Volume XXII | 30 August 2022

In this issue:

GLOBAL

1. Kigali Amendment latest ratification

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

Mongolia, 27 July 2022

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. 2022 Ozone2Climate Technology Roadshow and Industry Roundtable convenes in Chongqing, China

1 August 2022, Chongqing, China – The 11th Ozone2Climate (O2C) Technology Roadshow and Industry Roundtable was jointly organized by the Foreign Environmental Cooperation Center, Ministry of Ecology and Environment, China(FECO/MEE) and the China Refrigeration and Air-Conditioning Industry Association (CRAA), the United Nations Environment Programme (UNEP), and the United Nations Development Programme (UNDP), as part of the 33rd International Exhibition for Refrigeration, Air Conditioning, Heating and Ventilation, Frozen Food Processing, Packaging and Storage (CRH 2022), one of the three most influential annual exhibitions in the world, and the largest of its kind in the Asia-Pacific region. The event was held in Chongqing, China from 1 – 3 August 2022.

The O2C Technology Roadshow was inaugurated by Mr. Li Yonghong, Deputy Director General of FECO, Mr. Dong Wenfu, Division Director of Ozone Layer Protection, Department of Atmospheric Environment, MEE, Mr. James Curlin, Head of OzonAction, UNEP, Mr. James George, Deputy Resident Representative of UNDP China and Mr. Zhang Zhaohui, Vice Chairman and Secretary General of CRAA. More than 6,000 professionals visited the Roadshow.

"The Ozone2Climate Technology Roadshow and Industry Roundtable is an important platform for us to promote the green development of the industry in cooperation with UNEP, UNDP and CRAA. This activity has been committed to sharing ozone and climate-friendly technologies and market information for the refrigeration & air conditioning (RAC) industry", said Mr. Li Yonghong.

This year's O2C Technology Roadshow and Industry Roundtable exhibition, which covered an area of nearly 800 square metres, provided an opportunity for over 40 manufacturers and industries to demonstrate and showcase the best practices on the latest zero-ODP, lower-GWP as well as higher energy- efficient alternative developments in RAC around the world.

Mr. James S. Curlin reiterated that “UNEP will continue to work passionately with all stakeholders, in particular the refrigeration industry, the environment and climate sectors and the standards/safety sector in various countries, to continuously promote the production and use of ozone-friendly alternatives and technologies for achieving better social, economic and environmental benefits.”

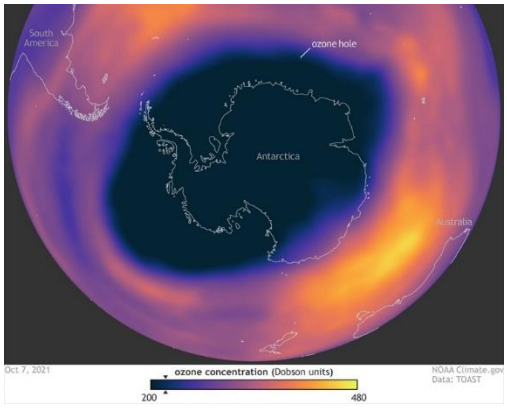
Successfully organized since 2011, the O2C Roadshows have significantly become a prominent platform for industry pioneers and policymakers to continue the engagement in promoting and developing climate and ozone-friendly RAC technologies.

Attended by well over 1,000 people, both onsite and virtually across countries in Asia-Pacific, the O2C roundtable provided insightful knowledge covering a wide range of topics and discussions, including, the development of policies related to the phase-down of HFCs (hydrofluorocarbons) and the phase-out of HCFCs (hydrochlorofluorocarbons), the latest developments in alternative refrigerants and equipment relying on these alternatives and the challenges of adopting alternative refrigerants in the refrigeration servicing industry and its strategy.

Contact: Shaofeng Hu, Senior Montreal Protocol Regional Coordinator UNEP, OzonAction Compliance Assistance Programme (CAP), Asia and Pacific Office

Image: OzonAction website

3. Path to recovery of ozone layer passes a significant milestone



An annual analysis of air samples collected at remote sites around the globe that is tracking a continued decline in the atmospheric concentration of ozone-depleting substances shows the threat to the ozone layer receding below a significant milestone in 2022, NOAA scientists have announced.

In early 2022, the overall concentration of ozone-depleting substances in the mid-latitude stratosphere had fallen just over 50 percent back to levels observed in 1980, before ozone depletion was significant. This slow but steady progress over the past three decades was achieved by international compliance with controls on production and trade of ozone-depleting substances in the Montreal Protocol on Substances that Deplete the Ozone Layer.

The pace of reduction in ozone-depleting substances (ODSs) over Antarctica, which experiences a large ozone hole in spring, has been slower, NOAA’s analysis showed.

“It’s great to see this progress,” said Stephen Montzka, senior scientist for NOAA’s Global Monitoring Laboratory. “At the same time, it’s a bit humbling to realize that science is still a long way from being able to claim that the issue of ozone depletion is behind us.”

NOAA’s **Ozone Depleting Gas Index** tracks the overall stratospheric concentration of ozone-depleting chlorine and bromine from long-lived ODSs relative to its peak concentration in the early 1990s.

Ozone is a highly reactive molecule formed of three oxygen atoms that is found primarily in two regions of the atmosphere. About 90% of Earth’s ozone resides in the stratosphere, which is above the troposphere, the layer closest to Earth’s surface. The region of the stratosphere with the highest amount of ozone is commonly referred to as the “ozone layer.” The stratospheric ozone layer absorbs the sun’s ultraviolet rays and protects all biological systems on Earth from these harmful rays.

In the 1980s, the scientific community discovered that a class of man-made chemicals was seriously damaging this protective ozone layer, creating a giant “hole” in the ozone layer over Antarctica and smaller, but still worrisome depletion in mid-latitudes. As part of the US response, Congress mandated that NASA and NOAA monitor stratospheric ozone and ozone-depleting substances in the 1990 amendments to the Clean Air Act. The Ozone Depleting Gas Index is one way that NOAA fulfills this mandate.

Scientists at NOAA’s Global Monitoring Laboratory created the index to render the results of a series of complex analyses into a single number that tracks the total abundance of these chemicals and how the threat they pose to the ozone layer is changing over time. The year 1980 was selected as the benchmark year for the index because scientific and policy communities have long viewed it as the date when ozone depletion first became obvious. NOAA calculates the index directly from surface observations of the 15 most abundant long-lived, chlorine- and bromine-containing chemicals whose production and consumption is controlled by the Montreal Protocol. These observations provide a direct measure of nearly all of the chlorine and bromine atoms in man-made chemicals with lifetimes longer than approximately six months.

Global Monitoring Laboratory scientists calculate two separate indices, one for the mid-latitudes, where a large fraction of the world’s population lives, and one for Antarctica, where deep ozone holes are observed in early spring as a result of super cold temperatures enabling catalytic ozone-destroying reactions on icy clouds.

In contrast to the mid-latitudes, progress toward recovery of the ozone layer over the Antarctic has not been as rapid, declining by 26% from peak values in the 1990s for multiple reasons, but particularly because air in the Antarctic stratosphere is older than in mid-latitudes.

The 2022 index for the Antarctic has fallen 26% from peak values in the 1990s, with recovery of the Antarctic ozone layer projected to occur sometime around 2070.

Read the full **ODGI report** at the Global Monitoring Laboratory's website.

The National Oceanic and Atmospheric Administration, 24 August 2022
Image: NOAA website

4. A new method to assess the health of the ozone layer

Researchers have developed a new method for assessing the impact of ozone-depleting chemicals released into the atmosphere.

The ozone layer sits in the stratosphere - between 15 km and 30 km above the Earth - and provides a shield from some of the sun's harmful ultraviolet radiation.

Without this ozone protection, higher levels of ultraviolet radiation would reach the Earth's surface and result in an increased incidence of skin cancer and eye disease as well as adversely effecting plants and crops.

Since the late 1980s, an international agreement called the Montreal Protocol has resulted in the phasing out of ozone-depleting chemicals, particularly chlorofluorocarbons (CFCs) which were used in, for example, refrigeration and air conditioning systems. As a consequence, the hole and thinning that was once seen in the ozone layer has been reducing.

But the rate at which the ozone layer is being replenished is slow, and recently some renewed, illegal production of CFCs has occurred.

A team of scientists from the University of Leeds, the National Centre for Atmospheric Science, the National Centre for Earth Observation and the University of Cambridge has developed a new method to help regulators more accurately assess the impact of the release of ozone-depleting chemicals – and the effectiveness of ozone layer protection measures.

The researchers have reported their findings - **Integrated ozone depletion as a metric for ozone recovery** - in the scientific journal Nature.

Known as the Integrated Ozone Depletion (IOD) metric, the new measurement considers three things: the strength of the emission, how long it will remain in the atmosphere, and how much ozone is chemically destroyed by it.

Professor Martyn Chipperfield, an atmospheric scientist and Director of the Institute for Climate and Atmospheric Science at Leeds, and one of the authors of the study, said: "For many decades scientists have used a very simple measure of how the ozone layer is recovering. That was useful in many ways but could not deal with widely varying scenarios of emissions of ozone-depleting substances.

"The new tool will provide a better measure of how the ozone layer is recovering."

The IOD metric will also enable scientists to estimate the effect of any new illegal or unregulated emissions on the ozone layer.

Lead author Professor John Pyle, of the National Centre for Atmospheric Science and the University of Cambridge, said it was time for a new method to assess the state of the ozone layer.

“Following the Montreal Protocol, we are now in a new phase - assessing the recovery of the ozone layer.

“This new phase calls for new metrics, like the Integrated Ozone Depletion. Our new metric can measure the impact of emissions - regardless of their size. Using an atmospheric chemistry computer model, we have been able to demonstrate a simple linear relationship between the IOD, the size of the emissions and the chemical lifetimes.

“So, with knowledge of the lifetimes, it is a simple matter to calculate the IOD, making this an excellent metric both for science and policy.”

The University of Leeds, 26 August 2022

Image: University of Leeds website

5. Propane — a solution for more sustainable air conditioning

Current severe heatwaves that will likely increase in severity and frequency in the future are driving a rise in the use of air conditioners, threatening the environment with their high energy consumption and refrigerants with high warming potential. A new study finds that switching to propane as a refrigerant could lessen the global temperature increase from space cooling.

We spend enormous amounts of energy on fighting off the heat in the summer, or throughout the whole year at lower latitudes—about one-tenth of the total worldwide electricity supply. If current temperature trends continue, the energy demands of space-coolers will more than triple by 2050. Apart from the rise in energy consumption, space-coolers also threaten the environment in different ways: by using halogenated refrigerants with high global warming potential.

Split-air conditioners (Split ACs) that use an indoor and an outdoor air unit connected by pipes are the most common appliances used for space-cooling. They mostly utilize HCFC-22 and HFC-410 as refrigerants, both of them characterized by a very high global warming potential score, up to 2,256—meaning that they trap up to 2,256 times more heat than carbon dioxide over 100 years. Urged by the Kigali Amendment to the Montreal Protocol, many manufacturers are looking for alternative refrigerants with lower global warming potential scores, such as HFC-32. However, with a global warming potential score of 771, HFC-32 still poses a significant climate hazard.

A study led by IIASA researcher Pallav Purohit in collaboration with researchers from the United Nations Environment Programme and the University of Leeds, showed that by switching to propane, an alternative low (<1) global warming potential refrigerant for space cooling, we could avoid a 0.09°C increase in global temperature by the end of the century, thereby making a significant contribution towards keeping the global temperature rise below 1.5 °C.

In the study published in *Proceedings of the National Academy of Sciences of the United States of America (PNAS),* researchers used the IIASA **Greenhouse Gas - Air Pollution Interactions and Synergies (GAINS) model** to compare the baseline halogenated refrigerant emission scenarios with scenarios of switching to HFC-32 or propane. While the switch to HFC-32 also lessened the global temperature increase (0.03°C by the end of the century), propane proved to be the superior solution in terms of sustainability.

“Propane exhibits significant environmental advantages through good energy performance and a global warming potential of less than 1. In split-ACs up to 7 kW, propane can be classified as a technically valid alternative to HFC-driven split-ACs,” says Purohit.

Energy-efficient split-ACs using propane are already available commercially in the Chinese and Indian markets. Despite performing similarly to split-ACs using HFC-32, and even better than the currently widespread appliances using HFC-410A and HCFC-22, some national regulations prohibit their use, primarily due to standards and codes restricting the use of refrigerants with higher flammability, hindering their wider adoption.

“To achieve the EU’s ambitious 2050 climate neutrality targets, early and aggressive action is needed. In the short term, converting new air-conditioning systems to more environmentally-friendly refrigerants can reduce their climate impact significantly, underlining the urgency of updating standards for policymakers,” concludes Purohit.

Reference: Purohit, P., Höglund-Isaksson, L., Borgford-Parnell, N., Klimont, Z., Smith, C.J. (2022). The key role of propane in a sustainable cooling sector. *Proceedings of the National Academy of Sciences of the United States of America (PNAS)* 119 (34) e2206131119. DOI: **10.1073/pnas.2206131119**. [**https://pure.iiasa.ac.at/18153**]

International Institute for Applied Systems Analysis (IIASA), 16 August 2022, By Pallav Purohit, Ansa Heyl

Image: IIASA website

6. Green Cooling Summit 2022 - Registration open

The digital GIZ flagship event around sustainable cooling returns: Mark your calendars for 13 & 14 September 2022.

This year's focus: Green Cooling in Supermarkets

The global commercial refrigeration market is estimated to reach USD 43.16 billion by 2028. This corresponds to a compound annual growth rate of 4.2% (2021 to 2028), with supermarket refrigeration making up a major part. When planning new supermarkets, HFCs are often still used as standard refrigerants.

Moreover, cooling systems typically account for about 40-60% of the total energy consumption in a supermarket. This does not only involve high cost, but massive GHG emissions due to fossil-fuel based electricity consumption as well as leakage of refrigerants with high global warming potential. There is a knowledge gap about the availability and enormous advantages of natural refrigerants and energy efficiency measures.

Join the event on 13 and 14 September for the Green Cooling Summit 2022! Policymakers, technology providers, project planners, supermarket operators and other stakeholders will present and debate enabling policies, state-of-the-art technologies, as well as best practices for planning, procurement, operation, and maintenance to advance Green Cooling in supermarkets.

Learn more / Register here >>>

GIZ - Green Cooling Initiative, 17 August 2022

Image: GIZ / Green Cooling Initiative website

AFRICA

7. Greenhouse Gas Inventory for the Refrigeration and Air Conditioning Sector in Kenya

This report contains the greenhouse gas inventory for the refrigeration and air conditioning (RAC) sector in Kenya. It has been established under the Green Cooling Initiative (GCI), financed by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) for Kenya and Ghana as part of their International Climate Initiative

(IKI) and the Climate Technology Centre and Network (CTCN) for Namibia and Mauritius. The report has been compiled by Habitat, Energy Application & Technology (HEAT) GmbH and by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH and is based on previous work prepared between 2017 and 2019, which contained an inventory, technology gap, policy analysis and a road map for the RAC sector in Kenya. This report contains updated inventory figures that were developed based on updated import figures collected by the Kenyan Revenue Authority's Customs Department and detailed market survey of split ACs and domestic refrigerators that was carried out by CLASP1 in March 2021.

RAC appliances are rapidly spreading across Africa. With an emerging middle class and an increasing population, the number of RAC appliances are estimated to more than double by 2030. This will contribute to increased energy needs in many African countries. To limit the energy consumption and the resulting greenhouse gas (GHG) emissions, there is a need to establish and engage a network to help identify and sustainably form a broad range of low global warming potential (GWP) technologies for Green Cooling. An extensive GHG inventory of the RAC sector serves as a basis for recommendations on suitable technologies and policies to transform the market in terms of energy consumption and GHG emissions. Additionally, further project proposals can establish their impact calculations based on the foundation laid by this inventory.

Over recent years, Kenya has experienced a steady growth of the number of RAC appliances in use. Due to a growing population and the warmer temperatures expected as an impact of climate change, the demand for air conditioning rises. Figure 1 shows that the sales of domestic refrigerators decreased, most likely due to effects of market saturation, while sales of unitary AC and commercial refrigeration equipment increased. Sales of split ACs tend to have fluctuated in recent years. In addition, the effects of the COVID-19 pandemic resulted in a general temporary drop of sales in 2020.

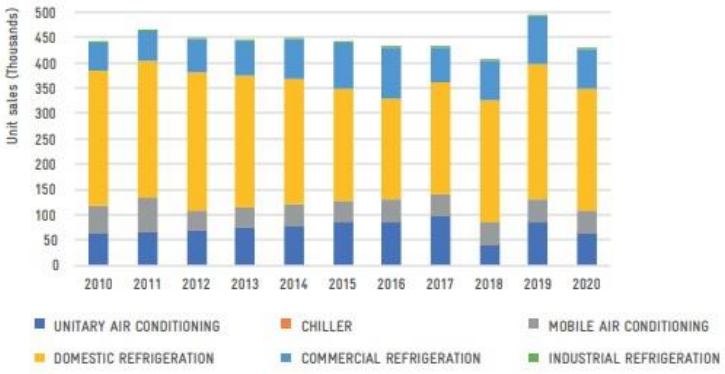


FIGURE 1 SECTORIAL BREAKDOWN OF RAC EQUIPMENT SOLD BETWEEN 2010 AND 2020 IN KENYA

Along with the growth of the RAC appliance sector, the resulting greenhouse gas (GHG) emissions increased from about 3.23 Mt CO2eq in 2010 to 4.1 Mt CO2eq in 2020. Based on current trends and a projected hotter climate in Kenya, the GHG emissions from the RAC sector are prone to double by 2050 to about 8 Mt CO2eq, as shown in Figure 2. The

highly optimistic development expected by Kenyan importers of RAC equipment between 2016 and 2020 did not materialise. This is true for the whole period and is not linked to August 2022, the COVID-19 pandemic. However, the past growth and ongoing effects of the COVID-19 pandemic on the whole economy resulted in lower emission projections for 2030 and 2050 than calculated in 2018. Very apparent is the effect of the recently introduced minimum energy performance standards (MEPS) for domestic refrigerators. In conjunction with the global shift from high-GWP refrigerants to hydrocarbon in domestic refrigerators, the higher energy efficiency has led to considerable emission reductions.

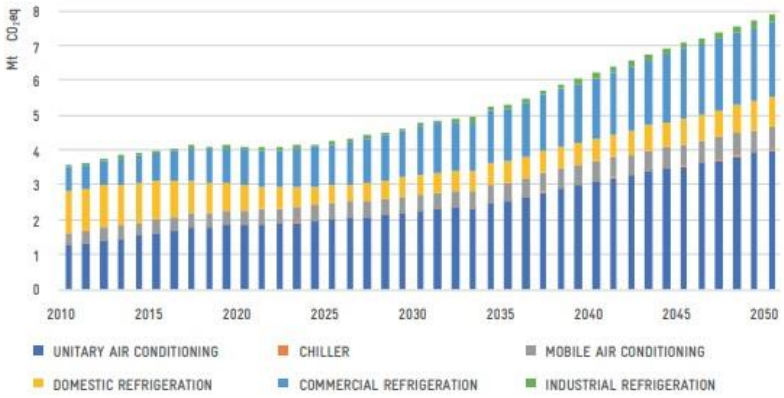


FIGURE 2: PROJECTED GHG EMISSIONS FOR THE RAC INDUSTRY IN KENYA FROM 2010 TO 2050

GIZ Proklima and CLASP have joined forces earlier this year and provided a National Cooling Action Plan for Kenya. The emission reduction calculations within the Cooling Action Plan are based on this inventory and the presented business as usual (BAU) scenario (Figure 3).

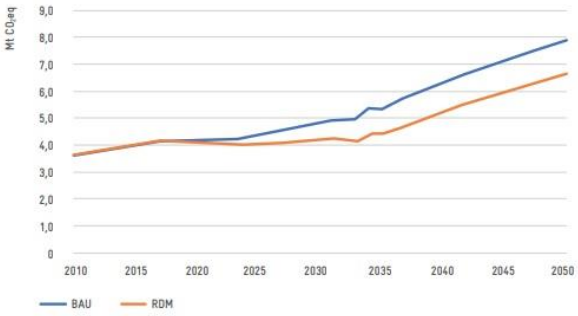


FIGURE 3:
PROJECTED RAC SECTOR EMISSIONS FOR THE BAU SCENARIO AND ALL MEASURES APPLIED IN KENYA'S NATIONAL COOLING ACTION PLAN

The Green Cooling Initiative, August 2022

Images: GCI website

LATIN AMERICA AND CARIBBEAN

8. How Chile is putting its ageing refrigerators out to pasture

Rosa Cordero, who is diabetic, remembers a time when she couldn't store her insulin safely. Her refrigerator was old and unreliable, and she never knew if the temperature was cool enough to store the drug.

Not only was the fridge imperilling her insulin supplies, it was also causing her food to rot, driving up her electricity bills, and hurting the environment.

Cordero, who lives in Santiago, the capital of Chile, does not have a lot of money to spend on appliances. But thanks to United for Efficiency (U4E), a United Nations Environment Programme (UNEP)-led initiative backed by the Global Environment Facility (GEF), she was able to secure a new, energy-efficient refrigerator.

"It gives me so much joy to have a new fridge. I've never had a new one before; now I can keep my insulin fresh," said Cordero, who added the fridge costs about US$7 a month to operate, down from US$30 for her old one.

In 2018, U4E established a programme in Chile, with support from Fundación Chile, the Ministry of Energy and private companies such as Hisense, Samsung and Whirlpool, to help consumers access new, energy-efficient refrigerators.

Under the U4E scheme, which operates in countries around the world, consumers can buy new refrigerators with a discount of up to 35 per cent if they trade in their old, energy-inefficient refrigerator. U4E also takes away the old product for free and ensures it is safely recycled for free. Chile's old-for-new-appliance campaign replaced more than 1,500 ageing refrigerators in its first month alone.

Annually the project aims to save over 1.3 terawatt hours of electricity, avoiding the need to build three power plants of 100 megawatts each. Newer refrigerators and freezers will save over 600,000 tonnes of carbon dioxide each year, the equivalent emissions from more than 340,000 cars. They will save Chilean consumers more than US$294 million in electricity costs every year.

"U4E aims to make energy efficient, environmentally friendly refrigerators available to all," said Paul Kellett, U4E's global programme manager. "Cost shouldn't be an inhibitor to an energy efficient-product."

Cooling Emissions and Policy Synthesis, a UNEP and International Energy Agency report, found that the impact of energy-efficient refrigerators can be significant. By combining energy-efficient products and moving away from inefficient, polluting refrigerants, greenhouse gas emissions of between 210 - 460 gigatons of carbon dioxide equivalent

could be avoided over the next four decades. Based on 2018 levels, this equates to between four to eight years of total annual global greenhouse gas emissions.

“These types of projects are critically important to reducing emissions and energy use in developing countries, especially as we expect a significant growth in the need for refrigeration over the next decade,” said Filippo Berardi, GEF Senior Climate Change Expert.

“There is a crucial window of opportunity to ensure that these growing needs are satisfied with reliable, low-emission technology, which can also allow customers to save on their electricity bills.”

The problem of energy-inefficient refrigerators in Chile is acute, according to U4E. There are over 6.8 million domestic refrigerators and freezers in Chile, with almost 100 per cent of households owning one. More than 1 million of these are at least 15 years old. The Ministry of Energy in Chile estimates that 19 per cent of all household electricity used comes from refrigerators.

There is hope the lessons learned in Chile can help other nations saddled with inefficient, polluting appliances. “Many countries can benefit from old appliance replacement programmes like Chile have successfully implemented here,” said Kellett.

United Nations Environment Programme (UNEP), 31 August 2022

Image: UNEP website / Freepik

NORTH AMERICA

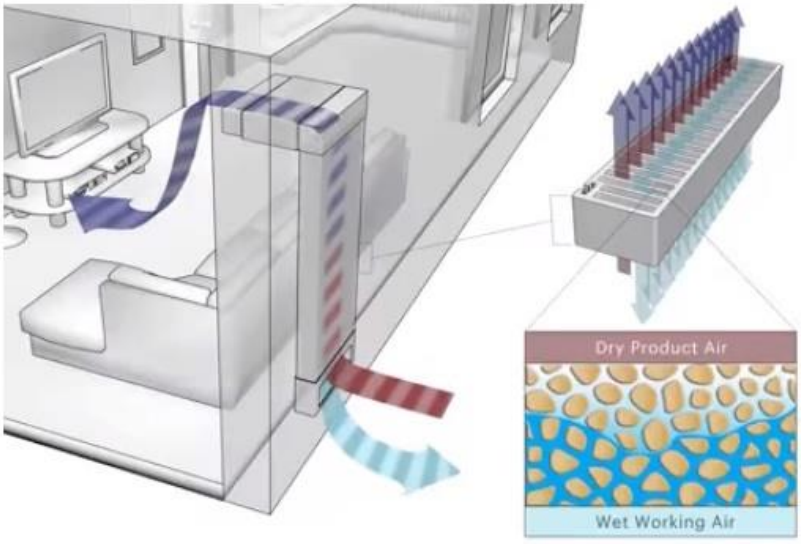
9. Harvard researchers designed a cheaper, more efficient air conditioner

Air conditioners are terrible for the environment, which is complicated by the fact that they’re increasingly necessary as outside temperatures increase. This could be one solution.

In China, a searing heat wave has lasted for more than two months, and the power grid is straining as people crank up their air-conditioning. The country is one of the places where AC use has been growing the fastest, with a five-fold jump between 2000 and 2017. But as the planet keeps getting hotter, and more people around the world are able to afford air-conditioning, its use is growing everywhere. By the middle of the century, there are likely to be about 5.6 billion of the appliances, and nearly triple the energy demand of cooling today.

“I think the numbers come out to about 10 new air conditioners every second for the next 30 years,” says Jack Alvarenga, a research scientist at Harvard University’s Wyss Institute, and part of a team working on redesigning how homes can be cooled. “That’s an

unbelievable number. Just to fathom the amount of cooling demand that's about to come online in the next couple of decades is concerning."



[Photo: Wyss Institute at Harvard University]

The problem is significant both because of the amount of energy that air conditioners require and the fact that current refrigerants, the chemicals that absorb the heat in your AC, are also potent greenhouse gases. (Thanks to the global Kigali Agreement, the worst refrigerants are being phased out, but that will take time.) The more AC is used, the hotter it will get outside. Then people need to use even more air-conditioning, and the cycle continues.

At Harvard, a multidisciplinary team is working on a design for a new type of air-conditioning that uses a fraction of the energy, and uses water instead of ultra-polluting refrigerants. Called ColdSNAP (SNAP stands for "superhydrophobic nano-architecture process"), it incorporates a unique coating also developed at the university. "A lot of innovative materials are kind of products that want a problem," says Jonathan Grinham, an architecture professor at the university's Graduate School of Design and one of the partners on the project. "We call it a technology push. . . . Okay, I have something that has super-unique behavior. So how does it benefit society? Where do we apply this type of technology?"

In this case, the coating repels liquids, inspired by the way duck feathers stay dry. The team realized that if it selectively applied this coating to certain places on ceramic—a material that naturally absorbs moisture—they could use it in a new type of evaporative cooler. Sometimes called swamp coolers, the devices usually only work in dry climates. The basic concept is simple: If you put hot air in contact with water, the water absorbs heat as it evaporates. It uses 75% less energy than typical air conditioners. But the process of evaporative cooling also creates humidity, and so doesn't work well in, say, Florida. In the new device, when water evaporates to cool the air, a heat-exchange component made with the coating traps the humidity, and the air flowing into the room is more comfortable.

This month, the researchers started testing it on humid, hot days in the Boston area, at Harvard's experimental HouseZero, an old house that's been retrofitted with technology to make it as efficient as possible. The team hasn't crunched all of the data yet but says the technology shows promise for widespread use. "We're cooling at a much higher efficiency than a typical AC unit, we're able to achieve a cool temperature, and we're able to do all that using less water than standards ask for," says Grinham.

The technology still needs development beyond the initial prototype, and the team will have to show that it can meet certain performance requirements of the manufacturers that might eventually bring it to market. Consumers might have to also think differently about how they expect air-conditioning to work since this type of device isn't a dehumidifier. But because it uses so much less energy and is cheaper to make, it could be ideally suited for areas where electricity is expensive, and customers can afford a standard air conditioner. "We need to find the right market, the right consumer," he says.

Other researchers and startups are also developing better alternatives to standard air-conditioning. That includes efficient heat pumps—which exist now and can get incentives for consumers from the Inflation Reduction Act. Other new features include sensors that allow the device to let in outdoor air when it gets cooler or connect directly to solar panels to avoid putting a strain on the electrical grid. At Harvard's HouseZero, a geothermal well helps keep the house cool on days when it isn't testing the new technology, and the windows are also designed to automatically open when the temperature drops at night. Other tweaks to building design can also help—from ultra-white paint that reflects sunlight to passive designs that strategically choose where to place windows and add shade.

Fast Company, 28 August 2022, By Adele Peters

Image: Fast Company website /Wyss institute at Harvard University

FEATURED

UN environment programme | ozone secretariat

OZONE SECRETARIAT

Overview for the meetings of the ozone treaties in 2022

69th IMPCOM, Montreal, Canada | 29 October 2022
33rd MOP Bureau, Montreal, Canada | 30 October 2022
34th MOP, Montreal, Canada | 31 October - 04 November 2022

Click here for past and upcoming Montreal Protocol Meetings Dates and Venue.

SunSmart Global UV App helps protect you from the dangers of the sun and promotes public health. A new app for mobile phones that provides localized information on ultraviolet (UV) radiation levels has been launched by the World Health Organization (WHO), the World Meteorological Organization (WMO), the United Nations Environment Programme (UNEP) and the International Labour Organization (ILO). The *SunSmart Global UV app* is available free of charge at both the **Apple App** and **Google Play** stores. It provides personalized options so that users can take actions to protect prolonged, excessive UV exposure, a major cause of skin cancer and other UV related diseases. The app allows the inclusion of national and local data streams and adaptation to multiple languages – it is currently available in Chinese, English, French, Russian, Dutch and Spanish.

Image: UNEP, Ozone Secretariat website

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, 14 February 2022

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 >>>**

Multilateral Fund
for the Implementation of the Montreal Protocol

THE MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL

Multilateral Fund's post-COVID-19 recovery response

The COVID-19 pandemic has wreaked havoc on people's health and economic security around the world. The economic impact of lockdowns has left many developing countries vulnerable to further financial decline. Many of those countries are beneficiaries of the Multilateral Fund for the Implementation of the Montreal Protocol (referred to as Article 5 countries). Their continued efforts to restore the ozone layer, mitigate climate change and protect the environment are at risk.

COVID-19 has had an unprecedented adverse impact on the manufacturing and trade of a range of consumable products because of supply constraints and a fall in demand. Cooling applications are one example. Converting cooling applications to ozone- and climate-friendly technologies is a cornerstone of the work of the Multilateral Fund, which is expected to be temporarily undermined by the pandemic. Recovery will be slow, and it will take time before output and manufacturing can be brought back to pre-pandemic levels.

The Multilateral Fund recognizes the urgency of this moment and the role it can play in post-COVID-19 recovery measures to support the environmental protection efforts of Article 5 countries and to contribute to the economic sectors that rely on the substances needed for cooling applications like refrigeration and air-conditioning that are essential for human health and welfare.

In this context, the Multilateral Fund's response involves immediate action to reinforce its role of providing financial and technical assistance to Article 5 countries to sustain the implementation of their phase-out activities under the Montreal Protocol and to contribute to economic recovery post-COVID-19. The Executive Committee has given a high priority to the continued operations of the Fund by establishing an effective intersessional approval process that has provided over US $35 million. The funds are being used for continued support to the national ozone units in implementing phase-out activities at the country level; for continued conversion of manufacturing lines, including refrigeration and air-conditioning manufacturing lines to low-to-zero global-warming-potential alternative technologies not relying on controlled substances; and for technical assistance to technicians so that they can apply better servicing practices and sustain their livelihood despite the downturn in the economy. This funding is expected to provide economic stimulus that will allow these small enterprises to remain in operation.

Much-needed international cooperation has continuously been provided through the Multilateral Fund to governments of Article 5 countries to support them in establishing policies that will support their recovery efforts, especially for sectors in which people's livelihoods are directly affected by the pandemic. The bilateral and implementing agencies of the Fund continue to identify near-term priorities and approaches for capacity-building, information exchange and implementing training projects in these countries despite the challenges of travel restrictions. Their efforts have resulted in innovative virtual on-line solutions ensuring that countries continue to be assisted during this time.

The Multilateral Fund will continue its work to heal and restore the ozone layer, which is protecting the planet from the side effects of excessive ultraviolet radiation, despite the challenges of the new reality created by the pandemic.

- Policies, Procedures, Guidelines and Criteria of the Multilateral Fund (July 2022) 7/29/2022
- HCFC phase-out management plans and HCFC production phase-out management plans (July 2022), 7/28/2022
- Updated guide for project preparation of Stage I of Kigali HFC implementation plans (KIP) (April 2022), 4/28/2022
- Updated guide for the presentation of stage II of HCFC phase-out management plans (February 2022), 2/15/2022
- Executive Committee Primer 2022, 1/23/2022
- Adjusted consolidated business plan of the Multilateral Fund 2022-2024, 1/5/2022

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

OzonAction

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.

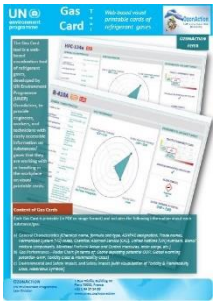
The section below features several of our most recent products.
Visit OzonAction website for more information, discover the entire range of products.

Images in this section are by OzonAction

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

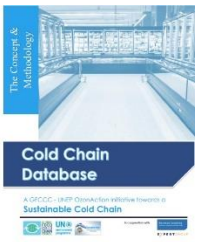


Gas Card Tool: Web-based Visual Printable Cards of Refrigerant Gases-Content of Gas Cards - Each Gas Card is printable (in PDF or image format) and includes the following information about each substance/gas: a) General Characteristics (Chemical name, formula and type, ASHRAE designation, Trade names, 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)*



OzonAction and GFCCC launch the methodology questionnaires the Cold Chain Database Initiative - The Global Food Cold Chain Council (GFCCC) and the United Nations Environment Programme (UNEP) OzonAction announced the launch of their Cold Chain Database and Modeling initiative. The initiative marks the first formal step to assist developing countries in identifying their cold chain baseline along with consumption of relevant HCFCs or HFCs or other refrigerants. The initiative was conceived in 2019 and kicked off during the 31st Meeting of Parties to the Montreal Protocol (Rome, Italy), which concluded with the Rome Declaration on "The Contribution of the Montreal Protocol to Food Loss Reduction through Sustainable Cold Chain Development".

> ***GFCCC-UNEP OzonAction Cold Chain Modelling Press Release***
> ***GFCCC-UNEP Cold Chain Database Methodology Final***
> *For countries or partners interested to use the model data collection detailed questionnaires, please fill in the* ***Expression of Interest and NDA of Cold Chain Database*** *form and return to* ***Ayman Eltalouny***

Contact: Ayman Eltalouny, Coordinator International Partnerships, UNEP, OzonAction

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. 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

Watch these videos on the OzonAction YouTube Channel:

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

Request download 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!**

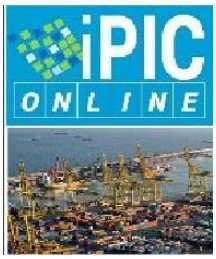
The flyer is available from the **OzonAction website**.

Refrigerant Cylinder Colours: What has Changed - *A new UNEP OzonAction factsheet on the new AHRI revised guideline on a major change to refrigerant cylinder colours* - One of the ways in which refrigeration cylinders are quickly identified is by cylinder colour. Although there was never a truly globally adopted international standard, the guideline from the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) although not required by law was used by the vast majority of industry and chemical producers around the world. An AHRI revised guideline, first published in 2015, now removes paint colour assignments for refrigerant containers and specifies that all refrigerant containers should have the same paint colour from 2020 onwards. NOOs and technicians should be aware of this change and inform national stakeholders, as well as familiarising themselves with relevant container labels and markings for refrigerants. **Read/download the factsheet**

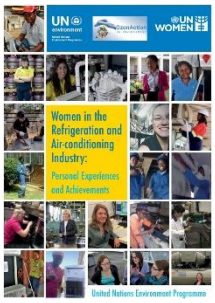
Update on new refrigerants designations and safety classifications- The latest version of the factsheet providing up to date information on refrigerant designations and safety classifications is now available (September 2020 update). The factsheet, produced by **ASHRAE** in cooperation with **UN Environment Programme OzonAction** is updated every 6 months. **Read/download the factsheet**

Contact: **Ayman Eltalouny**, OzonAction, UN Environment Programme

[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 hydrochlorofluoro-carbons (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.



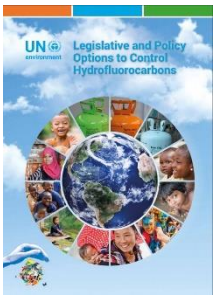
[Women in the refrigeration and air-conditioning industry: Personal experiences and achievements](#) The United Nations Environment Programme's (UNEP), OzonAction, in cooperation with UN Women, has compiled this booklet to raise awareness of the opportunities available to women and to highlight the particular 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](#)

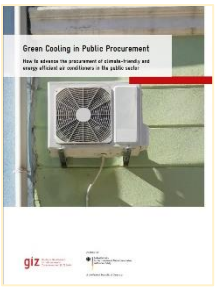
PUBLICATIONS

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**



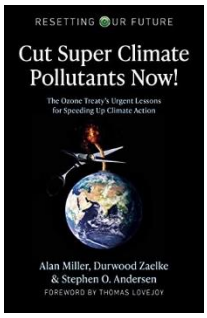
Latest issue of Centro Studi Galileo magazine,
Industria & Formazione, n. **6-2022**
(in Italian).

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**



Cut Super Climate Pollutants Now!: The Ozone Treaty's Urgent Lessons for Speeding Up Climate Action (Resetting Our Future). We have a decade or less to radically slow global warming before we risk hitting irreversible tipping points that will lock in catastrophic climate change. The good news is that we know how to slow global warming enough to avert disaster. Cut Super Climate Pollutants Now! explains how a 10-year sprint to cut short-lived "super climate pollutants" -- primarily HFC refrigerants, black carbon (soot), and methane -- can cut the rate of global warming in half, so we can stay in the race to net zero climate emissions by 2050.

Authors: Alan Miller, Durwood Zaelke, Stephen O. Andersen.

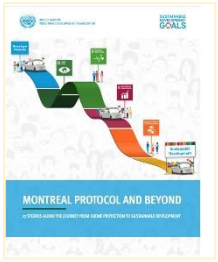


E-Book on Process Safety Management (PSM) Training for Ammonia Refrigeration - a new e-book about the critical elements of a process safety management (PSM) training program for facilities operating an ammonia refrigeration system. The e-book, titled "**7 Keys to a Compliant PSM Training Program for 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:

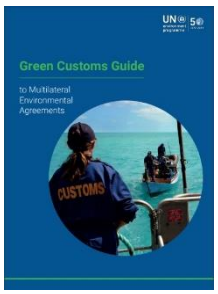
- Safety hazards and health considerations
- Emergency shutdown procedures
- Addressing deviations from system operating limits
- Risks and costs of non-compliance with regulatory standards

Request free Download here

Montreal Protocol and beyond: 17 stories along the journey from ozone layer protection to sustainable development - The 2030 Agenda for Sustainable Development and the 17 Sustainable Development Goals (SDGs) embody the global commitment to build a more sustainable future for all. These universally agreed objectives address the most urgent environmental, social and economic challenges of our time... **Read/Download here**



The Green Customs Guide to Multilateral Environmental Agreements was designed to promote sustainable trade and encourage customs and border control officers to take on a proactive role in protecting the environment. The guide provides useful information and guidance about relevant trade-related multilateral environmental agreements (MEAs), thus facilitating legitimate trade in environmentally sensitive items while preventing illicit trade in such items and contributing to the achievement of the Sustainable Development Goals.



Read/Download the full report.

See pages 91-98 on "How the Montreal Protocol regulates trade", and "Montreal Protocol-specific training materials for customs officers."

Photovoltaic-powered Air Conditioning in Buildings - Space cooling in buildings is characterized by enormous growth rates, due to increasing ambient temperatures, growing population and urbanisation. Air-conditioned buildings in many countries are largely dominated by mid to low appliance energy efficiency levels, highly climate-damaging refrigerants as well as fossil-fuel based electricity supply. This in sum generates a huge amount of greenhouse gas (GHG) emissions, furthering climate change. The objective of this paper is to further unfold the technical and economic potential of solar PV-powered green air conditioners. Therefore, it focuses on the most widely applied type of active cooling appliance: single split-type air conditioning systems with a cooling capacity up to 5 kW. It looks at the current development of technical main components and based on that defines model cases for hybrid and off-grid solutions for private and small commercial applications. The technical and economic potential for these cases is then analysed for 13 countries worldwide. Subsequently, a case study on Médecins Sans Frontières' (MSF) solar AC project in Haiti provides practical insights on the use of PV-powered AC systems in the context of off-grid social infrastructure. **Read/Download the study here**

International Institute of Refrigeration (IIR) **New Informatory Note. Low-GWP Refrigerants: Status and Outlook -** The latest IIR Informatory Note outlines the options available for low-GWP refrigerants and their respective performance. It provides a series of recommendations on refrigerant selection criteria, research priorities and personnel training. A Summary for policymakers outlining the main conclusions and recommendations of this Informatory Note is available in open access. Also available in French language.

Africa's Cold Rush and the Promise of Refrigeration. For the developing world, refrigeration is growth. In Rwanda, it could spark an economic transformation. *Article in The New Yorker, 15 August 2022, By Nicola Twilley*

Listen to this story

0:13 / 40:33

MISCELLANEOUS

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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The views expressed in articles written by external authors are solely the viewpoints of those authors and do not represent the policy or viewpoint of UNEP. While UNEP strives to avoid inclusion of misleading or inaccurate information, it is ultimately the responsibility of the reader to evaluate the accuracy of any news article in OzoNews. The citing of commercial technologies, products or services does not constitute endorsement of those items by UNEP.

If you have questions or comments regarding any news item, please contact directly the source indicated at the bottom of each article.

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

If you wish to submit articles, invite new subscribers, please contact:
Samira Korban-de Gobert, samira.degobert@un.org

UN environment programme

Multilateral Fund for the Implementation of the Montreal Protocol

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