options Committee, and more recently, the Medical and Chemicals Technical Options Committee, providing leadership to synthesise policy-relevant technical advice for the Montreal Protocol and other treaty bodies, such as the Kyoto Protocol.

Her extensive policy development experience includes ozone layer protection, climate change, air quality, and chemicals and hazardous wastes management, with extensive experience in strategic policy, regulatory and legislative development, and public policy processes, including managing the development of an inventory of air pollutant emissions for the city of Brisbane.

In addition, **Michael Stafford-Bennett**, another long-standing supporter of the work of the Montreal Protocol, was made a Member of the Order of Australia (AM), for his significant service to the refrigeration industry, and to the environment.

He was instrumental in establishing Refrigerant Reclaim Australia, award winning and successful refrigerant stewardship programme, and a founding member of the Australian Refrigeration Council in 2001. He also has supported the take back and destruction of used refrigerant in the Pacific and been an important advisor to Australia and the global community on refrigerant management for 20 years.

View the Australia Day 2023 Honours List

The Governor-General of the Commonwealth of Australia, January 2023
Image: The Governor-General of the Commonwealth of Australia Website

LATIN AMERICA AND CARIBBEAN

9. St Kitts: Department of Environment continues work on Montreal Protocol by engaging students as data collectors

Basseterre, St Kitts, February 5, 2023 – The National Ozone Unit (NOU) within the Department of Environment continues its project work on the Montreal Protocol with student data collectors.

The Montreal Protocol, to which St Kitts and Nevis is party, addresses Substances that Deplete the Ozone Layer and is a landmark environmental agreement that controls the manufacture and the use of man-made chemicals that, in turn, damages the ozone layer which is a protective shield from the harmful radiation of the sun to humans and the environment.

Critical components of the Montreal Protocol include data collection and monitoring. The students are therefore charged with updating the three-year-old National Database of refrigeration and air conditioning technicians on both islands as part of the Hydrochlorofluorocarbons (HCFC) Phase-out Management Plan (HPMP) which is one of the programmes under the Montreal Protocol to phase out Ozone Depleting Substance (ODS).

In Stage 1 of the project, the students, who all study Natural Sciences, will engage at least seventy air condition and refrigerator technicians, especially in fisheries, yachting, and hotel sector, who, by nature of their jobs, deal directly with the gases that weaken the ozone layer. The objective of the project is to achieve at least a 35% reduction in Hydrochlorofluorocarbons (HCFCs) used in St. Kitts and Nevis.

Abygale Richards, former Cayon High School Environment Club member and a year two student of Natural Sciences at the Clarence Fitzroy Bryant College shared her anticipation in joining the project.

She said, “I am excited because I get to volunteer for the Montreal Protocol. I am just excited for the experience and opportunity because it may help me in the future.”

Meanwhile, Vicia Woods, Biosafety Officer in the Department of Environment, said one outcome from the data collection is opportunities for training for the technicians, owing to the fact that some did not have formal opportunities for apprenticeship.

She said, “The reason why we want to know this information is because for the same project, we want to provide the opportunities of training and also with the requisite tools. We also want to ensure that the technicians are up to date with the latest technologies. That is why we need as many persons as possible to know what is needed, what we have and how it is being used and how we can make it better.”

Permanent Secretary in the Ministry of Environment, Sharon Rattan said ultimately, the exercise seeks to complete the mapping of technicians, importers, and the use of their technologies.

She said, “The data being collected would assist the National Ozone Unit in being aware of the training, equipment and technology needs within the sector. With this information, the NOU will be better equipped to assist the sector in St. Kitts and Nevis in being compliant with the Montreal Protocol.”

Through this data collection exercise, possible outcomes include the establishment of a formal Air-Conditioning and Refrigeration Association, reformation of policy and legislation, heightened public awareness, the establishment of licensing and certification systems and the development and implementation of a monitoring, evaluating, and reporting mechanism.

In December 2022, the Minister of Environment et al, Hon. Dr. Joyelle Clarke, Permanent Secretary in the same Ministry, Sharon Rattan and Woods met with a visiting Montreal Protocol Monitoring Team to reaffirm St Kitts and Nevis’ commitment to implementing required project activities starting with the engagement of students, in particular, former CHS Environment Club members and Natural Sciences and Environmental Science students for the data collection for Phase 1 of the project activities.

ZIZ Broadcasting Corporation, 8 February 2023

Image: ZIZ Broadcasting Corporation Website / Students engaged in Montreal Protocol project.

NORTH AMERICA

10. How supermarket freezers are heating the planet, and how they could change

Grocery chains under pressure to switch from HFCs to natural refrigerants to curb climate change

Climate-conscious shoppers may buy local food and try to cut packaging waste, but those efforts could be negated by potent greenhouse gases leaking from supermarket fridges.

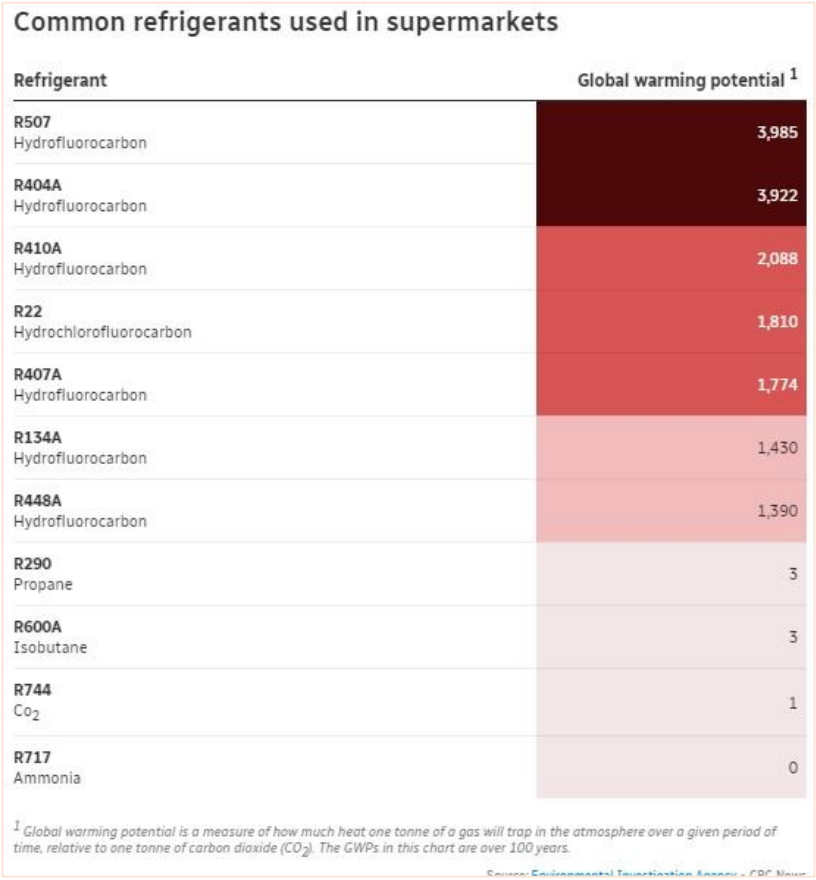
Refrigerants called hydrofluorocarbons or HFCs are widely used to keep food cold or frozen at grocery stores and during transport. (They're also used for other refrigeration applications, like ice rinks and air conditioners).

They were originally brought in to replace ozone-depleting refrigerants called chlorofluorocarbons (CFCs), which were banned in a landmark 1987 agreement called the Montreal Protocol, in order to save the Earth's protective ozone layer.

But HFCs are themselves powerful greenhouse gases.

Typically, each tonne of HFCs can trap as much heat in the atmosphere as 1,400 to 4,000 tonnes of carbon dioxide over 100 years, depending on the type of HFC.

Here's a look at why that's happening, what the solutions are, and how ordinary shoppers could make a difference.



How do HFCs get from supermarkets into the atmosphere?

Supermarket fridges aren't like your fridge at home, which typically contains less than 200 grams of refrigerant. And it's in a sealed unit that's unlikely to leak, says Morgan Smith, spokesperson for the North American Sustainable Refrigeration Council. Her non-profit group has partnered with industry to help enable the transition from HFCs to more climate-friendly refrigerants because the complexity of their systems makes them prone to leaking significant amounts of HFCs.

Beneath and behind the cases of vegetables, dairy and frozen foods at a typical supermarket are kilometres of piping with thousands of valves, containing literally a tonne of refrigerant.

"It's so large and so complex, with so many different points of connection that those systems are inherently leaky, and so they leak about 25 per cent of their refrigerant charge every year," said Smith.

That's something another non-profit group called the Environmental Investigation Agency has captured on video using infrared cameras and HFC detectors in U.S. grocery stores. It also measured levels of HFCs in the store using chemical detectors.

Three chemical detectors show readings of HFCs at a Gristedes grocery store in New York during a survey by the Environmental Investigation Agency and 350NYC in 2022. (Environmental Investigation Agency)

It detected leaks at 55 per cent of the dozens of U.S. stores where it took measurements. On average, it found a single supermarket emits 875 pounds (400 kilograms) of HFCs a year, equivalent to carbon emissions from 300 cars. In the U.S. alone, it calculated supermarket HFC leaks cause as much global warming as burning 22 million tonnes of coal.

How big a deal are these emissions really?

HFCs are such a big problem for climate change that Canada and 196 other countries have signed an international agreement, the Kigali Amendment to the Montreal Protocol, to reduce HFC consumption 85 per cent by 2036, relative to 2011 to 2013.

Shelie Miller, a professor who studies the environmental impact of the food system at the University of Michigan, says emissions from refrigerants may be relatively small compared to the food system emissions overall and major categories such as food waste.

"But that's also just because the food system has such a big impact," she said.

On the other hand, targeting HFCs in supermarkets can be very effective at curbing emissions.

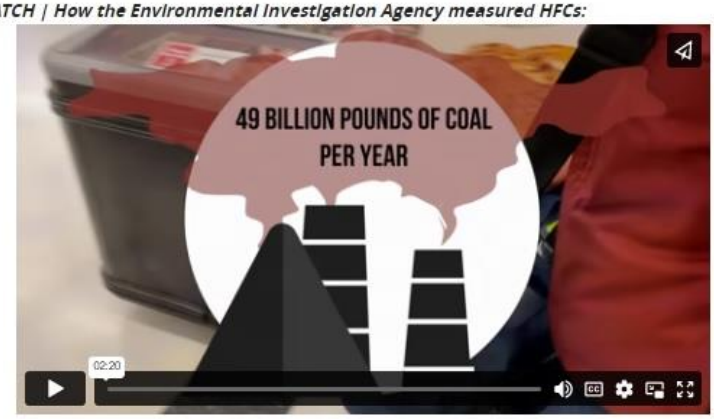
"You can make fairly small changes and have a relatively large impact just because the chemicals themselves that we're using right now have such large global warming potentials," Miller said.

While potent, HFCs are short-lived greenhouse gases, said Miller, lasting no more than 30 years in the atmosphere, compared to hundreds of years for CO_2. Since a typical refrigeration system lasts about 30 years, decisions made now about what refrigerant to use can affect global emissions for decades.

"We need to be thinking about the sources and the hubs of where emissions are happening. And so our grocery stores are a great way to target our overall food system and reduce emissions."

Project Drawdown is a U.S.-based nonprofit organization focused on identifying and supporting the most effective climate solutions. It has consistently listed preventing refrigerant leaks and replacing HFCs with more climate friendly refrigerants among its top climate solutions, capable of reducing CO_2 emissions by more than 100 billion tonnes by 2050.

WATCH | How the Environmental Investigation Agency measured HFCs:



What can be used for refrigeration in place of HFCs?

The main alternatives are called "natural" refrigerants because they are all chemicals found in nature. They include:

- CO_2.
- Ammonia.
- Propane.

While CO_2 is a greenhouse gas, its global warming potential is so much lower than that of HFCs. And propane, while it's a fossil fuel, is not burned when used in refrigeration. In fact, all three of these chemicals are considered refrigerants with ultra-low global warming potential.

How are Canadian supermarkets progressing at switching away from HFCs?

According to Shecco, a market research firm focused on sustainable technologies, there were 340 commercial CO_2 refrigeration installations in Canada as of May 2020. That was far fewer than Japan, with 6,500 and Europe with 29,000, and growing more slowly than every other region in the world listed, including the U.S., Australia and New Zealand.

However, Jeffrey Gingras, president of Evapco LMP, a Laval, Que.-based company that makes CO_2 refrigeration systems, said he's seen an exponential growth in installations in the past three years, and did a record 125 installations in supermarkets, about half of them in Canada, in 2022.

The Environmental Investigation Agency has been building a global map of refrigerants used in supermarkets since it launched its Climate-Friendly Supermarkets project in 2019.

Two Canadian community groups, Drawdown Toronto and Drawdown B.C., have helped coordinate submissions to the map in their regions, and have added about 250 stores to

the map. (Note: I volunteered for Drawdown Toronto while on leave from CBC News and added one store. You can read more about that in our What On Earth newsletter.)

This is a refrigerator label from the inside of a supermarket fridge, showing the type of refrigerant used. In this case, it's an HFC called R404A, with a global warming potential close to 4,000 times that of CO2. (Emily Chung/CBC News)

That was enough for the EIA to issue its first ever scorecard on Canadian supermarkets last fall.

It reported on the five largest food retailers in Canada: Costco, Loblaws, Metro, Sobeys, and Walmart.

The best-performing was Sobeys, which had the highest percentage of stores using ultra-low global warming potential refrigerants (nine per cent), was the only listed company that publicly reports its refrigerant leak rate (seven per cent) and has committed to transition to climate-friendly refrigerants for all new stores and renovation projects starting in 2024.

Some stores have also reported taking their own actions on HFCs, including Loblaws, which ranked third in the report and told CBC News that it has cut its greenhouse gas emissions by 30 per cent "in a large part" because of its strategy to reduce refrigerant leaks: using less refrigerant, detecting leaks early and reducing the emissions intensity of the refrigerants it uses.

Walmart Canada, which came fourth in the report, told CBC News in an email that it is installing natural refrigerants in all new stores and during major remodels with new grocery departments, and will switch all stores running on HFC refrigerants to more environmentally friendly options. It did not give a timeline, but said its global operations are aiming for zero emissions by 2040.

The other companies did not respond to CBC's requests for comment.

EIA's global map does show very few green dots in Canada compared to the U.S. and Europe. Avipsa Mahapatra, the group's climate campaign lead, said that may be because no Canadian supermarket chains have not submitted their own data, unlike in other countries, and there isn't much information. "I actually have a hunch that Canada is not very far behind," she said.

Ordinary shoppers can add local grocery stores to the Environmental Investigation Agency's map of supermarket refrigerants. (Environmental Investigation Agency)

Why aren't HFCs getting ditched faster?

Morgan Smith of the North American Sustainable Refrigeration Council said making the switch to natural refrigerants isn't easy. They may require different training and equipment: ammonia is toxic, propane is flammable, and CO_2 operates under very high pressures.

Smith said CO_2 tends to be the natural refrigerant of choice for most supermarkets because it's non-toxic and its systems work a lot like HFC systems. The high pressures mean it does need different piping and different valves, so a system can take months to build, and can't just be swapped out overnight like parts of the existing system when it needs repairs.

It's easiest if you have the space to build a new system alongside while the old system is still running, Smith said. Otherwise, you might have to shut down the store during the retrofit, which is difficult for both customers and the store operator.

For smaller stores, one option is to switch to individual fridges similar to your home fridge, with propane refrigerant in a sealed unit, Smith said.

Michael Zabaneh of the Retail Council of Canada said refrigerant projects are quite expensive for supermarkets.

"They can be challenging and that's probably the biggest barrier, the need to pay for higher capital costs to either upgrade the equipment so that it can handle natural refrigerants, or buy new equipment."

Experts say it's not easy to convert an existing HFC refrigeration system to natural refrigerants, as they often require different equipment such as valves and piping. (CBC / Radio-Canada)

However, he said most large grocery chains are aware of the problems with HFCs and customer and investor pressure to reduce greenhouse gas emissions and are taking action.

The Environmental Investigation Agency's Mahapatra acknowledged that retrofitting older stores is expensive and challenging. However, she says grocery chains should be making all new stores use natural refrigerants.

"There is no excuse for any supermarket today to build a new store that still contains HFCs. That is just simply foolish," she said, noting that international agreements to phase out HFCs will eventually force companies to change the systems anyway.

What is the government doing about this?

The federal government will start to offer carbon offset credits for projects that cut refrigerant emissions, including those in supermarkets. Environment and Climate Change Canada told CBC News in an email that they'll go into effect "in the next few months." Once that happens, companies will be able to apply to get credits for projects that started as far back as January 1, 2017.

Federal regulations have also been brought in to comply with the Kigali Amendment, the international agreement on HFCs that went into effect in 2018, with reduction targets starting in 2019.

The regulations will start to ban the manufacture and import of certain equipment containing HFCs with a global warming potential above a specific limit.

Gingras said the Quebec government did offer incentives for a period of time starting 2014 that made natural refrigerant systems competitive with HFCs, and those did lead to a widespread conversion of supermarkets in the province. However, he hasn't heard of anything similar in other provinces.

Is there a role for ordinary shoppers?

Avipsa Mahapatra says grocery store customers can make a difference by adding their local stores to the climate-friendly supermarket map, being more aware and putting pressure on grocery store chains, especially when it comes to new supermarkets.

"So, if it's a new store that is being built in your community, it is our job as … residents of that community, to make sure that it is not an HFC store."

Morgan Smith at the North American Sustainable Refrigeration Council also thinks the public can make a difference: "The more people that are aware of this topic, the more resources and support there are to actually enable this transition."

CBC News, 29 january 2023, By Emily Chung, Science, climate, environment reporter
Images: CBC website

11. NOAA Research scientist Stephen Montzka named 2022 AAAS Fellow

NOAA's Stephen Montzka, of the Global Monitoring Laboratory, was named on 1st February 2023 as a 2022 Fellow of the American Association for the Advancement of Science (AAAS).

Election as an **AAAS Fellow** is an honor bestowed upon AAAS members by their peers to recognize their efforts to advance science or its applications. Montzka is among the more than 500 scientists, engineers, and innovators who have been elected 2022 Fellows.

Montzka, senior scientist for the Global Monitoring Laboratory, is recognized for his distinguished contributions to the field of atmospheric sciences, particularly for measuring and interpreting trends in greenhouse gas and ozone-depleting substance concentrations worldwide. He is among 26 AAAS Fellows elected from NOAA since 1976.

In his more than 30-year career at NOAA, Montzka has developed important records of global trace-gas concentrations related to ozone depletion, climate change, and air quality, addressing key issues in atmospheric science and informing international environmental policy.

His research includes a study documenting a peak in ozone-depleting gas concentrations in the mid-1990s following the adoption of the Montreal Protocol on Substances that Deplete the Ozone Layer, the international treaty tasked with ensuring stratospheric ozone layer recovery.

Montzka led a team that detected a 2012-2018 increase in emissions of the banned ozone-destroying chemical CFC-11, a substantial violation of the Montreal Protocol. In follow-up investigations, he and his colleagues found that eastern China was responsible for most of the rising emissions. In a pair of 2021 Nature papers, they documented the subsequent decline in CFC-11 emissions globally and from eastern China between 2018

and 2019. The team's work indicates that efforts to address the first known substantive violation of the Montreal Protocol are successful.

Recently, Montzka guided a collaboration between NOAA and the U.S. Environmental Protection Agency (EPA) to enable the inclusion of NOAA's measurement-derived estimates of U.S. greenhouse gas emissions in the U.S. Inventory of Greenhouse Gas Emissions and Sinks.

Read the full press release at NASA

UNEP, Ozone Secretariat, 1 February 2023

Images: Ozone Secretariat website

EUROPE AND CENTRAL ASIA

12. Alarming levels of PFAS in Norwegian Arctic ice pose new risk to wildlife

Oxford University-led study detects 26 types of PFAS compounds in ice around Svalbard, threatening downstream ecosystems

A polar bear in Svalbard, Norway. 'As a polar bear, you have exposure to toxic man made chemicals, and stresses from a changing habitat.' Photograph: Paul Souders/Getty Images

Norwegian Arctic ice is contaminated with alarming levels of toxic PFAS, and the chemicals may represent a major environmental stressor to the region's wildlife, **new research** finds.

The Oxford University-led study's measurements of ice around Svalbard, Norway, detected 26 types of PFAS compounds, and found when ice melts, the chemicals can move from glaciers into downstream ecosystems like Arctic fjords and tundra.

The meltwater can contain a cocktail of contaminants that includes PFAS and affects the entire food web, including plankton, fish, seal and apex animals like polar bears, which have previously been found to have high PFAS levels in their blood.

"There's a washout of contaminants that occurs seasonally … and some PFAS seem to be mobile during melts, which could be important to ecosystems downstream," said Dr William Hartz, a lead author on the study who noted a "doubling up effect" on animals as climate changes and ice melts. The climate has been warming faster in Svalbard than the world's average.

"As a polar bear, you have exposure to toxic manmade chemicals, and stresses from a changing habitat," he added.

PFAS are a class of about 12,000 chemicals often used to make thousands of consumer products resist water, stains, and heat. They are called "forever chemicals" because they do not naturally break down, and they are linked to cancer, liver disease, kidney stress, fetal complications and other serious health problems.

Among PFAS compounds researchers found in ice at levels above US advisory drinking water limits were PFOS and PFOA, which are considered to be two of the most dangerous.

The study also found particularly high levels of TFA, a refrigeration byproduct. During the Montreal Protocol in 1987, many nations agreed to phase out chlorofluorocarbons, or CFCs, a potent greenhouse gas used for refrigeration. Those were ultimately replaced with hydrofluoro-olefin, or HFOs.

Once in the environment, HFOs, which are also a greenhouse gas, can turn into TFA, and TFA levels are increasing in the Arctic, the study and results from previous measurements have found. TFA and other PFAS compounds are highly mobile and can move through the atmosphere to be deposited in the Arctic or elsewhere around the world.

Though TFA is thought to be less toxic than many other PFAS, the chemical has not been thoroughly studied, so no one knows what damage the compounds may be doing.

“Limited knowledge about the safe levels of TFA in the environment needs addressing,” the authors stated.

The Guardian, 11 February 2023, By Tom Perkins

Image: The Guardian website

See also >>>

- "**What the hole in the ozone layer tells us about PFAS**", Waste 360, 8 February 2023, By EREF Staff

- "**European Chemical Agency Publishes Proposal to Restrict PFAS Chemicals, Including Some F-Gases and TFA**", r744, 10 February 2023, By Thomas Trevisan

13. AREA: EU Women in cooling video competition

AREA (Air conditioning and Refrigeration European Association) and World Refrigeration Day (WRD) have partnered to launch a competition on best practices for all EU women in cooling.

The challenge is to provide a video showing their best practices (e.g. installation, repair, charging, leak checking, recovery…) using the right PPE, right tools, etc.… (please refer to the attached modalities); the video will be provided by uploading it on AREA’s Facebook page within the deadline of May 13th.

AREA’s appointed judges will decide the winner, who will be awarded:

- by AREA (through ATF) of flight, accommodation, and conference fee
- and by Steve Gill (WRD) of a check in the value of 1,000 EUR

- receiving the prize in the frame of **UNEP-IIR-AREA-CSG 20th European Conference (Milan, 8-9 June 2023)**.

Any AREA language is welcome.

Thank you very much, and good luck to EU women in cooling!

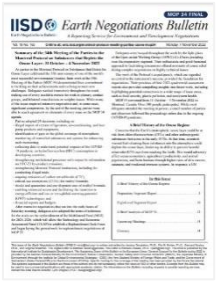
- **Specifications for the award WOMAN IN COOLING.pdf**

- **WOMEN IN COOLING leaflet.pdf**

AREA (Air conditioning and Refrigeration European Association), February 2023
Image: AREA website

FEATURED

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



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

Image: ENB-IISD website

Overview for the meetings of the ozone treaties in 2022-2023 - Click **here** for upcoming and past Montreal Protocol Meetings dates and venues.

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

Image: UNEP, Ozone Secretariat website

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

Image: UNEP, Ozone Secretariat website

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:

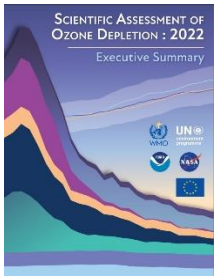
- **The Technology and Economic Assessment Panel**
- **The Scientific Assessment Panel**
- **The Environmental Effects Assessment Panel**

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, November 2022



The Multilateral Fund for the Implementation of the Montreal Protocol

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

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

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

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

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

Latest News and Announcement:

- **UPDATED guide for the submission of institutional strengthening projects,** 1/27/2023
- **UPDATED institutional strengthening request format now available in EN/FR/SP.,**1/20/2023

The 92nd meeting is scheduled for 29 May to 2 June 2023, in Montreal, Canada
The 93rd meeting is scheduled for 11 to 15 December 2023, in Montreal, Canada

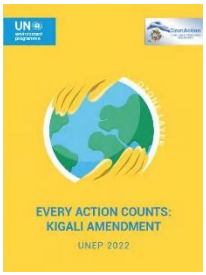
>>> Click **here** for the Executive Committee upcoming and past Meetings and related documents.

OzonAction Compliance Assistance Programme produces and outreaches a wide variety of information and capacity building materials and tools that support the implementation of the Montreal Protocol programs and assist Article-5 countries in meeting the compliance targets. These include publications, technology briefs and factsheets, mobile applications, videos, e-Learning, modelling, and database programs and special educational or certification programs.

The section below features several of our most recent products.

Visit OzonAction website for more information, discover the entire range of products.

Images in this section are by OzonAction



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

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

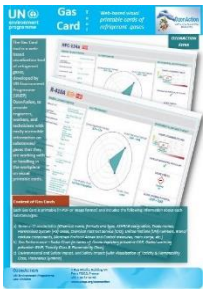
Refrigeration, Air-Conditioning, and Heat Pumps (RACHP) Associations & Organizations: This Knowledge Map provides a global directory of RACHP associations, societies, and organisations around the world. These are key stakeholders for ensuring safe and efficient refrigerant transitions.

Local Technical & Vocational Education and Training (TVET): This Knowledge Map provides a global directory of TVET entities and centres around the world. These are the strategic partners for conducting and promoting training and certification programmes related to the refrigeration servicing sector.

Click **HERE** to access the OzonAction Knowledge Maps tool

Click **HERE** to download the OzonAction Knowledge Maps tool flyer

Gas Card Tool: Web-based Visual Printable Cards of Refrigerant Gases



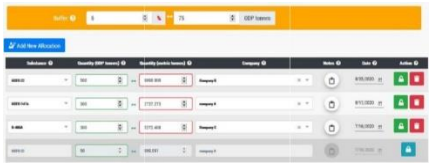
Content of Gas Cards - Each Gas Card is printable (in PDF or image format) and includes the following information about each substance/gas: a) General Characteristics (Chemical name, formula and type, ASHRAE designation, Trade names, Harmonized System (HS) codes, Chemical Abstract Service (CAS), United Nations (UN) numbers, Blend/ mixture components, Montreal Protocol Annex and Control measures, main usage, etc.) b) Gas Performance—Radar Chart (in terms of: Ozone depleting potential-ODP, Global warming potential- GWP, Toxicity Class & Flammability Class) c) Environmental and Safety Impact, and Safety Impact (with visualization of Toxicity & Flammability Class, Hazardous Symbols).

More Information - The Gas Card web-based tool is part of UNEP OzonAction's portfolio of activities and tools to assist various stakeholders in developing countries, including customs officers and technicians, to achieve and maintain compliance with the Montreal Protocol on Substances the Deplete the Ozone Layer. In the left navigation bar of the Gas Card tool web page, you will find a list of commonly used HFCs and HFC Blends in different sectors. *

Using the Gas Gard web-based tool

- The Gas Gard tool is available online on the **OzonAction website**
- Read the full **2021 annual iPIC report**
- See the **flyer** introducing the new iPIC platform

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



HCFC Quota and Licence Tracker - a new desktop application to assist with HCFC licences and quotas - National Ozone Officers have the great responsibility of managing the allocation and monitoring of quotas for substances controlled under the Montreal Protocol. This process can be complex with many importers, especially if the country imports a range of different hydrochlorofluorocarbons (HCFCs) and mixtures containing HCFCs. To address this challenge, OzonAction developed a new desktop application that helps Ozone Officers with the tasks of planning, calculating, monitoring, and managing consumption quotas and licences. It can be used on a daily basis to track and manage the current year's quota allocations for different importers, or for future planning by trying different scenarios that adjust the type of substances imported, their quantity, or the number of importers. The HCFC Quota and Licence Tracker allows Ozone Officers to see the effect of such scenarios on the national HCFC consumption and helps ensure that the quotas stay within agreed HCFC Phase-out Management Plan (HPMP) targets. For countries that have ratified the Kigali Amendment, in the future OzonAction will extend the tracker to include hydrofluorocarbons (HFCs) once countries begin designing their quota systems for those controlled substances.

Access the:

- **HCFC Quota tracker app**
- **Flyer for more information on the tracker**
- **Short video tutorial on the OzonAction YouTube Channel**

GWP-ODP Calculator Application - Updated- "Quickly, efficiently and accurately convert between values in metric tonnes, ODP tonnes and CO_2-equivalent tonnes"

Data are extremely important for the Montreal Protocol community, and the data reporting formats for both A7 and CP have changed recently, to a large degree triggered by the Kigali Amendment. HFCs, blends, CO_2-equivalent values, etc, now have to be addressed much more frequently by Ozone Officers during their daily work. Sometimes the terminology and values are complex and can be confusing, and it helps to have it all the official facts and figures in one place. Conversion formulas need to be applied to calculate CO_2-eq values from both GWP and metric tonne values. This free app from OzonAction is a practical tool for Ozone Officers to help demystify some of this process and put frequently needed information at their fingertips.

What's new in the app:

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

If you already have the application installed on your device, be sure to update to benefit from the new features. The app can be viewed in English, French or Spanish.

Smartphone Application: Just search for "*GWP-ODP Calculator*" or UNEP in the Google Play store or use the QR code – free to download! If you already have the application installed on your device, be sure to update to benefit from the new features.

Desktop Application: *GWP-ODP Calculator* is also available online on the OzonAction **website**

Watch the new short introductory tutorial **video** on the *GWP-ODP Calculator*- available now on **YouTube**

>>> Read/download the flyer

Updated OzonAction "WhatGas?" Mobile App

The OzonAction 'WhatGas?' application is an information and identification tool for refrigerants gases: ozone depleting substances (ODS), HFCs and other alternatives. It is intended to provide some stakeholders, including Montreal Protocol National Ozone Officers, customs officers, and refrigeration and air-conditioning technicians with a modern, easy-to-use tool that can be accessed via mobile devices or the OzonAction website to facilitate work in the field, when dealing with or inspecting ODS and alternatives, and as a useful reference tool.

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

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

RAC Technician Videos - Full length films!

Two 'full length' videos for refrigeration and air-conditioning (RAC) sector servicing technicians: on 1) Techniques, Safety and Best Practice and 2) Flammable Refrigerant Safety.
The OzonAction Refrigeration and Air-Conditioning Technician Video Series consists of instructional videos on techniques, security and best practice and flammable refrigerant safety. They are intended to serve as a complementary training tool RAC sector servicing technicians to help them revise and retain the skills they have acquired during hands-on training. The videos are not intended to replace structured formal technician training, but to supplement and provide some revision of tips and skills and to build on training already undertaken.

These videos are based on the successful UNEP OzonAction smartphone application, the RAC Technician Video Series app. This application has been downloaded on more than **86,000** devices since its launch.

Following many requests to make the videos more versatile and better suited to classroom and training settings, OzonAction has responded to this demand and produced two 'full-length' instructional videos.

You may wish to share this message and the flyer with:

- Your national/regional RAC associations
- Training or vocational institutes
- Master RAC trainers in your country
- Any other interested national stakeholders

You can watch these videos on the OzonAction YouTube Channel:

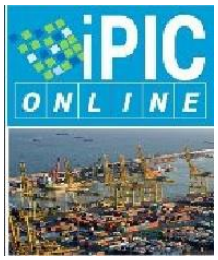
- **Techniques, Safety and Best Practice**
- **Flammable Refrigerant Safety**

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

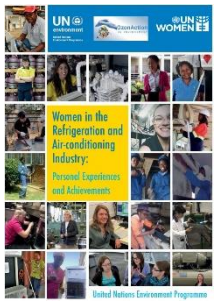
If you prefer to access the video clips via the OzonAction smartphone application, just search for "RAC Technician Video Series" or UNEP in the Google Play Store and iTunes/App Store or scan the QR code –**Free to download!**

The flyer is available from the **OzonAction website**.

OzonAction's iPIC platform - Updated-Collaboration between China and Thailand using OzonAction's informal Prior Informed Consent (iPIC) system has resulted in the prevention of a huge consignment of ozone-depleting and climate damaging hydrochlorofluorocarbons (HCFCs). Those chemicals, which are primarily used as refrigerants for air conditioners and fridges, are controlled under the Montreal Protocol on Substances that Deplete the Ozone Layer and are being phased out by all countries according to a specific timeline.

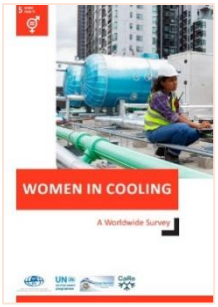


Women in the refrigeration and air-conditioning industry: Personal experiences and achievements -The United Nations Environment Programme's (UNEP), OzonAction, in cooperation with UN Women, has compiled this booklet to raise awareness of the opportunities available to women and to highlight the particular experiences and examples of women working in the sector and to recognise their successes. All of the professionals presented in the booklet are pioneers. They are role models whose stories should inspire a new generation of young women to enter the weld and follow in their footsteps. **Read/download the publication**

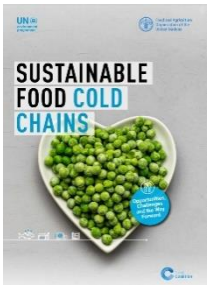


As part of IIR and UNEP OzonAction's partnership, a set of Cold Chain Technology Briefs was released over the past few years, which includes in-depth summaries about the cold chain in different key sectors. They include descriptions of technology, refrigerant options and trends and conclude with prospects and challenges. They cover the main cold chain sub-sectors, i.e., **Production & Processing**, **Cold Storage**, **Transport Refrigeration**, **Commercial & Domestic**, and **Fishing Vessels**. **Download the Cold Chain Technology brief in English | French | Russian | Spanish**

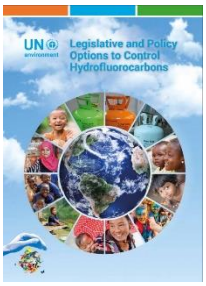
PUBLICATIONS



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



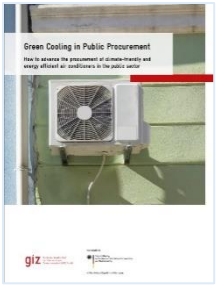
Sustainable Food Cold Chains: Opportunities, Challenges and the Way Forward-This [UNEP-FAO] report explores how food cold chain development can become more sustainable and makes a series of important recommendations. These include governments and other cold chain stakeholders collaborating to adopt a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



Legislative and Policy Options to Control Hydrofluorocarbons-In order to follow and facilitate the HFC phase-down schedules contained in the Kigali Amendment, the Parties, including both developed and developing countries, will have to implement certain measures. This booklet contains a recommended set of legislative and policy options which the developing (Article 5) countries may wish to consider for implementation. It is intended to be a guide/tool for countries.
Read/download

Latest issue of Centro Studi Galileo magazine,
Industria & Formazione, n. **10-2022**
(in Italian).

Green Cooling in public procurement How to advance the procurement of climate-friendly and energy-efficient cooling equipment in the public sector? Air conditioning in public buildings is often responsible for around 50% of total electricity consumption. Switching to climate-friendly cooling technologies ("Green Cooling") can reduce costs and energy consumption and improve the carbon footprint of public buildings. This study takes a closer look at the benefits of Green Cooling in the public sector and discusses current barriers and possible solutions. The information presented provides a solid basis to revise current procurement criteria for sustainable cooling systems in public buildings. **Read/Download the study**



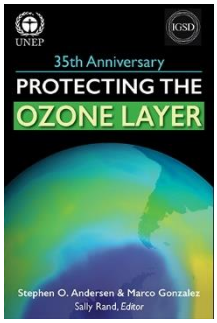
E-Book on Process Safety Management (PSM) Training for Ammonia Refrigeration - a new e-book about the critical elements of a process safety management (PSM) training program for facilities operating an ammonia refrigeration system.

The e-book, titled "**7 Keys to a Compliant PSM Training Program for Ammonia Refrigeration**," outlines important questions a facility's program should address and questions that trained plant personnel should be able to answer. Topics covered include:

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

Request free Download here

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



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

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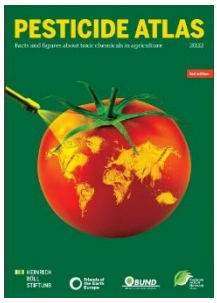

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I am in the Montreal Protocol Who's Who… Why Aren't You?

The United Nations Environment Programme, OzonAction, in collaboration with Marco Gonzalez and Stephen O. Andersen are updating and expanding the "**Montreal Protocol Who's Who**".

We invite you to submit your nomination*, and/or nominate Ozone Layer Champion(s). ***The short profile should reflect the nominee's valuable work related to the Montreal Protocol and ozone layer protection.***

Please notify and nominate worthy candidates through the **on-line form**.

We look forward to receiving your nomination(s), and please feel free to contact our team for any further assistance concerning your nomination.

Take this opportunity to raise the profile of women and men who made an important contribution to the Montreal Protocol success and ozone layer protection.

- View the «Montreal Protocol Who's Who» **Introductory video**
- Contact : **Samira Korban-de Gobert,** UN Environment Programme, OzonAction

** If you are already nominated, no need to resubmit your profile*

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

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