

# OzoNews

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

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## GLOBAL

### 1. Kigali Amendment latest ratification

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

**Gambia, 5 May 2021**  
**Bosnia and Herzegovina, 26 May 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*

## ***World Ozone Day 2021***



***Montreal Protocol - Keeping us,  
our food and vaccines cool***

### **2. World Ozone Day 2021 celebrating the Montreal Protocol that is: Keeping us, our food and vaccines cool**

The Montreal Protocol started life as a global agreement to protect the ozone layer, a job it has done well, making it one of the most successful environmental agreements to date. A united global effort to phase out ozone-depleting substances means that, today, the hole in the ozone layer is healing, in turn protecting human health, economies and ecosystems. But, as this year's World Ozone Day seeks to highlight, the Montreal Protocol does so much more – such as slowing climate change and helping to boost energy efficiency in the cooling sector, which contributes to food security.

Many ozone-depleting substances warm the climate, so the agreement has already slowed climate change. The Kigali Amendment to the Montreal Protocol is set to deliver even stronger climate benefits. Under the Amendment, nations have committed to phase down hydrofluorocarbons (HFCs). While HFCs don't damage the ozone layer, these coolants are

powerful greenhouse gases. Reducing their use, as agreed, is expected to avoid up to 0.4°C of global temperature rise by the end of the century, while continuing to protect the ozone layer.

The Kigali Amendment also provides an opportunity for improved energy efficiency in the cooling sector. New innovation replacing HFCs offers an opportunity to redesign air conditioning and refrigeration to use less power, allowing expansion of comfort cooling and cold chain efficiencies without increasing climate impacts. The combination of reducing HFC consumption and improved cold chain efficiencies, particularly in developing economies, will also combat food loss.

Around one third of all food produced globally for human consumption is either lost or wasted each year, largely due to a lack of access to cold chains. Food loss and waste amounts to billions of US dollars a year; not only wasting precious resources such as land, water and energy, but also generating an estimated 8 per cent of total greenhouse gases per year globally.

By developing cold chain solutions that are more efficient, more climate friendly, and cheaper to buy and operate, cold chains will become more effective and widely available. This will provide producers such as farmers and pharmaceutical providers with access to pre-cooling, refrigerated storage and refrigerated transport – ensuring products such as food and vaccines reach people in safe and good condition.

On this World Ozone Day, we celebrate and acknowledge the Montreal Protocol and its Kigali Amendment in its wider efforts to keep us, our food, and vaccines cool!

[The United Nations Environment Programme, Ozone Secretariat, June 2021](#)

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### 3. Montreal Parties agree on replenishing funds for ozone action



Parties to the ozone agreement gathered for one-day meeting to decide on replenishing funds for implementing the agreement during 2021, and the first part of an open-ended working group meeting focused on guidance to the Technology and Economic Assessment Panel (TEAP) Replenishment Task Force. The TEAP is an advisory body that provides technical information to support parties' decision-making.

The extraordinary meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer (ExMOP 4) convened online on 21 May 2021 to ensure donor countries could make payments to the Multilateral Fund for Implementation of the

Montreal Protocol (MLF) within the fiscal year. The MLF assists developing countries with implementation of their obligations under the Protocol. The Earth Negotiations Bulletin reports that “discussions were swift, with many parties emphasizing the importance of funding for implementation of the Montreal Protocol, and parties adopted a decision on this issue and closed the meeting within 90 minutes.”

Delegates then held a two-day series of discussions on scope and content of guidance to the TEAP Replenishment Task Force on further work on its replenishment report. According to ENB, this report will provide important information to parties when they undertake negotiations on replenishment of the Multilateral Fund later in 2021. Discussions at OEWG 43 sought to determine what information would best serve parties as they negotiate and how much work could realistically be carried out by the TEAP members ahead of these negotiations. They needed to determine whether the report needed to be updated or supplemented with a new report.

On this item, reaching agreement was more challenging: “Despite efforts to achieve a compromise on possible elements of guidance to the TEAP, parties were only able to agree on an updated report, rather than a more comprehensive supplemental report.”

The second part of OEWG 43 is scheduled for July 2021, when delegates will discuss two technical issues: energy efficiency and unexpected emissions of the ozone-depleting substance CFC-11.

See also >>> [ENB meeting summary](#), [SDG Knowledge Hub story on continuing MLF operations](#)

Related events:

- [43<sup>rd</sup> Meeting of the Open-ended Working Group of the Parties to the Montreal Protocol \(OEWG43\): Replenishment](#)
- [Fourth Extraordinary Meeting of the Parties to the Montreal Protocol \(ExMOP4\)](#)

[IISD, 1 June 2021](#)

*Image: UN Photo/Mark Garten -IISD website*

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#### 4. World Refrigeration Day announces theme of 2021 campaign

### **“Cooling Champions: Cool Careers for a Better World”**

World Refrigeration Day celebrates the people and technologies responsible for creating and maintaining the world we live in, a world dependent upon temperature-controlled environments. Centered around June 26, the event is supported globally by industry, professional groups, scientific and engineering

associations, as well as by governments and individuals.

The WRD 21 campaign will focus on careers in the refrigeration, air-conditioning and heat pumps industry and is titled **“Cooling Champions: Cool Careers for a Better World”**. The goal of the campaign is to inspire students and young professionals – for both men and women – in all countries, encouraging them to meet the challenges faced in their communities.

Following successful campaigns in the last two years, the WRD Secretariat will continue partnering with UNEP OzonAction in the WRD 21 campaign to attract a new generation of Cooling Champions. The campaign includes other partners representing the industry and professionals around the world. The full list of partners and the campaign program will be announced in the coming weeks.

Refrigeration is at the very heart of modern life. More than 15 million people are employed worldwide in the refrigeration sector. The total number of refrigeration, air-conditioning and heat-pump systems in operation worldwide is around 5 billion. Those systems provide the conditions we require for health, comfort, worker productivity, manufacturing, and essential environments for food, pharmaceuticals, and digital data. Dedicated professionals design, build, maintain, and regulate them as well as educate a new generation of practitioners.

Opportunities within the industry abound for young people with a wide range of career aspirations. Advanced cooling technologies need to be implemented in order to expand life required environmental conditions while meeting sustainability requirements of international climate and ozone protection accords.

A new generation of cooling champions – engineers, technicians, researchers, educators, policy experts and executives – are needed to create controlled environments modern life requires. The benefits of reaching into a wide diversity of communities for promising talent will be a high campaign priority.

To support the Cooling Champions Campaign contact: [info@worldrefrigerationday.org](mailto:info@worldrefrigerationday.org)

[World Refrigeration Day 26<sup>th</sup> June around the World](#)

Image: WRD

## 5. Variations in methyl bromide concentration with distance and time during quarantine fumigation

### Abstract

Methyl bromide (MB) is a highly toxic and ozone-depleting substance and should be replaced. Worker exposure to high MB concentrations during fumigation has been previously reported. However, variations in MB concentration as a function of distance from fumigated objects or of time after degassing have not been reported so far.

In this study, air samples were collected at various distances from fumigated objects (oranges, wood in containers, and wood in tarpaulin) during injection and degassing and analyzed via gas chromatography according to the Occupational Safety and Health Agency method.

In addition, MB concentrations were directly measured over time using a gas detector during degassing. Non-linear regression analysis of the logarithmically transformed data indicated a clear decrease in MB concentration with distance as well as time. Non-linear regression models were constructed to describe the decrease in MB concentration with distance from the objects and with time during degassing ( $P < 0.05$  for all models).

The results of this study could aid in establishing appropriate safety guidelines, and hence, in preventing risks related to MB exposure.

**Authors:** Min-Goo Park, Young-Seoub Hong, Chung Gyoo Park, Dong-Chul Gu & Hyoung-ho Mo

[Environmental Monitoring and Assessment](#), volume 193, Article number: 397 (2021)

Image: Environmental Monitoring and Assessment website

Published: 08 June 2021

Variations in methyl bromide concentration with distance and time during quarantine fumigation

Min-Goo Park, Young-Seoub Hong, Chung Gyoo Park, Dong-Chul Gu & Hyoung-ho Mo<sup>✉</sup>

[Environmental Monitoring and Assessment](#) 193, Article number: 397 (2021) | [Cite this article](#)

22 Accesses | Metrics

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AFRICA

## 6. Nigeria Federal Government inaugurates project steering committee for Stage II of HPMP

The federal government, Tuesday, inaugurated the Project Steering Committee for Stage II of the Hydrochlorofluorocarbon Phase-Out Management Plan, HPMP.



Minister of Environment, Dr. Muhammad Abubakar, who inaugurated the committee, in Abuja, explained that it will among other things, be responsible for advising on actions needed to ensure that the project achieves the desired results.

He further explained that the stage II HPMP which was a project under the Montreal Protocol on Substances that Deplete the Ozone Layer, "is a follow up to stage I, which the Ministry successfully implemented from 2010- 2018, in the Foam, Refrigeration & Air conditioning sectors."

"The specific responsibilities of the Project Steering Committee include: Address project issues as raised by the National Ozone Office of the Ministry Provide guidance on new project risks, and agree on possible mitigation and management actions to address specific risks; ensure coordination with various government agencies and their participation in project activities, among others," he explained.

According to him, "HPMP is a project under the Montreal Protocol on Substances that Deplete the Ozone Layer, designed to phase out the use of HCFCs in all the relevant industrial sectors, in order to continue to prevent the depletion of the ozone layer and save mankind from the deleterious effects of this global issue."

He recalled that the implementation of the HPMP Stage 1 project, successfully upgraded a System House at vitapur Nig. Ltd, for the formulation of Methyl formate-based pre-blended polyols as an alternative to Ozone Depleting Hydrochlorofluorocarbon (HCFC)-I41b in the manufacture of rigid polyurethane foam.

He added that during stage 1, a Pilot Hydrocarbon Plant, for the production of high-grade Hydrocarbon Refrigerants was established to be used as alternative non-ozone depleting refrigerants in the refrigeration and air conditioning servicing sector.

Hear him: "The project was commissioned by my humble self in September 2020. The System House which is one or two Such in Africa, the other being in South Africa will provide availability of Ozone-friendly and Low Global warming Potential blowing agents in the production of rigid foam, generate foreign exchange for the country from the export of Methyl formate and foreign exchange savings from local production.

"The plant will also assist to building local capacity in the formulation of Methyl formate-based systems and consequently generate employment and wealth. Also, the Methyl formate systems Will serve as a source of raw material to the 70 ice-making machine manufacturers, which my Ministry in collaboration with UNIDO Supported with Low-

Pressure Foaming Machines for the production of thermal insulation in the manufacture of ice-making machines.”

Abubakar noted that the completion of stage 1, achieved the target of a 10 percent reduction in the use of HCFCs, in line with the phase-out schedule for developing countries, as set by the Montreal Protocol.

“We are working out ways to upscale the plant to produce in commercial quantity and serve as a hub for the production and supply of high-grade Hydrocarbon Refrigerants in Nigeria and also for the West African Region.

He said: “The project will complement the HPMP Stage I project taking account of difficulties encountered, experience gained, and lessons learned in the implementation of stage 1.”

“The strategy for implementing the second stage was determined taking into account the following factors: The levels of reductions in Ozone Depleting refrigerants imported into the country,” he explained.

The committee, according to the Minister, has the Director, Pollution Control and Environmental Health in the Federal Ministry of Environment, as chairman, representatives from UNDP, UNIDO, Nigerian Customs Service, Federal Ministry of Education, Small & Medium Enterprises Development Agency of Nigeria (SMEDAN), Representative from HPMP 2, Nigerian Association of Refrigerators and Air-conditioning Practitioners (NARAP) and Refrigeration Training Centers as its members.

**Vanguard News Nigeria, 1 June 2021, By Joseph Erunke & Alice Ekpang**

*Image: Vanguard News Agency website*

## ASIA AND THE PACIFIC



### 7. South Asia - Southeast Asia Networks brainstorm HFC Policies



Bangkok, Thailand, 4 May 2021 – Most countries in the Asia and Pacific region are in Article 5 Group 1, as per the Kigali Amendment, and need to freeze hydrofluorocarbon (HFC) consumption at baseline level starting from 2024. Moreover, the HFC phase-down will overlap with the ongoing HCFC (hydrochlorofluorocarbon) phase-out for most Article 5 countries. To assist the South Asia (SA) and Southeast Asia (SEA) Networks of National Ozone Officers to review policy options for an HFC phase-down and discuss which policies are implementable and suitable for individual countries, a virtual meeting was convened on 28 April 2021 by the UN Environment Programme's (UNEP) OzonAction Compliance Assistance Programme (CAP), Asia and the Pacific Office.

A total of 70 participants (32 female and 38 male) from 21 SA-SEA countries took part in the meeting. The participants discussed HFC policies that can be either integrated into or strengthened in their existing national policy or additionally introduced, such as strengthening the monitoring, reporting, verification and enforcement (MRVE) of the licensing system, controlling the growth of HFCs, preventing emission, building the capacity of various stakeholders, raising public awareness and synergizing with the national cooling action plan, Sustainable Development Goals, energy efficiency programmes, occupational safety standards and waste management etc. Countries were urged to consider the following points when developing HFC phase-down policies: (i) inter-ministry cooperation to supplement the work that is beyond the mandate of National Ozone Units (NOUs); (ii) balance of the concurrent obligations of HCFC phaseout and HFC freeze; and (iii) the trends of digital transformation for the management of activities. UNEP's publication, "Legislative and Policy options to control Hydrofluorocarbons", was used as a reference to facilitate the discussion of the pros and cons of different policy options in the country context.

Break-out groups were held following the plenary session to discuss the possibility and applicability of various HFC policies. The participants shared views on HFC policy options from their national perspective based on domestic consultation under the Enabling Activities projects for HFC phase-down and experience in the management of the HCFC phaseout.

Ms. Justina Belo of Timor Leste's NOU said that "We are strengthening our capacity of monitoring, reporting, verification and enforcement (MRVE) as one of our main implementing policies. Soon, the HFC licensing system will be integrated into the National Single Window System in Timor Leste to further strengthen the data monitoring and data reconciliation which will be supplemented with mandatory reporting by importers. The Joint Domestic Refrigerant Market Inspection program that has been established for HCFCs can be further extended to HFCs. Today, we have learned policy options from presentations and discussions in the meeting and we are glad to learn that Timor Leste is on the right track for HFC phase-down policy for MRVE system."

Mr. Sugath Dharmakeerthi, National Ozone Officer of Sri Lanka stated that "Sri Lanka agrees that the certification system for Refrigeration and Air Conditioning (RAC) and Mobile Air Conditioning (MAC) technicians are an important policy, and the country is on track to have the RAC and MAC certification system that incorporates Good Servicing Practices in order to support a safe and high-quality RAC-MAC servicing sector. Based on our experience of integration of the good servicing practices in the certification system, we found that it is a long process and requires a lot of clear discussion with relevant

stakeholders. However, despite the challenges, Sri Lanka maintains its commitment to making it happen.”

This thematic meeting is the second meeting in a series of thematic workshops that UNEP CAP plans to conduct in the region following a survey of Network members conducted in November 2020, and in conjunction with UNEP’s approved 2021 Work Plan.

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

*Image by Shutterstock*

## 8. DENR moving toward 'green' cooling systems to protect ozone layer

The [Philippines] Department of Environment and Natural Resources (DENR) is battling for the creation of policies that favor the use of “low carbon, energy efficient” cold chain systems in a bid to totally get rid of hydrochlorofluorocarbon (HCFC) use.

HCFC is a substance that worsens global warming by eating up the earth’s ozone layer.

The vehicle for such goal by the DENR is the Global Partnership for Improving the Food Cold Chain in the Philippines (GPI-FCCP)—a \$27.5-million endeavor.

Through GPI-FCCP, the agency is pushing for refrigeration systems in the food industry that will no longer use ODS-HCFC. ODS stands for “ozone depleting substances.” Stringent policies are important in providing a stable environment for investors in “green” cooling technologies, the DENR said.

Cold chain covers every produce that needs cooling from the “field to the fork”; this involves transport, storage, transformation, and packaging. “Policies will involve national standards for flammable refrigerants and revision of energy efficiency standards,” the DENR said in a statement Sunday, June 6. [...]

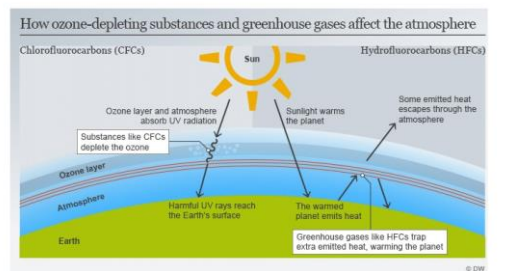
[Manila Bulletin, 6 June 2021, By Ellson Quismorio](#)

*Image: Manila Bulletin website*

## DENR moving toward 'green' cooling systems to protect ozone layer

Published June 6, 2021, 11:25 PM  
by Ellson Quismorio

The Department of Environment and Natural Resources (DENR) is battling for the creation of policies that favor the use of “low carbon, energy efficient” cold chain systems in a bid to totally get rid of hydrochlorofluorocarbon (HCFC) use.



## NORTH AMERICA

### 9. Washington State climate bill will curb HFCs

Bill is modeled on HFC regulations passed in California.



CLIMATE BILL: Washington State Governor Jay Inslee recently signed a package of climate bills including HB 1050, a bill to regulate HFCs. (Courtesy of the Office of the Governor)

Washington State Governor Jay Inslee recently signed a package of climate bills including HB 1050, a bill to regulate HFCs. Sponsored by Rep. Joe Fitzgibbon, the bill sets a maximum GWP threshold and applies strict regulations for HFCs. The legislature first regulated HFCs in 2019.

“There are safer alternatives to these chemicals. Since we first adopted our standards in 2019, we have seen manufacturers step up to the plate with alternatives, states across the country adopting our legislation, and the U.S. Congress taking bipartisan action to accelerate the transition away from these chemicals,” said Fitzgibbon.

The U.S. Congress passed a bill in December of 2020 to require an 85% economy-wide phasedown of the HFC refrigerant supply over the next 15 years. This will avoid the equivalent of over 4.7 billion metric tons of CO<sub>2</sub> by 2050.

“Washington state has cemented its leadership role on HFCs with this bill, which calls for transitioning new cooling systems to more climate-friendly alternatives and makes significant strides toward improving management and disposal of refrigerants,” said Christina Starr, senior policy analyst at the Environmental Investigation Agency. “States

have an essential role in advancing U.S. climate action by adopting laws like HB 1050, which supports ambitious federal implementation of the HFC phase down nationwide.”

The reduction called for in HB 1050 is expected to reduce the climate impact of refrigerants used in air conditioners by roughly 70% and in commercial refrigeration systems by around 90%. The law will ban the use of HFCs with a GWP of over 750 in all stationary air conditioning systems by 2026, similar to regulations recently approved by the California Air Resources Board. The bill also directs the Department of Ecology to set up a refrigerant management program to safely manage and dispose of HFCs going forward.

According to AHRI, the bill adds a provision that the specified deadlines would only apply if the state building code council adopts ASHRAE and UL safety standards (ASHRAE 15, 15.2 and 34, and UL standard UL 60335-2-40 edition 4) into the state building code before January 1, 2023.

“We are very pleased to have worked with Representative Fitzgibbon on legislation that provides sufficient planning time and the necessary tools not only to enable the use of low GWP refrigerants, but also to align with the national transition under the American Innovation and Manufacturing (AIM) Act mandate,” said Helen Walter-Terrinoni, vice president of regulatory affairs for AHRI.

“We’ve got a heck of a job to do in the years to come. Our climate commitment, made by our legislature in 2020, is to cut climate pollution by over 50% in the next nine years, on our pathway to net-zero climate pollution by 2050. It won’t be easy, but these bills go a long ways to getting us there,” said Inslee.

The new law can be found [here](#)

[The ACHR news, 2 June 2021](#)

*Image: Courtesy of the Washington State Governor office*

## EUROPE & CENTRAL ASIA

### 10. Environmental impact of HFO refrigerants & alternatives for the future

Michael Kauffeld – a refrigeration technology expert & Mihaela Dudita – a chemist – assess the environmental impact of HFO refrigerants & present environmental benign alternatives for the future

Despite the EU F-Gas Regulation (No. 517/2014) (or precisely because of it), refrigeration (1) system operators and manufacturers are still faced with the question of which refrigerants should be used today and in the future. Synthetic HFO refrigerants, so-called “low-GWP” refrigerants, are offered by the chemical industry as HFC substitutes. Based on recent studies by American, Australian, British, German and Swiss scientists, the authors

analyse the current situation of the refrigerant market and assess the refrigerants that will still be economically viable and permissible in the future, while at the same time being environmentally benign.

Due to their ozone depletion potential (ODP), fully halogenated chlorofluorocarbons (CFCs) and partially halogenated CFCs (hydrochlorofluorocarbons, abbreviation HCFCs) have not been permitted in new installations in the EU for more than twenty years thanks to the Montreal Protocol and corresponding national regulations. They release reactive chlorine in the upper atmosphere, causing degradation of and holes in the ozone layer. The HFCs (hydrofluorocarbons) which contain no chlorine, offered by the chemical industry as substitutes, are now regulated internationally because of their high global warming potential (GWP) (2) by the Kigali Amendment to the Montreal Protocol and within the EU by the F-Gas Regulation.

Both the Kigali Amendment and EU F-Gas regulation prescribe a phase-down of HFCs, which in the EU is well underway. Currently, only 45% of the CO<sub>2</sub>-equivalent quantity from 2015 may be placed on the market in the EU. Unfortunately, there are extensive illegal HFC imports into the EU. According to the EFCTC (European Fluorocarbons Technical Committee), there were up to 73 Mt CO<sub>2</sub>-equivalent HFC black imports in 2018 and 2019.

HFOs: Hydrofluoroolefins

HFOs (Hydrofluoroolefins) are currently being promoted as low-GWP refrigerants by the chemical industry and various refrigeration and air conditioning system manufacturers. HFOs are composed of the same atoms like HFCs: carbon (C), hydrogen (H) and fluorine (F), but are unsaturated organic compounds – hence the suffix “olefin”. Currently marketed HFOs are based on alkenes like propene (e.g. HFO-1234yf or HFO-1234ze) and sometimes butene (e.g. HFO[1]1336mzz) or ethene (HFO-1132a). Like their hydrocarbon parent, they have a double bond between two carbon atoms. This double bond makes the molecules less stable and leads to fast decomposition in the atmosphere – within a few days instead of years to decades for HFCs. When HFOs decompose in the atmosphere, trifluoroacetic acid (TFA(A)) is formed, which also remains in the atmosphere for several days (Holland et al., 2021). The trifluoroacetic acid then forms trifluoroacetate (TFA), a salt of trifluoroacetic acid, in water and on the ground.

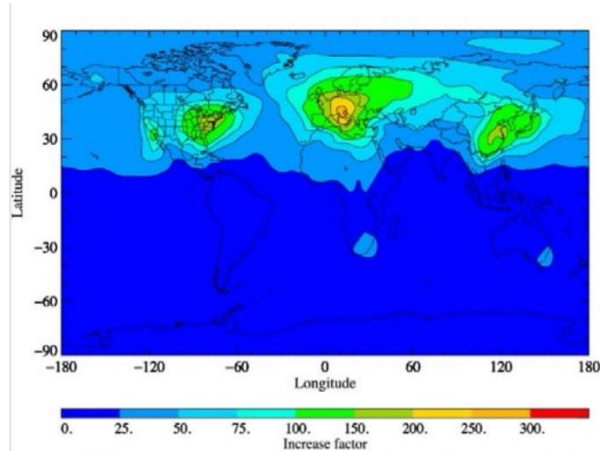


Figure. 1: Predicted TFA increase in the troposphere (the lowest 8 km of the atmosphere) with annual HFC-134a emissions of 210,000 tonnes per year and future HFO-1234yf emissions at the same level if HFC-134a is completely replaced by HFO-1234yf (Holland et al., 2021). Even higher HFO-1234yf emissions are predicted for the future by Holland et al. (2021). Reprinted with permission from ACS Earth & Space Chemistry. Copyright 2021 American Chemical Society.

Due to its high polarity and low degradability, it is difficult to remove TFA from drinking water (ICPR 2019). HFCs also produce trifluoroacetic acid when degraded in the atmosphere, but at a much slower rate and thus less locally and to a much lesser extent (Luecken et al., 2010). HFO-1234yf causes about five times more TFA than HFC-134a (Luecken et al., 2010), i.e. HFO-1234yf transforms 100% into TFA (Behringer et al., 2021). Unfortunately, natural degradation processes cannot compensate for the increase in TFA caused by HFO emissions (Holland et al., 2021).

Therefore, according to simulations by Holland et al. (2021), the complete replacement of HFC-134a by HFO-1234yf leads to 33 times as much TFA worldwide in the lower approx. 8 km of the atmosphere (troposphere). However, due to the rapid decay of HFO-1234yf in the atmosphere, the increase in TFA varies greatly from region to region and is significantly higher, especially in areas with many vehicle air conditioning systems, see Figure 1. In Central Europe, up to 250-fold increases are predicted (Holland et al., 2021). This is – to our knowledge – the first study predicting such high increases in regional TFA depositions. If the findings can be verified, it would most likely mean the end of widespread use of HFOs.

Rainwater deposition measurements of TFA at eight different sampling sites of the German Meteorological Service (DWD) systematically distributed over Germany (Behringer et al., 2021) reveal a 4-fold higher TFA deposition during the actual measurement period from 2018 to 2020 compared to 1995/1996. Behringer et al. (2021) conclude that “the trifluoroacetate concentrations in rainwater determined in the measurement program are significantly higher than previously reported in the relevant literature” thereby supporting the findings of Holland et al. (2021) that there will be a much higher increase in TFA deposition in central Europe as previously anticipated. TFA is degraded in the atmosphere within approximately four months (Holland, et al, 2021). However, by far the largest part of the TFA formed in the air from HFO is already washed out of the atmosphere beforehand by rain, fog, or snow, which reduces the residence time of TFA in the atmosphere to five to nine days (Holland et al., 2021).

A not inconsiderable part of the washed-out TFA accumulates in terminal water bodies and eventually ends up in groundwater at some point. TFA is very stable in water and not particularly healthy for some aquatic organisms. It cannot be removed from water with the purification processes used in today's drinking water treatment (ICPR 2019). Due to the longevity of TFA in the environment (up to 30 years), Behringer et al. (2021) propose that any HFO regulation will come into force too late once the negative consequences of an increased amount of TFA in rainwater becomes evident.

Besides the HFO-TFA issue, which has been discussed for some years and which – especially in the case of HFO-1234yf – seems to become more severe than previously proposed, another issue regarding HFOs is just popping up: HFO-1234ze might form HFC-23 as one of its secondary atmospheric breakdown products (Campbell et al., 2021). HFC-23 is a very potent greenhouse gas with a GWP100 of 14,800. Campbell et al. (2021) suggest that the secondary GWP of HFO1234ze would then be in the range of  $1,400 \pm 700$  considering the amount of HFC-23 which may form from HFO-1234ze in the atmosphere. An interesting new aspect and definitely not in favour of HFOs.

Using CFCs for more than sixty years as refrigerants, aerosols, foam blowing agents, etc., the ozone layer in the stratosphere has been damaged; with HFCs in the last 30 years or so, the atmosphere below the ozone layer has been heated, and now with the next generation of synthetic refrigerants – HFOs, the lowest layer of the atmosphere and the waters at the Earth's surface are potentially being damaged. Bravo! We have slowly moved from an altitude of about 20 km (ozone layer) to the surface of the earth. The misguided path of refrigerants that are foreign to the environment should, therefore, be ended as soon as possible.

### **Alternatives**

An analysis conducted by Mark McLinden (2017) and his colleagues at NIST and the Catholic University of America using the PubChem database – a listing of more than 60 million chemical compounds – found that there are no fundamentally new classes of chemicals for use in vapour compression refrigeration systems (McLinden and Huber, 2020). McLinden and Huber (2020) conclude that HFOs are the last generation of refrigerants. More substances that would be suitable as refrigerants are not available from chemistry. If HFOs have to be phased out for one reason or another, we will have to fall back on first generation refrigerants.

A hundred years ago – due to insufficient development of chemical engineering – only substances that also occur in nature were used as refrigerants, such as ammonia, CO<sub>2</sub> and hydrocarbons. These refrigerants are, therefore, often referred to as natural refrigerants, although they are usually also produced synthetically. However, since the same molecules also occur in nature, they could be called nature-identical refrigerants, but the term “natural refrigerant” is most often used. For all these substances, the global warming potential (GWP) is well below ten – CO<sub>2</sub> is as GWP-reference gas per definition equal to one and ammonia even zero.

Unfortunately, there is no single natural alternative that can replace HFCs in all applications, just as there is no single HFC refrigerant (or HFO for that matter) that can be used in all applications. Which refrigerant is most suitable depends on several factors, such as the local economic and regulatory situation, as well as climatic and other factors.

Natural refrigerants offer a lower environmental impact from direct emissions. In addition, many natural refrigerant technologies offer additional indirect emission reductions through increased energy efficiency compared to conventional HFC technologies (Kauffeld, 2016). Refrigeration systems using ammonia or hydrocarbons achieve 10- 15% higher energy efficiency.

This compensates for any energetic disadvantages due to intermediate secondary refrigerant cycles, which may be necessary due to local safety considerations. When designed and operated properly, such indirect refrigeration systems can be energy efficient and offer the advantage of thermal energy storage.

### Indirect contributions to global warming

In addition to the direct global warming potential (GWP) of a refrigerant and the indirect contribution to global warming via the energy consumption (3) of the refrigeration, air conditioning or heat pump system, refrigerants also contribute to global warming during their manufacturing process. Figure 2 shows some examples of CO<sub>2</sub>-equivalent emissions during the manufacturing process. It is clear that the natural working fluids (ammonia, CO<sub>2</sub> and hydrocarbons) have the lowest CO<sub>2</sub> equivalent emissions.

### Conclusion

In summary, we should not only look for refrigerants with low global warming potential (GWP), but also choose the ones that are not leading to dangerous degradation products like hydrogen fluoride (HF) or trifluoroacetic acid/ trifluoroacetate (TFA). Several studies have shown a significantly higher concentration of TFA in rainwater, thus eventually also in groundwater and drinking water.

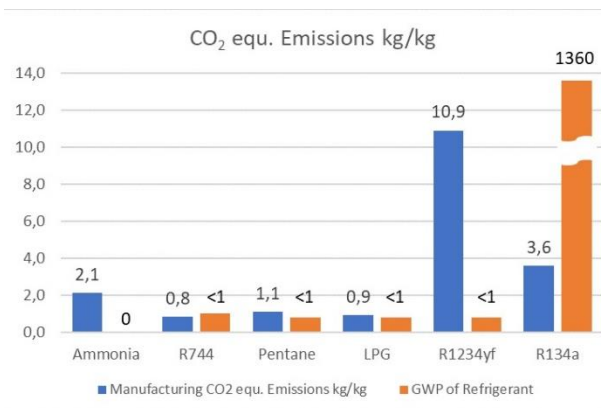


Figure. 2: Refrigerant production-related CO<sub>2</sub>-equivalent emissions (Bacal et al, 2013; Wood and Cowie 2004; Winnipeg Sewage Treatment Program South End Plant, 2011), GWP100 of the refrigerant (UNEP RTOC 2018).  
 Since the manufacturing CO<sub>2</sub>-equ. emission figures are from three different publications, the numbers may vary to some extent. The overall picture, that HFCs result in higher and HFOs in even higher CO<sub>2</sub>-equ. emissions compared to natural refrigerants is without doubt since the chemistry behind the HFC and HFO molecules is more complex.

Alternative refrigerants should be halogen-free, avoiding thus atmospheric TFA and HF formation – and maybe even the very potent greenhouse gas HFC-23 (CHF<sub>3</sub>) as a secondary atmospheric breakdown product. Just as the use of CFCs and HFCs turned out to be a mistake because of their ozone depletion and global warming potential, the authors believe that HFOs will disappear because of the environmental impact of their atmospheric



breakdown products – especially the TFA issue. The future of vapour compression refrigeration technology thus belongs once again unreservedly to the natural refrigerants that have already been used successfully for more than a hundred years: ammonia, carbon dioxide, hydrocarbons, and water.

The environmentally harmful effect of HFO refrigerants due to the trifluoroacetic acid that is formed as one of their atmospheric decay products will very likely lead to banning HFO refrigerants in a future European F-gas regulation. Ultimately, only natural refrigerants will be approved for new installations. In order to reduce the risk of flammability and toxicity of some natural refrigerants to a minimum, there will be installed – especially for applications with access by the general public – an increasing number of indirect refrigeration systems.

[Open Access Government, 11 June 2021](#)

*Images: OAG website*

## 11. ODS Banks Inventories and ODS destruction options - Webinars Registration open

Reducing banks of Ozone Depleting Substances (ODS) is a complex issue but can significantly contribute to protect our environment. In two webinars on 16 and 17 June 2021, we will present the most important findings and experiences from the first phase of the project.



The project "[Management and destruction of existing ozone depleting substances in ODS banks](#)(opens in a new window)" has been one of the first projects that has addressed the ODS banks management topic systematically at global level and in five partner countries. The first phase of the project is ending in June and against this background, we will look back at the key findings and lessons learned by focusing on two key aspects to be considered in the establishment of successful and sustainable ODS bank management and destruction activities.

### Agendas

#### Webinar 1:

Quantifying the problem: Estimating national ODS banks and future waste streams (16 June 2021, 14:00-16:00 CEST)

This first webinar will highlight the importance of quantifying the amount of ozone depleting substances (ODS) banks at national level as a basis for any action and policy decisions in the field of ODS bank management. The objective is to present key elements of an ODS bank inventory and go through practical exercises to improve participants' competences to carry out an ODS bank inventory. The information has been compiled in the [Guideline to conduct an ODS bank inventory](#).

## Webinar 2:

ODS destruction options for developing countries: Theory and Practice (17 June 2021, 14:00-16:00 CEST)

This second webinar will provide an overview of different ODS destruction technologies and assess them in the context of developing countries and emerging economies. It will discuss and assess country-settings in which different technology options would be applicable. Background information on this topic can be found in the [Analysis of different thermal ODS destruction options](#).

[Learn more / Register >>>](#)

[Deutsche Gesellschaft für Internationale Zusammenarbeit \(giz\) GmbH, June 2021](#)

Image: GIZ website

## 12. Multi-Group European HVAC&R Conference June 2021

Centro Studi Galileo, an Italian HVAC&R training center, held its 19<sup>th</sup> European Conference virtually and in person at the Polytechnic University, Milan, Italy, 10-11 June 2021.

The conference, divided into five thematic sessions, was organized by Centro Studi Galileo with the United Nations Environment Programme (UNEP) - OzonAction, International Institute for Refrigeration (IIR), Air conditioning and Refrigeration European Association (AREA), Italian Association of RAC Technicians (ATF) and Renewable Energy Institute (REI).



The 19<sup>th</sup> European Conference will mark an “historic step” towards closer relations between Europe and Africa. AREA President Marco Buoni (also Director General of Centro Studi Galileo and Secretary General of the ATF Association) and U-3ARC President Madi Sakandé will sign a Memorandum of Understanding (MOU). The MoU will “guarantee the exchange of skills and resources, focusing on training and capacity building of the human capital, aiming at strengthening the African economy, strongly encouraged by UNEP - OzonAction,” Centro Studi Galileo said in a statement.

### The following is an overview of the program:

**First Session** | Technologies; equipment and components. New components & equipment with alternative refrigerants, considering their energy efficiency and environmental issues, results and updates.

**Second Session** | F-Gas and Refrigerants. New refrigerants and future perspectives, in reference to the f-gas regulations and energy saving.

**Third Session** | Green Cooling and Energy Efficiency, including the European Green Deal and ecodesign. Energy efficiency in plants. Heat pumps, cooling with absorption and adsorption plants. Renewable energy and chemistry in air conditioning and refrigeration. Evaporative cooling, district cooling and magnetic cooling. Mobile air conditioning.

**Fourth Session** | Regulations & Certifications Globally. Policy: global f-gas phase down and EU regulation review, training and certification.

**Fifth Session** | The Cold Chain. The cold chain, food and vaccines distribution and conservation, cold storage and transport, controls and data loggers.

Visit [Centro Studi Galileo](#) for more information on the [conference](#).

[r744, 9 June 2021, By: Michael Garry](#)

Image: r744 website

## FEATURED



## OZONE SECRETARIAT

### [Overview for the meetings of the ozone treaties in 2021](#)

- [43<sup>rd</sup> OEWG](#) - Online meetings | 22 May - 17 Jul 2021 (Replenishment: 22 & 24 May, CFC-11: 14 & 15 Jul, Energy Efficiency: 16 & 17 Jul)
- [66<sup>th</sup> IMPCOM](#) - Online meeting | 12 - 13 Jul 2021
- [11<sup>th</sup> ORM \(part II\)](#) - Online meeting | 19 - 23 Jul 2021
- [67<sup>th</sup> IMPCOM](#) - Nairobi, Kenya (tentative) | 23 Oct 2021
- [12<sup>th</sup> COP \(part I\)](#) – [32<sup>nd</sup> MOP Bureau](#) - Nairobi, Kenya (tentative) | 24 Oct 2021
- [12<sup>th</sup> COP \(part II\)](#) – [33<sup>rd</sup> MOP](#) - Nairobi, Kenya (tentative) | 25 - 29 Oct 2021

Click [here](#) for past and upcoming Montreal Protocol Meetings Dates and Venue.

## 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](#)

- [Report of the Extended Intersessional Approval Process](#) established for the 86<sup>th</sup> meeting of the Executive Committee
- Click [here](#) for the Executive Committee upcoming and past Meetings and related documents..
- [Executive Committee Primer – 2020](#) - An introduction to the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol.



## 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*

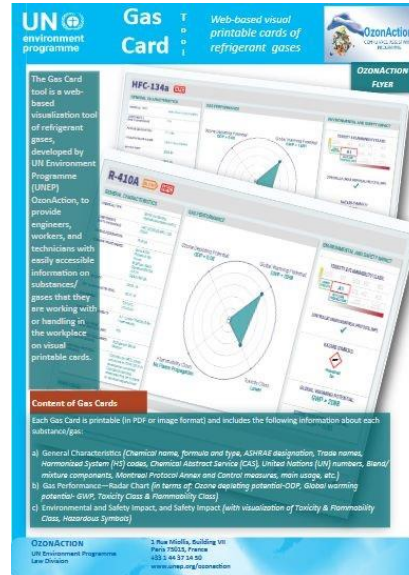


[Climate Action with OzonAction](#) - The Montreal Protocol on Substances that Deplete the Ozone Layer protects human health and the environment by phasing out nearly 100 industrial chemicals known as ozone depleting substances (ODS)- which include hydrochlorofluorocarbons (HCFCs) and chlorofluorocarbons (CFCs). The Montreal Protocol also works to phase down hydrofluorocarbons (HFCs), which are not ODS but are powerful greenhouse gases. UNEP's OzonAction supports 147 developing countries in making their Montreal Protocol targets. [...]

Excerpt from the "[Environmental Governance Update - April 2021](#) - Good governance for healthy planet and people", June 2021.

Read pages 6-9 to learn more about [Climate Action with OzonAction](#)

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)



### [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](#)

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### [GWP-ODP Calculator Application](#) - Updated

“Quickly, efficiently and accurately convert between values in metric tonnes, ODP tonnes and CO<sub>2</sub>-equivalent tonnes”

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



#### **What's new in the app:**

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

- References added for sources of all values
- New refrigerant mixtures (with ASHRAE -approved refrigerant designations)

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<sub>2</sub>-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<sub>2</sub>-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<sub>2</sub>- 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.

Feel free to share this message and the flyer with:

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



You can watch these videos on the OzonAction YouTube Channel:

- [Techniques, Safety and Best Practice](#)

- [Flammable Refrigerant Safety](#)

⬇ The videos are also available for download by request from UNEP OzonAction:  
[unep-ozonaction@un.org](mailto:unep-ozonaction@un.org)



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

The flyer is available from the [OzonAction website](#).

### [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).

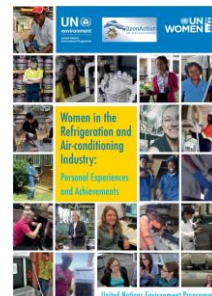
Those chemicals, which are primarily used as refrigerants for air conditioners and fridges, are controlled under the Montreal Protocol on Substances that Deplete the Ozone Layer and are being phased out by all countries according to a specific timeline.



### [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.



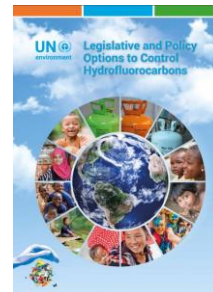
Read/download the [publication](#)

## 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.

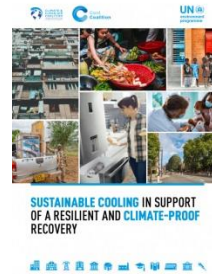


[Read/download](#)

Latest issue of Centro Studi Galileo magazine, [Industria & Formazione, n. 449 - 2021](#) (in Italian).



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



[Solar Cooling \(2020\), 40<sup>th</sup> Informatory Note on Refrigeration Technologies](#).

Summary - Solar cooling is a promising and environmentally friendly technology that can help meet the growing global demand for space cooling. Solar cooling can be achieved by various technologies. The two main commercial options are photovoltaic (PV)-driven vapour compression chillers and heat-driven cooling machines powered by solar collectors. Thermal cooling equipment can be coupled with various types of solar collectors with different efficiencies and costs. Overall system efficiencies of PV-driven and solar thermal-driven plants may not have such different values. Economic analysis indicates that the investment cost for the PV solution is at least half that of other systems. Solar cooling may have a very positive environmental impact by reducing the use of fossil fuels, and the technology may be considered mature to compete with conventional cooling equipment.



\* This Informatory Note is an update of a previous version published in April 2017. It was prepared by Renato Lazzarin (President of IIR Section E).

A Summary for policy makers - Solar Cooling 2020 is [available](#) in English and French languages.

[International Institute of Refrigeration, March 2021](#)

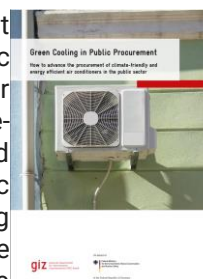
[Leaks, maintenance and emissions: Refrigeration and air conditioning equipment report](#) details common faults identified in both residential and commercial refrigeration and air conditioning equipment. The report also lists the impacts of these faults and how routine maintenance of the equipment has 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.



## 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



**R744.com**

the best local options. [Watch this space!](#)

Originally established in 2006, the new and improved [R744.com](#) offers a trusted source for the latest CO<sub>2</sub> products, services and news from around the world with a key feature being the new marketplace. In addition to the latest CO<sub>2</sub> news and information about the site's partners, the revamped R744.com includes a store where users can browse all available products, and filter for a wide variety of criteria, including components and services. It is also possible to narrow your search to include only products available in your home region, making it easier to find





### [Retradeables introducing a brand new reclaiming marketplace](#)

- F-gases are a family of man-made gases used in a range of industrial applications. As consumer demand for refrigeration and air-conditioning products increased, industry emissions have also dramatically increased. New EU regulations force us to prioritize environmental obligations, whilst continuing to serve the increased consumer demand and operate with a decreased amount of F-gas ...

The International Institute of Refrigeration (IIR) develops carbon footprint model for cold chain that the group says would help reduce food waste by 55% and global CO<sub>2</sub> emissions by 50%. The model is described in a report, [“The Carbon Footprint of the Cold Chain: 7<sup>th</sup> Informatory Note on Refrigeration and Food,”](#) published in April. The carbon footprint model calculates CO<sub>2</sub>e emissions for each stage of the current global cold chain, including all countries in the world. The emissions from the current global cold chain are then compared with those of an “improved” cold chain. “The latter corresponds to a reasonable assumption in which the cold chain in all countries is brought to the same level of equipment and performance as that existing in developed countries,” the report said. From this, the report concluded that “an improved global cold chain would allow a reduction of almost 50% of the CO<sub>2</sub> emissions of the current cold chain” and “would also avoid 55% of the food losses attributable to the current cold chain.” According to IIR estimates, 12% of food produced globally in 2017 was lost due to an insufficient cold chain. [The International Institute of Refrigeration \(IIR\), 8 June 2021](#)

Image: IIR website





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