Volume XXII | 28 February 2022

In this issue:

GLOBAL

1. Kigali Amendment latest ratifications

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

Spain, Provisional application under Article V, 20 January 2022
Turkey, 10 November 2021
St. Lucia, 2 November 2021

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. Launch of the 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.

The course is hosted on InforMEA, the United Nations information portal on Multilateral Environmental Agreements (MEA). The portal is a one-stop information hub on international environmental law searchable by key terms across treaty texts, COP/MOP decisions, national plans and reports, laws, court decisions and more. In addition, part of the platform is dedicated to e-learning containing around 40 free online courses on topics related to MEAs.

The Ozone introductory course, found under 'Climate and Atmosphere', is a self-paced course that allows navigating the lessons at your convenience and takes about 2-4 hours to complete, excluding additional materials. On completing the course and taking a final quiz, you will obtain a certificate.

The Ozone Secretariat is developing an advanced course to complement the introductory one with further insight and deep-dive into the ozone treaties to further enhance the knowledge of our stakeholders.

United Nations Environment Programme (UNEP), Ozone Secretariat, 14 February 2022

Image: UNEP, Ozone Secretariat website

3. Cooling Matters: World Refrigeration Day Announces 2022 Theme

LAS VEGAS, 14 February 2022 – Food available when and where we choose. Apps that make our cell phones personal assistants and inanimate products SMART. Vaccines to protect us from disease, and medicines to cure disease. Cities thriving in places once inhabitable. They all require cooling.

"Cooling is at the very heart of modern life. It enables people to live and work comfortably, it saves lives, it enables people to achieve. The need for cooling is everywhere, it touches lives in fantastic, though often unnoticed ways. However, we look at it, cooling matters to us." said Steve Gill, founder of World Refrigeration Day.

At a side session held during the 2022 AHR Expo in Las Vegas, Gill announced that Cooling Matters would be the day's 2022 theme. "Our objective is to make the public aware of cooling's essential benefits, how cooling impacts daily life, and how technology choices foster environmental well-being of future generations." World Refrigeration Day is celebrated on and around June 26.

According to the secretariat, despite policies, standards and codes related to the refrigeration and air-conditioning industry, there is still significant lack of public understanding of cooling's importance even though issues like refrigerant transition, emissions reduction, and maximizing energy efficiency have been addressed for decades by governments due to global policies and binding international frameworks.

At AHR, partnering groups for previous World Refrigeration Day campaigns described how the day serves as a platform to educate the public about cooling's benefits. Past campaigns targeted refrigerant choices that protect the ozone layer, using the cold chain to distribute food, medicines, and vaccines, and promoting "cool" careers. Together, those

partnering groups represent a half million engineers and technicians, more than a thousand suppliers of equipment services, and near 200 governmental bodies and agencies: United Nations Environment Program OzonAction, ASHRAE, European Partnership for Energy and the Environment, Federation of Ibero-American Air Conditioning and Refrigeration Associations, Global Food Cold Chain Council, International Institute of Refrigeration, Indian Society of Heating, Refrigerating and Air-Conditioning Engineers, and Union of Associations of African Actors in Refrigeration and Air Conditioning. They are among some hundred national and international associations that are World Refrigeration Day allies.

“The public can make choices that minimize environmental impacts when they select, operate and maintain cooling equipment,” Gill explained. According to the International Energy Agency, the average efficiency of air conditioners sold today is less than half of what is typically available on the shelves – and one third of best available technology.

Buildings generate nearly 40% of annual global CO_2 emissions. Of those total emissions, building operations are responsible for 28% annually, while building materials and construction are responsible for an additional 11% annually. “How RAC systems are maintained and operated is one of the most important actions the world can take to address climate change,” said Rajan Rajendran representing ASHRAE’s Refrigeration Committee and the Global Food Cold Chain Council.

The challenge will only become greater. “Half of the buildings standing in 2060 have not yet been built,” said Ayman Eltalouny, representing UNEP OzonAction. There are 3.6 billion cooling units in use today. By 2050, that number is expected to be 9.5 billion. “If left unchecked, emissions from cooling appliances are expected to double by 2030. They will triple by 2100 driven by heat waves, population growth, urbanization and a growing middle class. Moving to best available cooling technologies would reduce cumulative emissions by 38 gigatons of CO_2 emissions by 2030. This would avoid future greenhouse gas emissions equivalent to 2018 levels.”

And there is the increasing need for food. “Due to population growth, the world will need 60% more food by 2050. The unfortunate reality is much of the world’s food supply is lost due to waste,” said Rajendran. “Increasing refrigeration in emerging economies is required to meet this growing demand. Some 475 million tons of food currently lost could be saved by wider application of refrigeration.”

“We must communicate to the public that there is value to cooling if we hope to have policies in place which encourage use of low carbon emitting refrigeration and air conditioning,” said Rajendran.

Said Gill, “Cooling Matters will tell the story of how our wellbeing depends upon cooling and how cooling technology choices can safeguard the well-being of future generations. We encourage the whole the refrigeration and air-conditioning industry to join us in celebrating World Refrigeration Day 2022. Join the global community conversation using the hashtags #coolingmatters and WREFD22.”

Learn more about World Refrigeration Day "Cooling Matters," visit www.worldrefrigerationday.org or contact info@worldrefrigerationday.org

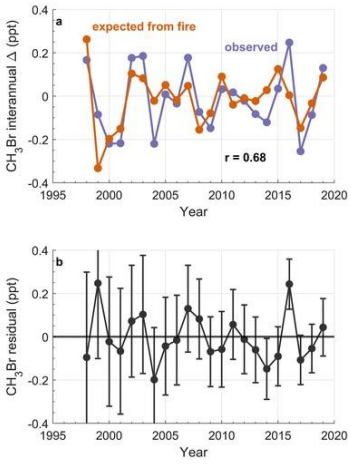
4. Fires are driving short-term spikes in an ozone-depleting gas

New research reveals global wildfires as an important cause of the short-term spikes in the atmospheric abundance of a potent ozone-depleting chemical, methyl bromide.

Since 1999, the Montreal Protocol has phased out most anthropogenic production of methyl bromide. As a result, atmospheric concentrations of methyl bromide have been declining. However, scientists have detected mysterious inter-annual variations in atmospheric methyl bromide concentrations.

"We first found a strong correlation between the growth rate of atmospheric methyl bromide concentrations and the El Niño Southern Oscillation, also known as ENSO," said the lead author Melinda Nicewonger, NRC Postdoctoral Fellow at Global Monitoring Laboratory. "At the same time, we knew that the occurrence of global wildfires is linked to variations in ENSO."

Using surface measurements from NOAA's global air sampling network and an analysis of methyl bromide emissions from numerous sources, Nicewonger and her colleagues attributed 46% of the year-to-year variation of atmospheric methyl bromide abundance to global fires.



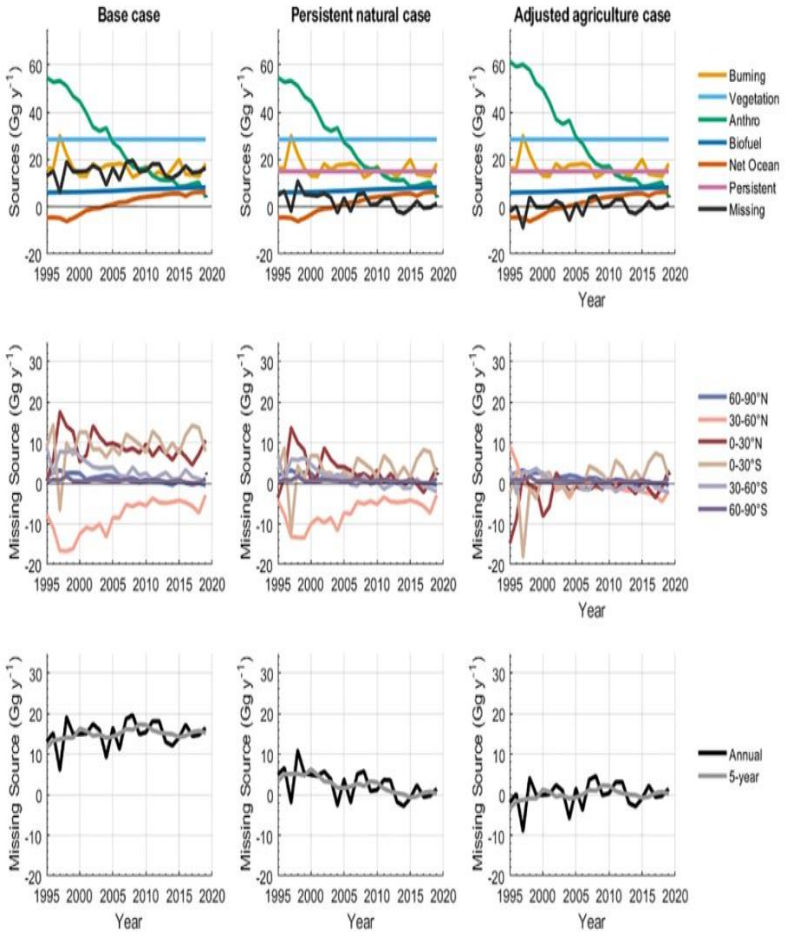
*Interannual variability (in ppt) of atmospheric methyl bromide (CH_3Br) mole fraction from the box model and from NOAA observations. (a) Expected interannual variability solely due to fire emissions of CH_3Br (orange) and the observed interannual variability from the NOAA network (purple) after removing the variability due to anthropogenic emissions based on the UNEP inventory. (b) Residuals in atmospheric CH_3Br variability (calculated as observed minus expected) not explained by the fire emissions. Error bars are the 1 standard deviation uncertainty estimate on the observationally based global mean estimate and do not include uncertainty in fire emissions. Figure 4 from **the interannual variability publication**.*

The same research team also published a **new paper** on the global methyl bromide budget, using the same ocean/atmosphere model.

Previous research had identified a gap between known sources and sinks of this potent ozone-depleting gas. However, the last budget assessment happened in 2009, and scientific knowledge of ocean/atmospheric processes has advanced since then.

"In this new model, we used high spatial and temporal resolution ocean wind data and an updated parametrization for the air/sea flux transfer of methyl bromide," said Nicewonger. "This allows us to better model the gas transport processes between the ocean and atmosphere."

The authors found an imbalance between the model-derived emissions and the bottom-up estimates of sources at 20 Gigagrams per year, 35 percent smaller than previously reported.



Results from the model inversion showing temporal and spatial characteristics of methyl bromide sources for three cases: base case (left column), persistent natural case (middle column, base case adding a constant unidentified vegetation source), and adjusted agriculture case (right column, persistent natural case adding a decreasing agricultural emission). Top row: bottom-up inventory of global sources including the inferred budget gap (or missing source) based on the model inversion, middle row: latitudinal distribution of the budget gap, bottom row: budget gap between optimized emissions and estimated sources shown as annual mean (black) and 5-year running average (gray). See legends for color key. Figure 7 from ***the global budget paper****.*

A persistent source is identified primarily in the tropics, likely originating from natural vegetation. A smaller time-varying source was found to scale with the anthropogenic

source during the production phase-out, suggesting the possibility of anthropogenic emissions being slightly underestimated in the past.

The results of these two studies narrow the gaps in our quantitative understanding of the processes that influence the atmospheric concentrations of methyl bromide. Furthermore, they highlight the value of the global atmospheric monitoring network in estimating the emissions and variations of ozone-depleting chemicals and assessing the effectiveness of international environmental agreements.

Global Monitoring Laboratory scientist Stephen Montzka is a co-author of both papers and Eric Saltzman from UC Irvine's Department of Earth System Science is the lead author of the budget study. NOAA Pacific Marine Environmental Laboratory developed the **NOAA COARE model** of trace-gas air-sea exchange processes that was adopted in these two studies.

Earth System Research Laboratories Global Monitoring Laboratory (NOAA), 24 February 2022, By Xinyi Zeng
Image: NOAA website

5. Widely used pesticides may threaten Earth's ozone layer
These copper-based chemicals can react with soil's carbon to make ozone-destroying gases.


Here, a copper-based fungicide is being sprayed on navel orange trees in California to protect the plants from brown rot fungus. This blight can cause crop losses of up to 50 percent. But such copper-based agents can make chemicals harmful to the stratospheric ozone layer, new data show.
DAVE THURBER/DESIGN PICS/GETTY IMAGES PLUS

For more than a century, farmers have protected their crops using copper-based chemicals. These pesticides ward off insects and fungi that would damage the plants, boosting harvests. But there's a catch. These chemicals also may react with soil to release gases that harm Earth's ozone layer. That's the finding of a new study.

"We've been using copper compounds since the 1800s without fully realizing some of the side effects," says Robert Rhew. He's a biogeochemist at the University of California, Berkeley.

Rhew's team found that copper-soil reactions produce two compounds. One is methyl bromide, which contains bromine. The other is methyl chloride, which contains chlorine. Bromine and chlorine are both highly reactive elements called halogens that share several common traits. One is the ability to form compounds that destroy ozone. As a result, methyl bromide and methyl chloride can both damage ozone in Earth's atmosphere. That ozone shields life on Earth from the sun's harmful ultraviolet rays.

"Copper was considered environmentally friendly," Rhew says. "It probably still is, compared to some alternatives." But, as his team now shows, copper-based

chemicals may threaten a critical region of Earth's atmosphere. The findings appeared in the January 10 *Nature Communications*.

Pumping out halogens

The idea that copper, soil, and halogens in the atmosphere may be linked came from a **20-year-old study**. In that research, a German team discovered that iron in soil reacts with other soil components. Those reactions can produce methyl bromide and methyl chloride. Copper, like iron, is a metal. Rhew's team wondered whether copper might react with soil to create the same halogens.

To find out, they added copper sulfate — the main ingredient in many copper-based pesticides — to soil. The team then measured gases released from the soil. The researchers tested soil with and without bacteria. They also studied soil exposed to sunlight or not.

Copper's reactions released more than iron's. Based on these data, Rhew's team estimate the amount of gas that copper-soil reactions could release into the air each year. Worldwide, it comes to some 4,000 metric tons of methyl bromide. On top of that, it could spew another 2,500 metric tons of methyl chloride. [...]

The continued release of chlorine and bromine won't help. These halogens are highly effective ozone-destroyers. That's because when halogens destroy ozone, Tegtmeier explains, "they do so catalytically." That is, the halogens survive the reaction. So halogens in the atmosphere can destroy ozone molecules again and again.

After CFCs were banned, methyl bromide and methyl chloride became the new major sources of halogens in the atmosphere. Volcanoes could have spewed some. But not enough to explain the levels seen in the atmosphere. The new study shows that copper-based chemicals may account for about 10 percent of the gases' mystery sources. Other sources of copper may add more halogenated gases to the atmosphere. These sources may include copper-based antifungal paints for boats.

"Some field studies might be great," says Tegtmeier. She's curious how much these copper-soil reactions occur in nature. After all, a lab environment is simple and controlled. Nature isn't. Different soils around the world may have different reactions with copper chemicals. "The big question," she says, is "what does this mean globally?"

If copper-based pesticides make ozone-destroying gases, society must manage these chemicals more carefully. Methyl bromide needs particular attention. Bromine has the potential to destroy more ozone than chlorine does. One molecule of methyl bromide in the stratosphere, is about equal "to 50 methyl chlorides," says Martyn Chipperfield. He's an atmospheric chemist not involved in the study. He works at the University of Leeds in England.

For Rhew, the big takeaway is that even chemicals long assumed to be eco-friendly can harm the environment. Moving forward, Rhew says, "when we talk about the environmental impacts of adding something to nature, we can't assume that we know everything right off the bat. Some consequences are invisible."

Science News for Students, 18 February 2022, By Katie Grace Carpenter

Image: DAVE THURBER/DESIGN PICS/GETTY IMAGES PLUS-Science News for Students website

6. Alternative Refrigerant Webinar - CO_2

Alternative Refrigerant Training Webinar

REAL Alternatives 4 LIFE will be delivering a webinar dedicated to carbon dioxide training and hosted by Walter Reulens of UCL (University College of Limburg), one of the REAL Alternatives 4 LIFE project team members and an expert in using e-learning for refrigeration and air conditioning.

He will discuss the blended learning programme which includes self-study e-learning, booklets for students and a package of resources for trainers wanting to develop training courses including specifications for practical training and standardised assessments leading to Certification of technicians.

Join this free webinar on 25th March at 2pm (UK time) to find out how you as a training provider or employer can benefit from offering REAL Alternatives training courses.

Click **here** to book your place.

REAL Alternatives Europe, February 2022

Image: REAL Alternatives Europe website

Call for nominations now open for Scientific Prizes at IIR Congress 2023 - Don't miss out on your chance to apply for the prestigious academic and scientific awards to be presented at the upcoming 26th IIR International Congress of Refrigeration. In anticipation of the 26th IIR International Congress of Refrigeration (ICR) to take place in Paris (France) in August 2023, the IIR is launching a call for nominations for several scientific prizes. The series of prestigious academic and scientific awards **recognise those who have made outstanding contributions to the field of refrigeration or have completed noteworthy research.**

The prizes presented will be the:

- IIR Gustav Lorentzen Medal
- IIR Science And Technology Medal
- IIR Young Researchers' Awards

Application deadline: April 30, 2022

International Institute of Refrigeration (IIR), 11 February 2022 */Image: IIR website*

Find out how to apply

AFRICA

7. Will new financing model help phase out climate-warming appliances?

Thousands of cooling appliances-comprising air conditioners and refrigerators-that are not eco-friendly and outdated could soon be phased out and be recycled following a 'new financing mechanism to subsidize the cost' to remove them from the market and use.

There has been a steady increase in refrigerators in the residential sector since 2012 with an estimated stock of 97,512 refrigerators owned by households in Rwanda as of 2020. At least 64,000 refrigerators are classified as old consuming a lot of energy. There are also over 50,000 air conditioners on the market but most of them are outdated and are not friendly to the environment studies, show.

According to Morris Kayitare, The leader of Rwanda Cooling Initiative, the new financing mechanism dubbed "Green On-Wage Financing mechanism" is expected to incentivize owners of the climate polluting cooling appliances to the take the equipment to e-waste recycling facility in Bugesera District and be facilitated to get new eco-friendly cooling appliance at 15 percent discount on the cost.

The program incentivizes households and micro-entrepreneurs to return end-of-life cooling equipment and acquire certified higher-efficiency cooling appliances in exchange through a dedicated take-back scheme in partnership with interested vendors and an e-waste management company.

In addition, salaried customers are able to acquire eligible equipment on special credit conditions and pay for it over time through deductions on their salaries at partner local financial institutions. "Among other packages, a consumer can access loans to buy such eco-friendly cooling appliances without collateral. We are going to work with banks to help consumers be able to access loans to replace such old cooling appliances. The person can only prove a source of income," he explained.

The new financing scheme, he noted, is aimed to help implement Kigali Amendment to the Montreal protocol adopted in 2016. Under the Kigali Amendment, countries are committed to improving energy efficiency of cooling equipment and reducing the production and consumption of HFCs pollutants by more than 80 percent over the next 30 years.
Hydrofluorocarbons (HFCs) are said to be powerful climate-warming gases.

Rwanda aims to unlock $4 million in potential financing through a Green On-Wage Financing mechanism to support the purchase of 12,000 energy efficient and climate friendly cooling products to replace used but operational equipment in the residential sector in Rwanda by 2024.

This seeks to address the burden of upfront investment and the need for collaterals to access such equipment.

Energy saving

Kayitare said that replacing the cooling appliances with the clean ones could also save energy besides environmental protection.

Studies show that old fridges alone that are not friendly to the environment as they use up electricity worth approximately Rwf4 billion annually.

He said that within two years at least 10,000 old refrigerators should be removed from residential homes.

“We hope that over 200,000 new fridges and 4,000 air conditioners could be on the market in the next two years,” he said. The appliances-that require to be phased out have different effects such as deplete ozone layer which results in global warming.

If not phased out, the substances could also pose different effects risks which include food shortage as the radiations disrupts developmental and physiological processes that decrease the productivity of crops as well as loss of wildlife since ozone depletion lead to a loss of plant species and reduce global food supply.

The effects of ozone layer depletion on human beings include skin cancer, risk of cataract, weakened human immune systems, DNA damage and lung diseases as ultraviolet radiations disturb biomolecules such as lipids, proteins and nucleic acids.

Recycling outdated appliances

Olivier Mbera, The General Manager of EnviroServe-an E-waste handling facility in Bugesera district said that the facility is ready to receive outdated cooling appliances that have toxic chemicals for handling and recycling them.

“Those who will supply us old cooling appliances will benefit from a 15 percent discount on cost to buy new and eco-friendly appliances. We have machines to handle such toxic gases which old appliances contain,” he said.

Jeanne D’arc Mujawamariya, the Minister for Environment, said that the Green On-wage mechanism is also part of implementing the National Cooling Strategy adopted in 2019 to transform the market towards efficient cooling equipment.

“The mechanism seals the Government of Rwanda’s commitment to tackle one of the World’s crisis – the climate change – which threatens food security, health and economic

wellbeing as well as the environment around us. We have a diverse range of projects to implement all the priority recommendations of the strategy," she said.

The development of a financing scheme for energy-efficient and climate friendly cooling products will address the first-cost barrier and incentivize consumers to recycle outdated existing appliances, she noted. She said cooling is complex and cuts across comfort, agriculture, health, and industry sectors adding it needs to be addressed comprehensively and continuously.

"The Green On-Wage mechanism will give consumers access to financing which allows them to make a choice to buy a relatively more expensive but efficient cooling equipment, considering long term benefits, as the savings made on the energy bill will render the efficient equipment cheaper over time," she said.

Cooling in post-harvest management

Mujawamariya said that avoiding upfront costs, and the ease of repayment will motivate investments in agriculture post-harvest management that may not otherwise happen. "Through the mechanism, REMA has scrutinized the efficiency of the equipment eligible under the Green On-wage mechanism, which gives the consumers some confidence in the promised savings.

A Take-back scheme has been developed to ensure collection, transportation, treatment, and disposal of discarded appliances, increasing the incentives for consumers and co-benefits for society," she said.

Beyond this mechanism, we will continue to support ambitious energy transition actions to help meet national development targets while fulfilling obligations under the Kigali Amendment to the Montreal Protocol and the Paris Climate Agreement, she added.

The New Times, 15 February 2022, By Michel Nkurunziza

Image: The New Times website

Asia Pacific Ozone2Climate Art Contest organized by the Asia-Pacific Regional Network of Ozone Officers, as part of UNEP's workplan under the Montreal Protocol's Multilateral Fund. **The Art Contest will run its course and close on 31 March 2022**, followed by the regional contest of nominated winners. The final winners in the three categories of artworks - photography, drawing, and graphic design, will be evaluated and announced on World Ozone Day in 2022.

For more information about the contest, please visit: **www.ozone2climate.org**

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

LATIN AMERICA AND CARIBBEAN

8. Produce y la ONU Medio Ambiente inician talleres para fortalecer la capacidad de la autoridad aduanera de control de sustancias reguladas – Perú

Con la finalidad de mejorar las capacidades del trabajo en los puertos para el control de sustancias reguladas bajo el Protocolo de Montreal y de los equipos de refrigeración que las contienen evitando así el ingreso al territorio nacional de sustancias prohibidas que provocan el deterioro de la Capa de Ozono.

El Ministerio de la Producción a través de la Dirección General de Asuntos Ambientales de Industria (DGAAMI) en un trabajo conjunto con el Programa de las Naciones Unidas para el Medio Ambiente (ONU Medio Ambiente) realizaron este 15, 16 y 17 de febrero de 2022, tres (03) talleres de capacitación a funcionarios aduaneros con el objetivo de fortalecer sus capacidades en:

- Identificación de sustancias controladas bajo el Protocolo de Montreal

- Nuevo Arancel de Aduanas 2022, para identificar la nueva clasificación arancelaria sobre sustancias que agotan la Capa de Ozono y sustancias con alto potencial de calentamiento global.

- Análisis de riesgo sobre el comercio ilegal de sustancias controladas por el Protocolo de Montreal

- Capacitar a los oficiales para realizar inspecciones de sustancias controladas y equipos de refrigeración y aire acondicionado (RAC).

Teniendo un total de 293 asistentes especialistas entre profesionales de las áreas de operatividad aduanera, gestión de riesgo, clasificación arancelaria e inteligencia aduanera de Arequipa (6), Lima (128), Cusco (7), Ica (5), Puno (6), tumbes (26), Piura (28), La libertad (9), Moquegua (4), Loreto (7), Ancash (4), Lambayeque (4), San Martín (12), Tacna (3), Ucayali (1) y de Madre de Dios (6) además se sumaron especialistas de la SUNAT que asistieron en representación de sus intendencias a nivel nacional.

Los talleres, que se enmarca dentro de la actividad “Prevención del comercio ilegal y capacitación sobre controles aduaneros en aplicación del Protocolo de Montreal en el Perú”, del Proyecto “Plan de Gestión de Eliminación de los Hidroclorofluorocarbonos (HCFC) - PGEH Fase II para el Perú”

Esta actividad permite fortalecer los controles que permitan la reducción de la contaminación local, impactando positivamente en la Capa de Ozono que repercute directamente en la calidad de vida de todos los ciudadanos.

[Ministerio de la Producción, 22 de febrero de 2022]

Image: Ministerio de la Producción website

9. Técnicos de refrigeración convertidos en "Héroes de capa verde" para proteger medio ambiente

Santo Domingo.- El Ministerio de Medio Ambiente y Recursos Naturales desea convertir en "Héroes de capa verde" a dominicanos que cada día buscan el pan de su familia a través de la refrigeración a los aparatos de aires acondicionados, quienes podrán aportar su granito de arena a la protección del planeta.

Aunque muchas personas creen que las grandes potencias e industrias son las principales responsables del calentamiento global debido a la gran cantidad de gases de efectos invernadero que generan, lo cierto es que miles de ciudadanos comunes afectan de manera directa a la capa de Ozono con su trabajo, como los técnicos de refrigeración.

En ese sentido, el Ministerio de Medio Ambiente y Recursos Naturales, a través del Programa Para la Protección de la Capa de Ozono (PRONAOZ), ha puesto en marcha una iniciativa que sin lugar a duda ha de beneficiar al planeta y consiste en la capacitación de técnicos de refrigeración, quienes manejan equipos de gases y sustancias que afectan el medio ambiente y el clima.

Los gases usados en los sistemas de refrigeración que corroen la estratósfera terrestre son del grupo Hidroclorofluorocarbonos (HCFC) los cuales contienen átomos de Cloro que al ser liberados a la atmósfera debilitan la Capa de Ozono, y desde hace décadas representan un importante problema medioambiental.

Por ello, es importante la aplicación de buenas prácticas al momento de reparar aparatos de aires acondicionados. En ese aspecto, a través de Mimarena Medio Ambiente otorga una licencia a técnicos que valida la preparación adecuada para que estos puedan manejar equipos que contienen gases HCFC.

El Programa de Protección de la Capa de Ozono del Ministerio de Medio Ambiente y Recursos Naturales (MIMARENA), está dirigido por el ingeniero Elías Gómez, quien, junto con el presidente de la Asociación de Técnicos en Refrigeración de Aire de República Dominicana, Catalino Archibal, llega al público objetivo, y desde ya los técnicos que han asumido su compromiso y responsabilidad con el medio ambiente han sido bautizados como héroes de capa verde.

Archibal, colabora con Medio Ambiente desde el año 1990 y ha logrado capacitar a gran parte del sector en coordinación con el programa de las Naciones Unidas, y de manera gratuita de la mano del Instituto Nacional de Formación Técnico Profesional (Infotep).

“Estamos en el proceso y motivando a todos los técnicos para que sigan obteniendo las licencias, que los avalan para trabajar garantizando la preservación de la Capa de Ozono que nos protege”, sostuvo Archibal, quien también exhortó a la población a contratar técnicos debidamente certificados.

Con la iniciativa de Mimarena el Ministerio de Medio Ambiente cumple con el decreto 360-15 que creó una comisión especial para otorgar licencias a técnicos de refrigeración y acondicionadores de aire, a fin de que estos eviten emitir fluidos o gases a la atmósfera.

También respeta el acuerdo «Protocolo de Montreal» firmado por 197 países e 16 de septiembre del año 1987 para para resolver el problema del consumo en los mercados de sustancias y gases que afectan la capa de ozono y reducir estos gradualmente hasta su eliminación.

En los anexos de este convenio se enumeran los equipos que contienen estos gases y sustancias que afectan a la capa de ozono y el clima, las que en una gran proporción son del uso del sector de la refrigeración.

El Día, 8 de Febrero 2022

Image: Reunión por el Día Mundial de la Capa de Ozono con el ministro Orlando Jorge Mera y los Técnicos en Refrigeración de Aire de República Dominicana “Héroes de Capa Verde”. El día website

10. Prohíben venta de espumas que dañan capa de ozono - Bolivia Ministerio de Medio Ambiente

Cuando faltan pocos días para las celebraciones de carnaval en diferentes municipios del país, el Viceministerio de Medio Ambiente emitió una resolución ministerial que prohíbe el juego con espuma que contenga HCFC-22, químico que causa problemas ambientales.

Este componente es un tipo de refrigerante sintético muy dañino para la capa de ozono, por ser nocivo para la salud y el medioambiente.

La Resolución Administrativa 011/2022, del 10 de febrero, que se encuentra en el Sistema Nacional de Información Ambiental, dice: “Se prohíbe el juego con la espuma aerosol/spray que contengan HCFC-22 o cualquier otro Clorofluorocarbono o Hidroclorofluorocarbono en su composición”.

Añade que, “a partir de la gestión 2023 está prohibido el juego con espuma aerosol/spray que contengan HFC-134a o cualquier otro hidrofluorocarbono en su composición”.

Los gobiernos autónomos departamentales y municipales deberán considerar actividades de control para la autorización de espumas en spray que no contengas sustancias mencionadas.

Cada año, la Alcaldía de La Paz reitera que el compuesto HCFC-22 tiene efectos negativos en la salud humana, como daños respiratorios, cáncer en la piel, irritaciones oculares y dérmicas, publicó talcual.bo.

Según Reacción Climática, un colectivo de voluntarios que tienen como misión aumentar la conciencia de la población sobre el Cambio Climático, el consumo de espumas artificiales durante los juegos del carnaval aumentó en los últimos años, lo que representa una amenaza al planeta porque el HCFC-22, que es un propulsor de aerosol en envases de spray, destruyen la capa de ozono en la atmósfera.

El Diario, 14 de Febrero 2022

Image: El Diario website

NORTH AMERICA

11. Hydrocarbon refrigeration, what every technician should know – Part 1 and 2

It is expected that hydrocarbon refrigerants will be approved for commercial and residential refrigeration equipment use in the United States within the next 90 days. Original equipment manufacturers are designing new hydrocarbon refrigeration equipment for 2012 introductions. To familiarise technicians with hydrocarbon refrigerants in preparation for the upcoming changes, Mr Gifford provided a comprehensive overview of the differences between hydrocarbons and fluorinated refrigerants.

The US Significant New Alternatives Policy (SNAP)

The SNAP ruling for hydrocarbon, which is expected to be out by the end of the year, is divided into two components:

- Refrigerators and freezers: the charge limitations are 57g (2.0 ounces) in any refrigerator, freezer, or combination refrigerator and freezer. This is equivalent to the liquid you would find in a typical cigarette lighter.

- Retail food refrigerator and freezers: the charge limitation for propane R290, which is a substitute for R12, R502 and R22, is 150g (5.3 ounces).

Advantages of hydrocarbons, their working temperatures, and pressures

Hydrocarbons are environmentally benign refrigerants. Their global warming potentials (GWP) are considerably lower than fluorinated refrigerants. Both R600a and R290 have a GWP of 3, which is relatively insignificant when you look at R12, R134a and R22, which have global warming potentials of 10,900, 1,430, and 1,810 respectively. Hydrocarbons also have lower discharge temperatures, improving the system reliability. One of the key benefits of hydrocarbons is the reduction in refrigerant charge. Compared to R22 and R134a, R290 results in a 40% reduction in refrigerant charge. R600a results in a 45% reduction in charge compared to R134a, and a 60% reduction compared to R12.

Hydrocarbon working temperatures and pressures:

- Condensing temperature 10-13°C over the environment temperature
- Suction pressure 3-5°C below the environment temperature
- Compressor discharge temperature: lower than or equal to 120°C
- Compressor dome temperature: Lower than or equal to 110°C
- Compressor winding temperature: Lower than 130°C
- Equalising pressure (psig): 58/58 for R600a and 128/128 for R290 for low back pressure
- Peak pressure (discharge) (psig): 145 for R600a and 360 for R290 for low back pressure
- Stabilised discharge pressure (psig): 113 for R600a and 290 for R290 for low back pressure

R290 is a good replacement for R22

The boiling points of R290 and R22 are very close matches, 42.1°C and 40.8°C respectively. The evaporating temperatures of R22 and R290 are also similar -40.8°C and -42.1°C. This means R290 can use the same evaporator design as R22. R290 also has a lower discharge temperature than R22, which improves compressor reliability, and can work at higher pressure ratios. Overall, this results in a 5% extension in the capacity range.

R600a is a good replacement for R12

R600a is widely used in domestic applications and many countries. 95% of domestic refrigerators in Europe work with R600a, and now Argentina, Brazil, China and other countries in Asia are beginning to adopt R600a in refrigerators and freezers. However its smaller volumetric capacity and higher pressure ratios, limit it to very small capacities. With regard to R600a, it has a lower molecular weight, 58.1 kg/kmol in comparison to R134a, 102 kg/kmol, which results in a lower charge for Isobutane. R600a also has lower operating pressures than R134a, improving reliability and extending life of the compressor. The limitation for R600a is in the range of 900 Btu per hour or about 264 W.

Hydrocarbon evacuation

The recommended minimum evacuation level for R600a and R290 systems is 200 microns. Moreover, technicians should use a high-quality vacuum pump specifically designed for evacuation and the vacuum should be pulled from both high and low pressure sides to ensure there are no condensables left in the system. Care should be taken to prevent moisture from entering systems and components prior to assembly otherwise evacuation will take longer.

With hydrocarbons soon to enter the US market Tecumseh expert Keith Gifford explained to technicians the different aspects of hydrocarbon refrigerants, including material compatibility, purity, lubrications, filter driers, and safety aspects.

Material compatibility

Hydrocarbon refrigerants are compatible with all common elastomers and plastic refrigeration materials used in valve seals, seals & gaskets. These include: neoprene, vitron, nitrile rubber, HNBR, PTFE and nylon. Incompatible materials are silicone-based rubbers, or natural rubbers.

Purity

Purity specifications for hydrocarbons are determined by international standard DIN 8960, which requires purity greater than 99.5% moisture, as a percentage by mass. The presence of moisture and acids reduces cooling capacity and increases energy consumption, whilst other impurities can result in capillary tube blockage. It is important to point out that the propane used for heating cannot be used in refrigeration systems because the purity level is not high enough.

Lubrication and filter driers

Hydrocarbon refrigerants are compatible with various lubricants necessary for reducing friction, sealing the refrigerant in the cylinder, and cooling the motor and pump. Specifically, they are compatible with Mineral Oil (MO), and Synthetic Alkylates (SA), and Polyol Ester (POE). With regard to filter driers hydrocarbon refrigerants allow the use of molecular sieve desiccant types such as XH5, XH6, XH7, XH9 and the universal filer drier MS 594. Silica based lubricants or filter driers are not compatible with hydrocarbons.

Flammability and classification

The flammability limits of hydrocarbons, between which the proportion of combustible gases in a mixture are flammable are as follows:

- R290: the lower explosion limit (LEL) is 2.1 and an upper explosion limit (UEL) is 9.5. This means for example, that for R290 the LEL is equivalent to 39g/m3 and the UEL is 177g/m^3.
- R600a the LEL is 1.8 and UEL is 8.5.

The charge limitation to be imposed by SNAP, the added safety requirements such as non-sparking electrical components, and ensuring the spark is contained if there is a spark, result in a very low probability of explosion. Moreover, if there were an explosion the small charge would contain it to a relatively minor level. With regards to classification, refrigerants are classified into two groups: group A, which pertains to flammability and

group B, which pertains to toxicity. Hydrocarbons are classified as A3 refrigerants due to their low toxicity and high flammability. R12 and R134a are classified as A1.

Safety

Unlike the propane used for heating, which has sulphur added so that it can be smelled; refrigerant grade hydrocarbons do not have any smell, and cannot be seen. Therefore, proper monitoring equipment is essential. The general precautions to take are:

- **Monitoring:** Combustible gas monitors should always be turned on before entering any service area and only turned off when technicians leave the service area
- **Ventilation:** A good ventilation of the service area should be established and maintained. It should be noted that hydrocarbons are heavier than air and tend to collect at a lower level.
- **Elimination:** Prior to beginning work technicians should extinguish sources of ignition in the service, for example by disconnecting power to appliances, etc.
- **Pressure:** A pressure relief valve should be used, and systems should not be pressurised beyond 150 psig field leak test pressure
- **Fans:** Those installed inside or outside the refrigerated space should not produce electrical arcs, even when short circuited or blocked

Finally, it should be noted that the risk of explosion is higher inside the cabinet where the refrigerant is confined, than outside.

Hydrocarbons21, 20 January 2022, By Tine Stausholm

Image: Hydrocarbons21 website

12. CO_2 refrigeration on the rise

Reviewing the regulatory, market and technological trends behind increased adoption of CO_2 refrigeration in the U.S.

For the past decade, CO_2 refrigeration systems in the U.S. have been perceived as exceptions to the accepted norms of commercial refrigeration. Mostly championed by a small subset of sustainably minded supermarket operators, CO_2 installations have been deployed often as proofs-of-concept — and more sparingly as a retailer's primary refrigeration strategy. Although the U.S. has seen steady increases in CO_2 adoption in recent years, it still hasn't experienced the industry-wide acceptance taking place in Europe.

But that appears to be changing. The global hydrofluorocarbon (HFC) refrigerant phasedown and subsequent environmental regulations have generated renewed interest in CO_2 refrigeration and set the stage for its likely widespread adoption in the U.S.

Throughout the food retail industry, stakeholders are rethinking their approach to refrigeration and promoting the use of refrigerants with lower global warming potential

(GWP). Among the environmental strategies identified to combat climate change, the greening of commercial and industrial refrigeration equipment has been recognized as an essential tactic of decarbonization plans and corporate sustainability initiatives. Retailers are seeking long-term refrigeration strategies that support:

- Environmental, social and governance (ESG) efforts
- Energy efficiency and emissions reductions targets
- Net zero goals

With zero ozone depletion potential (ODP)and a GWP of 1, the natural refrigerant CO_2 (refrigerant name R-744) has become a proven viable alternative to higher-GWP HFC refrigerants. In addition, the proliferation of CO_2 refrigeration systems around the globe has given equipment manufacturers opportunities to improve compression, controls and valve technologies — simplifying system management and bringing system costs into parity with traditional HFC systems. Let's look more closely at some of trends driving the increased adoption of CO_2 refrigeration in the U.S.

Regulations drive down GWP levels

Global, federal and state regulations are steering the industry away from HFCs and toward lower-GWP alternatives. The Kigali Amendment to the Montreal Protocol — which has been ratified by 129 countries — serves as the regulatory framework supporting a variety of these efforts in the U.S. and abroad.

Per its HFC production and consumption phasedown schedule, the next step will be a 40% reduction in 2024 (compared to the baseline established in 2011–2013). Refrigerant regulations in the U.S. have been constructed to follow this mandate.

AIM Act established federal mandate

The passing of the American Innovation and Manufacturing (AIM) Act in 2020 restored the Environmental Protection Agency's (EPA) authority to enforce HFC mandates and establish sector-based guidelines. As the EPA implements the Kigali Amendment's HFC refrigerant phasedown guidelines and supplies are reduced, the industry can expect an increase in HFC refrigerant prices.

CARB mandates

For many years, the California Air Resources Board (CARB) has led efforts to phase down HFCs in the state of California. Its current 2022 proposal has set 150 GWP as the refrigerant benchmark for its state-wide mandates. Thus, all new refrigeration systems containing more than 50 pounds of refrigerant installed in new facilities will be required to use refrigerants with less than 150 GWP.

Existing facilities will factor in the refrigeration footprint of equipment greater than 50 pounds in a retailer's entire fleet of stores in California, including: existing stores, new construction, retrofits and remodels. Many industry insiders consider what's happening in California as a potential preview of what's to come for the rest of the U.S.

As regulatory targets appear to be driving GWP levels near or below the 150 GWP threshold, many retailers are actively exploring their lower-GWP system options.

Global adoption trends

CO_2 refrigeration has been used widely in Europe for more than a decade. Today, that trend continues with adoption steadily increasing in the U.S. and other countries. Per recent industry data, nearly 46,500 CO_2 transcritical booster systems are currently installed worldwide.

- 900 in the U.S. (1,400 in North America with the inclusion of Canada)
- 40k in the E.U.
- 5k in Japan

Industry estimates show that the E.U. and U.S. have experienced significant growth in CO_2 refrigeration from 2020–2021. In the U.S., Emerson expects CO_2 adoption to increase up to 50% by 2025. This growth trend is expected to continue at a similar trajectory throughout the next decade, with the possibility that the U.S. could potentially mirror E.U. levels of adoption.

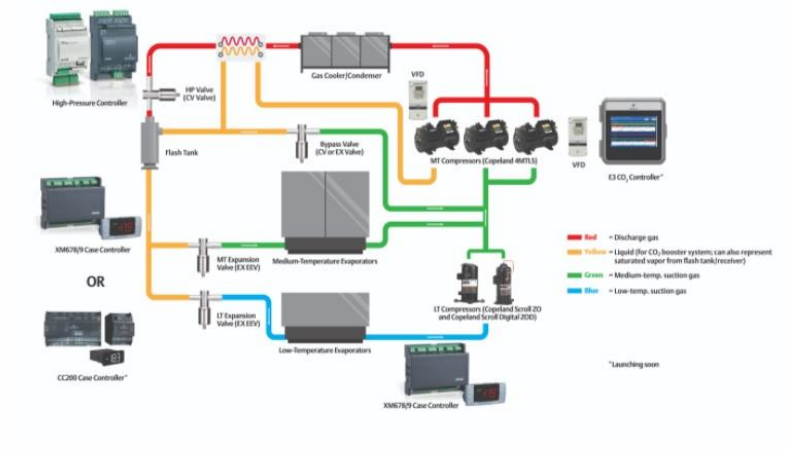
Technological improvements and emerging applications

CO_2 refrigeration technologies are continuously evolving. Thanks to increased global adoption and investments in research and development (R&D), equipment manufacturers continue to refine CO_2 components, overcome known challenges, and simplify system operation.

CO_2's inherent energy efficiency in most climates allows it to deliver direct and indirect emissions reductions, or lower total equivalent warming impact (TEWI). System technologies are evolving to enhance these benefits and mitigate CO_2 refrigerant and system complexities.

Electronic system controllers

To effectively manage CO_2's high pressures and system volatilities, CO_2 transcritical booster systems have benefited greatly from improvements in electronic controls designed to simplify installation, commissioning and system management during standard operation. These types of improvements minimize system complexities, alleviate the burden from technicians, and provide peace of mind to end users.



CO_2 transcritical booster systems (diagram above) continue to be the most widely adopted CO_2 refrigeration systems and are preferred in medium- to large-format food retail stores.

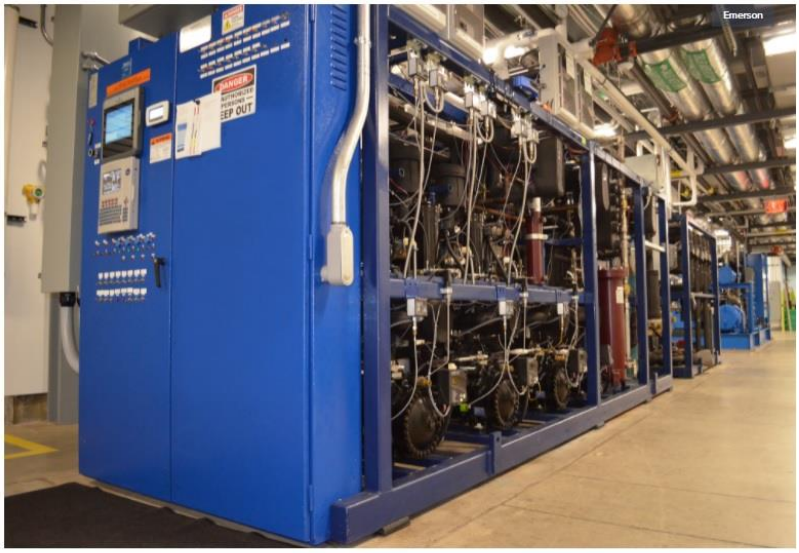
Integrated CO_2 transcritical booster system components

Today, CO_2 transcritical booster systems continue to be the most widely adopted CO_2 refrigeration systems and are preferred in medium- to large-format food retail stores. One key system advantage is that both medium- (MT) and low-temperature (LT) circuits run on R-744. System design requires the seamless integration of all components, including compressors, electronic expansion valves (EEVs), high-pressure valves and an electronic controller.

Warm ambient strategies

CO_2 transcritical booster systems are subject to declining efficiencies in warm ambient climates, but manufacturers have developed a variety of strategies to maintain efficiency levels.

- *Adiabatic gas coolers* — keep the refrigerant below its critical point for as long as possible to maximize system efficiencies
- *Parallel compression* — compresses excess flash gas at higher pressure via a dedicated intermediate stage compressor, resulting in 8–10% annualized efficiency gains
- *Mechanical sub-cooling* — provides increased refrigerant enthalpy
- *Gas ejectors, liquid ejectors* — optimize efficiency
- *Low superheat-of MT evaporators* — delivers year-round efficiency improvements



CO_2 transcritical booster systems are subject to declining efficiencies in warm ambient climates, but manufacturers have developed a variety of strategies to maintain efficiency levels.

Distributed CO_2 condensing units (CDUs)

Operators in the E.U. are beginning to utilize CO_2 CDUs to support distributed refrigeration system architectures. Although this approach is ideal in smaller-format stores, it can also potentially support larger store retrofits by allowing operators to decommission sections of their HFC systems and replace them with CO_2 CDUs.

A distributed CO_2 CDU approach provides a smaller, lighter and simpler alternative to centralized CO_2 systemsby offering true “plug and play” characteristics. One type of CO_2 transcritical scroll compressor recently launched in the E.U. is designed to support distributed CO_2 CDUs. It features dynamic vapor injection (DVI) that eliminates the need for parallel compression, thereby lowering system costs and increasing energy efficiencies. It leverages integrated controls that manage system operation and improve ease of use.

The release of similar CO_2 transcritical scroll compressors are expected to be extended globally over the coming years.

Preparing for a more sustainable future

The increased focus on sustainable refrigeration and ongoing efforts to improve CO_2 equipment and system technologies will position CO_2 for much wider global adoption over the next decade. As the market for CO_2 refrigeration continues to expand, the proliferation of new products is creating economies of scale, which lower the costs and complexities of implementing CO_2 technologies.

Watch for technological enhancements and new product offerings in CO_2 systems, giving end users and contractors the confidence to move forward with this environmentally friendly, natural refrigerant.

To access a full kit about CO_2 in refrigeration, click **here**

Supermarket News Daily newsletter, 17 February 2022, By Andre Patenaude
Image: Supermarket News Daily newsletter website

EUROPE & CENTRAL ASIA

13. Europe Plans New Standard for A3 Flammable Refrigerants in Road Transport and Revision of EN 378

The European Commission (EC) announced plans on February 2 to develop a new standard for the requirements and risk-analysis process for refrigerating systems that use flammable refrigerants for the transport of temperature-sensitive goods by road. The EC said it also intends to revise parts 1, 2 and 3 of the four-part **EN 378**, the European standard for safety and environmental requirements in refrigerating systems and heat pumps, as well as to create a completely new part 5 on safety classification and information about refrigerants.

This was all described in item 21 on natural refrigerants in the annex to the EC's "**2022 annual EU work programme for European standardisation**." The item referred to the **EU F-Gas Regulation (2014)**, which is **under review** this year.

Notably, the item said that the objective of these moves would be "ensuring an easier and bigger uptake of natural refrigerants in the RAC sector, which would reduce the environmental impact of such appliances." The EC added, "this can make EU companies in this sector more competitive."

Hydrocarbon rules in EN 378

EN 378 covers the design, manufacture, construction, installation, operation, maintenance, repair and disposal of refrigerating, air-conditioning and heat-pump systems and appliances. The standard includes rules on hydrocarbons, such as allowing hydrocarbon charges up to 1.5kg (3.3lbs) in commercial display cases if rigorous safety precautions are taken. Every installation using EN 378 charge limits has to have a specific risk assessment for each system location.

This standard has been invoked by U.K. retailer Waitrose, which employs display cases that include between 300g and 1,000g (10.6oz and 2.2lbs) of propylene (R1270) charge per circuit, depending on the size and type of fixture.

The EU also has product-specific standards regulating use of hydrocarbons, including EN 60335-2-89 for commercial cases and EN 60335-2-40 for air-conditioning and heat pumps. The -89 standard is expected to be updated soon to allow higher charge limits of hydrocarbons (up to 500g – 1.1lbs).

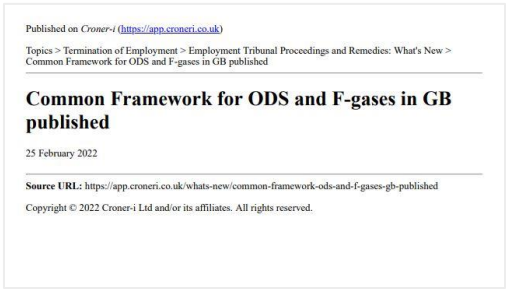
The EC is required to publish an annual EU work program for European standardization. This is to ensure "that EU products and services are competitive worldwide and reflect state-of-the-art safety, security, health, environmental considerations and the achievement of the Sustainable Development Goals," the EC said.

In recent years industry stakeholders, EU-funded projects as well as research institutions have highlighted the obstructing effect outdated standards can exert on the market for flammable natural refrigerants.

Hydrocarbons21, 17 February 2022, By Thomas Trevisan

Image: Headquarter of the European Commission, Berlaymont building in Brussels, Belgium- Hydrocarbons21 website

14. Common Framework for ODS and F-gases in GB published



Published on *Croner-i* (https://app.croneri.co.uk)

Topics > Termination of Employment > Employment Tribunal Proceedings and Remedies: What's New > Common Framework for ODS and F-gases in GB published

Common Framework for ODS and F-gases in GB published

25 February 2022

Source URL: https://app.croneri.co.uk/whats-new/common-framework-ods-and-f-gases-gb-published

The UK and devolved Governments of Scotland, Wales and the Department for Agriculture, Environment and Rural Affairs in Northern Ireland have published a Framework Outline Agreement for the Ozone-Depleting Substances and Fluorinated Greenhouse Gases UK Common Framework.

The UK Ozone-depleting Substances Regulations 2015 provide the execution and enforcement of Regulation 1005/2009 in the UK, and the rules and commitments established through them have been retained in Great Britain since the UK's exit from the EU.

Northern Ireland remains subject to the directly applicable EU ODS and F-gas legislation and continues to operate under the EU ODS and F-gas systems, in accordance with the terms of the Protocol on Ireland/Northern Ireland (the Northern Ireland Protocol).

This **Framework and the concordat** will facilitate UK decision-making, information sharing and cooperation and will ensure that the Parties continue to work together to deliver its international obligations. The parties have agreed to operate single ODS and F-gas systems across GB, subject to the consent and direction of functions by the Scottish and Welsh Ministers. The GB-wide systems cover ODS and F-gas registration, quota, licensing, and reporting arrangements.

Croner-i, 25 February 2022

Image: Croner-i website

FEATURED

OZONE SECRETARIAT

Overview for the meetings of the ozone treaties in 2022

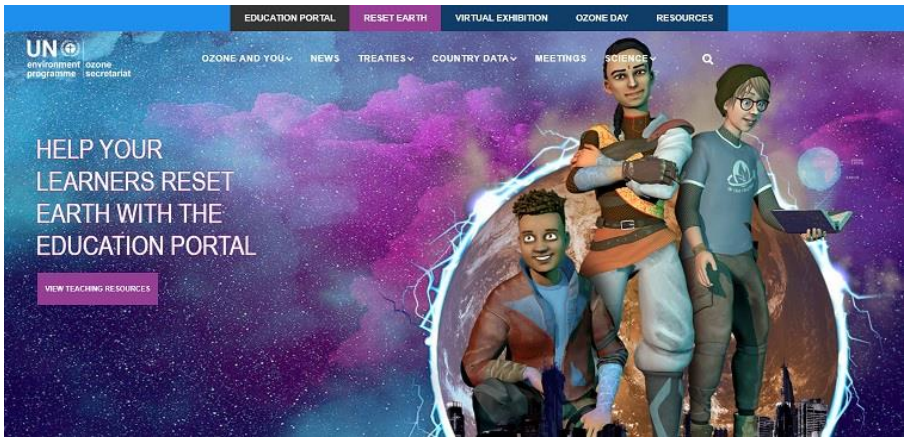
68th IMPCOM, Venue – to be determined, | 09 July 2022
44th OEWG, Venue – to be determined, | 11 - 15 July 2022
69th IMPCOM, Venue – to be determined, | 29 October 2022
33rd MOP Bureau, Venue – to be determined, | 30 October 2022
34th MOP, Venue – to be determined, | 31 October - 04 November 2022

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

Summary of the Combined Twelfth Meeting of the Conference of the Parties to the Vienna Convention for the Protection of the Ozone Layer (part II) and the Thirty-Third Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer: 23-29 October 2021.
The Earth Negotiations Bulletin, 1 November 2021, Vol. 19 No. 157
See also >>> IISD Daily coverage and photos

UNEP Ozone Secretariat launches 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 >>>

THE MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL

- Consultant vacancy announcement (Evaluation of regional networks of National Ozone Officers)
- Evaluation of regional networks of national ozone officers (desk study and terms of reference for the second phase)
- Evaluation of regional networks of national ozone officers (desk study and terms of reference for the second phase): Corrigendum
- Guide for project preparation of Stage I of Kigali HFC implementation plans (KIP) (February 2022)
- Updated guide for the presentation of stage II of HCFC phase-out management plans (February 2022)
- Executive Committee Primer 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

New OzonAction Knowledge Maps tool - The UNEP OzonAction Knowledge Maps tool was developed to provide the National Ozone Units (NOUs) and different UNEP partners with a simple tool to help them access data and information about relevant stakeholders, who are mainly involved in the implementation of programmes and projects under the Montreal Protocol (MP) supported by Multilateral Fund (MLF).

Currently, the first two available knowledge maps are described below:

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, for the training of technicians and supporting the national policies related to the Montreal Protocol.

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.

To develop this tool, UNEP OzonAction collected and reviewed different datasets from multiple sources, and then presented the collected datasets into a common platform and format (mainly in the form of a global map so that data can be geographically displayed). Kindly note that the data and information provided will be updated regularly through the feedback that will be received from NOUs and partners to update and/or add new records. Other maps are currently under development which will include access to other key data and information of importance to the implementation of Montreal Protocol programmes.

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

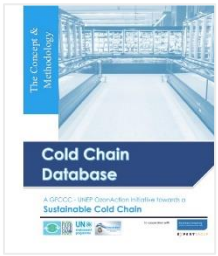
Click **HERE** to download the OzonAction Knowledge Maps tool flyer

Gas Card Tool: Web-based Visual Printable Cards of Refrigerant Gases developed by the UN Environment Programme (UNEP) OzonAction, to provide engineers, workers, and technicians with easily accessible information on substances/ gases that they are working with or handling in the workplace on visual printable cards. **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". The launch also comes in advance of the United Nations Food Systems Summit.

With the support provided by the Montreal Protocol's Multilateral Fund, the Cold Chain Database initiative is currently being piloted in six countries – Bahrain, Bosnia and

Herzegovina, Maldives, North Macedonia, Paraguay, and Senegal. From the pilot data gathering initiatives, a model is being developed that will allow the projection of benefits of cold chain expansion.

GFCCC is an independent not-for-profit industry organisation that seeks to simultaneously reduce food waste, and related greenhouse gas emissions in the processing, transportation, storage, and retail display of cold food by expanding and improving access to energy efficient low-global warming potential technology. The Cold Chain Database concept, methodology and data collection questionnaires are offered to interested countries and partners to help in assessing local cold chain capacities and designing respective action plans and policies.

> ***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

United Nations Environment Programme (UNEP), OzonAction

Image: OzonAction

HCFC Quota and Licence Tracker - **UNEP OzonAction launches 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 – Update
"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)

The new and updated UNEP OzonAction ***GWP-ODP Calculator*** application will help you to convert between values in metric tonnes, ozone depleting potential (ODP) tonnes and CO_2-equivalent tonnes of substances controlled by the Montreal Protocol and their alternatives.

This application, available at no cost, is particularly useful for National Ozone Officers to assist with understanding and calculating quantities of controlled substances, both pure substances and mixtures, for quota assignment, reporting requirements, etc. Other stakeholders interested in ODP and global warming potential (GWP) values of controlled substances and their alternatives will also find this tool useful.
Operation of the application is very simple — just select a substance from the dropdown list and enter the known value in the appropriate field; the calculator will automatically

perform the conversion between metric tonnes, ODP tonnes and/or CO_2-equivalent tonnes and display the corresponding converted values. The ODP, GWP and information about the substance is provided. For mixtures, the components of the mixture and their relative proportions (metric, ODP, CO_2- equivalent tonnes) are also calculated.

The updated ***GWP-ODP Calculator*** application now includes a new Kigali Amendment mode. The app can now be used in two different modes: the regular "Actual Values" mode and the "Kigali Amendment" mode. In the Kigali Amendment mode, the GWP values provided are those specified in the Kigali Amendment to the Montreal Protocol, i.e. GWP values are only assigned to controlled HFCs. In this mode the GWP values used to calculate the refrigerant blends/mixtures only include GWP contributions from components that are controlled HFCs. The user can effortlessly switch between modes.

The OzonAction GWP-ODP Calculator uses standard ODP values and GWP values as specified in the text of the Montreal Protocol to make the conversions. Other ODP and GWP values from the recent reports of the Montreal Protocol Technology and Economic Assessment Panel and Scientific Assessment Panel as well as the Intergovernmental Panel on Climate Change (IPCC) are used when appropriate, with references to sources of all values used. The app includes new refrigerant mixtures (with ASHRAE- approved refrigerant designations).

This application is designed primarily for use by Montreal Protocol National Ozone Units and other related stakeholders. The application was produced by UN Environment Programme (UNEP) OzonAction as a tool principally for developing countries to assist them in meeting their reporting and other commitments under the Protocol and is part of the OzonAction work programme under the Multilateral Fund for the Implementation of the Montreal Protocol.

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** for more information

OzonAction WhatGas? Updated

New features:
- An updated more user-friendly interface
- Multilingual interface: English, French and Spanish
- HFCs and HFC containing mixtures
- Latest updated ozone depleting potential and global warming potential values from the recent reports from the Montreal Protocol technology and scientific expert panels as well as the Intergovernmental Panel on Climate Change; as well as the standard ODP and GWP values as specified in the text of the Montreal Protocol
- References to sources of all values used
- New refrigerant mixtures (with ASHRAE approved refrigerant designations)
- Values for 'actual GWP' and 'Kigali Amendment context' GWP for pure substances and mixtures (i.e. only including GWP values/components assigned to controlled hydrofluorocarbons - HFCs).

The WhatGas? application is an information and identification tool for refrigerant gases: ozone depleting substances (ODS), HFCs and other alternatives. It is intended to provide a number of 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. If the user requires additional information or assistance in identifying a refrigerant gas they are inspecting or that is described in the relevant paperwork, this can be easily obtained by consulting the application.

Using the application:

If you already have the application installed on your device, be sure to update to benefit from the new features.

Smartphone Application: Just search for "WhatGas?" or UNEP in the Google Play store or use the QR code – free to download!

Desktop Application: WhatGas? is also available online on the OzonAction website

For more information: Watch the new short introductory tutorial video on WhatGas? available on YouTube

See/download the WhatGas? flyer

Over 10,000 installations on Android and iOS devices to date!

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.

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.

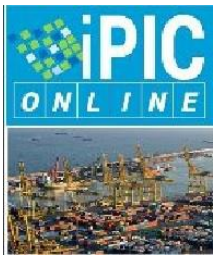
The purpose is to provide an update on ASHRAE standards for refrigerants and to introduce the new refrigerants that have been awarded an “R” number (or ASHRAE designation) over the last few years and which have been introduced into the international market.

Read/download the **factsheet**

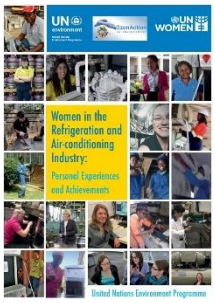
The factsheet, as well as more information on ASHRAE-UNEP joint activities and tools, is also available on the **ASHRAE UNEP Portal**.

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.



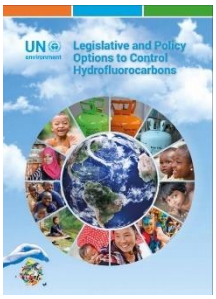
[Women in the refrigeration and air-conditioning industry: Personal experiences and achievements].The United Nations Environment Programme's (UNEP), OzonAction, in cooperation with UN Women, has compiled this booklet to raise awareness of the opportunities available to women and to highlight the particular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

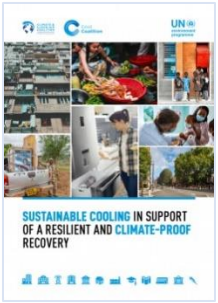
PUBLICATIONS

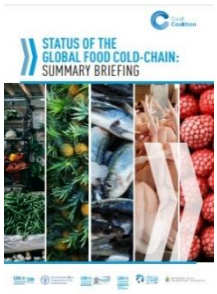
Legislative and Policy Options to Control Hydrofluorocarbons In order to follow and facilitate the HFC phase-down schedules contained in the Kigali Amendment, the Parties, including both developed and developing countries, will have to implement certain measures. This booklet contains a recommended set 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. 1-2022
(in Italian).

Sustainable Cooling in support of a Resilient and Climate Proof Recovery, Report by the Climate and Clean Air Coalition (CCAC), 2021



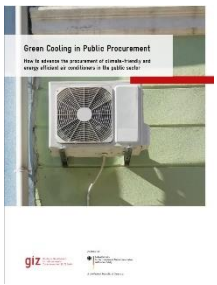


Status of the Global Food Cold-Chain: Summary Briefing-Food Cold Chain Food saved is as important as food produced. The UNEP-led Cool Coalition in collaboration with the Climate & Clean Air Coalition (CCAC), United Nations Environment Programme (UNEP), United Nations Food and Agriculture Organization (FAO), OzonAction and the Ozone Secretariat, with the support of the Italian Government, are producing a status report on the global food cold-chain, which will include case studies to show the current state and development across areas such as technologies, design approaches, finance and business models, policy, and planning. This brief is a short summary of the full report that will be published in December 2021. The aim is to help better identify and accelerate solutions to simultaneously feed the world, support smallholder and marginal farmers, and protect our environment.
Cool Coalition Secretariat, September 2021

Leaks, maintenance and emissions: Refrigeration and air conditioning equipment report details common faults identified in both residential and commercial refrigeration and air conditioning equipment. The report also lists the impacts of these faults and how routine maintenance of the equipment has the potential to significantly reduce electricity use, refrigerant leaks, and emissions.

The research was supported by an extensive survey of international and domestic literature included as Appendix B to the report.

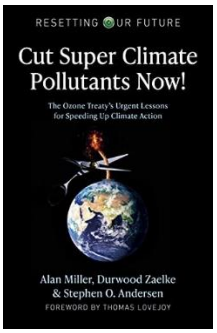
Australian Government, Department of Agriculture, Water and the Environment, Expert Group, 2021



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.



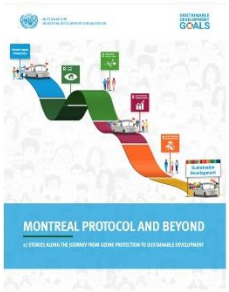
NEW publication by Stellar: E-Book on Process Safety Management (PSM) Training for Ammonia Refrigeration - a new e-book about the critical elements of a process safety management (PSM) training program for facilities operating an ammonia refrigeration system.

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

NEW publication by UNIDO: **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**



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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Request a PDF of the current issue

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The United Nations Environment (UNEP), Environmental rights and governance division, OzonAction, provides OzoNews as a free service for internal, non-commercial use by members of the Montreal Protocol community. Since its inception in January 2000, the goal of OzoNews is to provide current news relating to ozone depletion and the implementation of the Montreal Protocol, to stimulate discussion and promote cooperation in support of compliance with the Montreal Protocol. With the exception of items written by UNEP and occasional contributions solicited from other organizations, the news is sourced from on-line newspapers, journals, and websites.

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

UNEP, OzonAction, · 1 rue Miollis · Bat. VII · Paris 75015 · France