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GLOBAL

1. Kigali Amendment latest ratifications

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

India, 27 September 2021
El Salvador, 13 September 2021
Tunisia, 27 August 2021
Cameroon, 24 August 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. OzonAction and IIR Shine the Spotlight on Vaccine Cold Chain Technology

Since the start of the COVID-19 vaccination campaigns at the end of 2020, the world has become aware of the importance of refrigeration and, in particular, of the cold chain, which is essential for the organisation of a global vaccination campaign against the SARS-COV-II virus. The use of very low storage temperatures for the first vaccines has raised the public's awareness about the importance of the cold chain for vaccine preservation and mobilised all those involved in temperature-controlled logistics. Vaccines, which appeared more than two centuries ago in the United Kingdom have been stored under controlled temperatures for a very long time. In 1920, Professor d'Arsonval proposed using vacuum freeze-drying at -80°C to replace the iceboxes and antiseptics commonly used for transporting and preserving vaccine pulps.

A vaccine cold chain has been developed for many years, particularly under the aegis of the World Health Organization (WHO). Prior to COVID-19, more than 4.7 billion doses of vaccine were injected worldwide each year, representing a market of more than US$40 billion

(2019), which is expected to reach US$80 billion by 2025. The COVID-19 vaccination campaign has revolutionised the vaccine cold chain, with volumes almost twice as high as usual, but also because of the new storage and transport temperature ranges that require new equipment, new solutions and new organisations. To date, more than 7 billion COVID-19 vaccines have already been preordered worldwide, with storage temperatures ranging from -90°C to +8°C6.

This note provides an overview of the vaccine cold chain in general and COVID-19 in particular, its requirements and challenges. First, the effects of temperature on these vaccines, old and new, and their storage and transport requirements should be known. Second, the temperature-controlled logistics of vaccines in general and COVID-19 vaccines in particular, and the equipment and solutions used for their cold chain, must be analysed.

Finally, if refrigeration is essential for our health as well as for our food, it must be sustainable, and it is therefore necessary to analyse the challenges to be met so that the cold chain for vaccines disrupted by COVID-19, is sustainable in the short, medium, and long term. [...]

The vaccine cold chain is more critical than ever to the success and performance of vaccination campaigns around the world. The COVID-19 pandemic has highlighted the major role of the cold chain and more than doubled the needed capacity by adding new temperature ranges.

Refrigeration and health professionals must work together to meet this unprecedented challenge of primary importance to humanity: controlling and curbing the first major global pandemic in human history. This will of course require technical solutions, but above all it will require the men and women in the refrigeration and health sectors to implement new solutions on a daily basis and to continue this effort for many years to come!

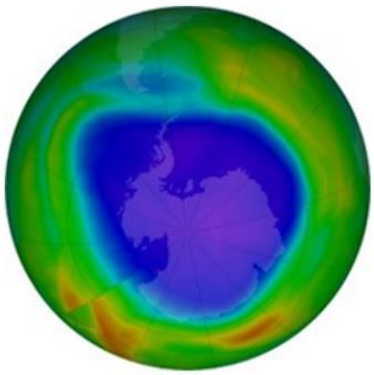
As part of IIR and UNEP OzonAction's partnership, a set of Cold Chain Technology Briefs was released over the past few years, which includes in-depth summaries about the cold chain in different key sectors. They include descriptions of technology, refrigerant options and trends and conclude with prospects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

The United Nations Environment Programme (UNEP), OzonAction, 8 September 2021

Image: OzonAction

3. Why the ‘larger than usual ozone hole’ is NOT unusual



21 September 2021. Credit: NASA

The ozone hole has reappeared over Antarctica as expected. Current observations show a somewhat more severe ozone hole, but this is because of the below average temperatures in the Antarctic stratospheric. But this above average severity is consistent with the continued decline of ozone depleting substances and the colder meteorological conditions.

Each year, severe depletion of the ozone layer occurs over the Antarctic during the spring season (from August to October), known as the ‘ozone hole’, reaching its maximum between mid-September and mid-October. This phenomenon is not a sign that the Montreal Protocol is not working, as the area, depth and duration of the ozone hole depends strongly on stratospheric weather conditions. The very low winter temperatures in the Antarctic stratosphere lead to the formation of polar stratospheric clouds (PSCs). The particles in these clouds release chlorine into reactive forms which deplete ozone.

The ozone hole area varies significantly from year to year because of the varying weather conditions in the southern hemisphere. For example, in 2019, NOAA and NASA scientists reported that abnormally warm temperatures in the Antarctic stratosphere dramatically limited ozone loss in September and October, resulting in the smallest ozone hole observed since 1982; the third time in 40 years. Similar weather patterns in the Antarctic stratosphere in September 1988 and 2002 also produced atypically small ozone holes. Contrary to the small 2019 ozone hole, the 2020 ozone hole was considered record-breaking as the longest-lasting hole since the ozone layer monitoring began. That hole finally closed at the end of December after an exceptional season of naturally occurring meteorological conditions.

Currently, the 2021 ozone hole growth rate is similar to last year’s and as of 16 September was around 23 million square km, making it a relatively large ozone hole. As ozone depletion normally peaks between mid-September and mid-October, the severity of the hole won’t be fully determined until late-October.

The year-to-year variability of the ozone hole’s area is large, somewhat masking long-term trends. The larger area of the 2021 ozone hole is tied to the below average cold conditions observed in the Antarctic stratosphere in August and September. Even so, the current ozone hole observations are clearly less severe than the extremely severe ozone holes of the 1990-2010 period. Long-term measurements of gases in the stratosphere show that ozone depleting chlorine and bromine are decreasing because of controls on ozone depleting substances, and the ozone layer is healing.

The United Nations Environment Programme (UNEP), Ozone Secretariat, 24 September 2021

Image: UNEP Ozone Secretariat website/NASA

See also ***>>>*** ***The Antarctic ozone hole is among the largest on record, how does it affect me?****, Article in EuroNews, 27 September 2021, By Rafael Cereceda*

4. Healing the Ozone Layer Through Diplomacy

Still Only One Earth: Lessons from 50 years of UN sustainable development policy

The Montreal Protocol shows what is possible when science, diplomacy, and business cooperate to implement international environmental agreements. When the people became aware of a hole in the ozone layer over Antarctica—and damage to the protective layer of atmosphere around the world—leaders around the world coordinated action on ozone depleting substances.

Key Messages and Recommendations

• Increased ultraviolet (UV) radiation, because of the destruction of the ozone layer, can greatly increase the incidence of skin cancer and cataracts, and significantly impact the global food chain.

• The Montreal Protocol demonstrates the success possible when science, diplomacy, and the private sector cooperate to implement international environmental agreements.

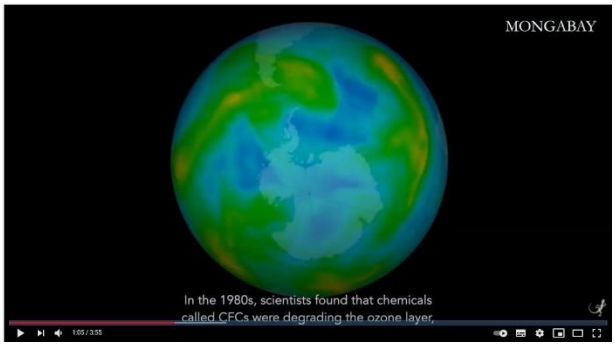
• The Montreal Protocol allows some quantities of ozone depleting substances to be produced and used, so cost-effective, environmentally friendly alternatives need to be developed.

• Measures need to be developed to safely reclaim and destroy ozone depleting chemicals that are still found in old equipment such as refrigeration systems and air conditioners, so they are not released into the atmosphere.

Read/download ***Full Text*** ***>>>***

IISD, Earth Negotiations Bulletin, BRIEF #25, September 2021, By Kate Helfenstein
Image: IISD website

5. What is a planetary boundary?



Watch the video >>>

In 2007, Johan Rockström and Will Steffen set out to answer a fundamental question: "What is the safe operating space for humanity on Planet Earth?" They suggested limits, called Planetary Boundaries — guardrails to keep us a safe distance from these catastrophic tipping points.

Because as our population has grown, we've pulled more resources away from our life-support systems. We've diverted water, land, and minerals to agriculture, industry, and urban development. People began to wonder, "would these pressures eventually prove too much?"

Mongabay.com, 8 September 2021

Image: Mongabay website

***See also >>> In saving the ozone layer, we avoided even more intense global warming**, By Mongabay.com, 19 August 2021*

6. Sustainable Refrigeration Summit - 27 September - 8 October 2021

Registration is now open for the **Sustainable Refrigeration Summit**

This **FREE virtual summit** will bring together commercial refrigeration, energy, environmental, and policy stakeholders to advance solutions for a **zero-emissions future for supermarket refrigeration.**

Attendees will gain knowledge on the latest regulatory and industry trends and hear directly from the food retailers, leading industry experts, and policymakers that are shaping the future of sustainable refrigeration.

Hosted over a two-week period, the summit will feature on-demand presentations and 1-2 live sessions each day, including:

- **LIVE** panel discussions with food retailers and other industry experts on zero emission strategies, technology solutions, opportunities, and challenges
- **LIVE** sessions covering the regulatory landscape, funding for natural refrigerants, and the latest trends and research
- **LIVE** interactive workshops with state policymakers to facilitate engagement in refrigerant rulemaking and state program development processes
- **ON-DEMAND** **technology sessions** showcasing the latest innovations in natural refrigerants

*Check out the **program** and stay tuned for **more** session details!*

REGISTER NOW

The North American Sustainable Refrigeration Council, August 2021

Image: NASRC website

AFRICA

7. Ghana spearheads an African proposal to the Montreal Protocol to stop appliance dumping

Ghana, on behalf of the African Parties to the Montreal Protocol on substances that deplete the Ozone Layer, has submitted to the Secretariat of the Montreal Protocol, a draft decision proposing next steps in stopping the environmentally harmful dumping of new and used cooling appliances that are also inefficient and/or use obsolete refrigerants.

This environmental leadership approach by Ghana was accomplished through a teamwork between The Energy Resources, Climate Change & Ozone Department of the Environmental Protection Agency, Ghana and the Office of Renewable Energy, Energy Efficiency, and Climate Change of the Energy Commission of Ghana.

The idea of the Montreal Protocol draft decision is to make the countries that dump new and used appliances accountable for the potential damages caused specifically to the people and economy of Ghana and to the global climate in general.

The hope of Africa is that appliance manufacturers will agree to offer products that are energy efficient as well as safe for the environment. This will help owners save money on

electricity that can be spent locally for nutrition, housing, education, and entertainment which will increase the quality of life and support sustainable development.

This hope, which Ghana and the rest of Africa are helping to advance is in tandem with **Decision 17/1(XII) of the African Ministerial Conference on the Environment**, urging Montreal Protocol Parties to adopt an action plan which will prevent market penetration of obsolete equipment into Africa while facilitating access to secure and energy-efficient technologies on the continent.

The Parties to the Montreal Protocol can take a decision as early as October 2021 to adopt the African Proposal and empower the Multilateral Fund of the Montreal Protocol to grant funds for capacity building activities.

When Ghana circulated the draft decision to Africa's Montreal Protocol representatives for input prior to sending it to the Montreal Protocol Secretariat the response was inspiring and clearly proved the consensus of support for taking fast action under the Montreal Protocol. [...]

Ghanaian Times, 23 September 2021

Image: Ghanaian Times

ASIA AND THE PACIFIC

8. Asia-Pacific launch a year-long Ozone2Climate Art Contest

"How can our daily life contribute to the ozone layer protection?" Mr. Siwakorn Maneethein, a third-year student of Geological Sciences at the Faculty of Science, Chiang Mai University, Thailand, enthusiastic about sustainable natural resources and environmental preservation shared his understanding of this significant question at a press conference of the launch of the **Asia Pacific Ozone2Climate Art Contest** on World Ozone Day, 16 September 2021.

In 2015, Maneethein, then a junior high school student aged 14, won the national contest essay on the topic 'How does our daily life protect the ozone layer?" organized by the National Ozone Unit of Thailand. Beforehand, Maneethein and two fellow students had thoroughly researched ozone layer protection and consulted with teachers on the subject. Maneethein then presented his views and saw the value of everyone in participating towards reducing the destruction of the ozone layer and global warming. He particularly appealed to his generation to contribute by choosing products not containing ozone depleting substances (ODS) but environmentally-friendly ones. Satisfied that Thailand had

successfully phased out CFCs in 2010 and switched to less damaging substances, Maneethein emphasized that the ozone layer and climate protection cannot be achieved individually, but requires cooperation among all, especially youth like himself who are the future generation.

Due to restrictions caused by the ongoing COVID-19 pandemic, the public awareness raising Ozone2Climate Art Contest was launched online by United Nations Environment Programme (UNEP) OzonAction, the United Nations Educational, Scientific and Cultural Organization (UNESCO), and more than 30 countries in the Asia Pacific region. A key factor of the Art Contest is to engage the general public especially the youth like Mr. Siwakorn Maneethein to link daily life activities and choices with the common environmental challenges faced globally, and consider how to be engaged to identify solutions, and most importantly, how everyone can contribute to addressing the challenges.

Officially opened on World Ozone Day, 16 September 2021, **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.

As highlighted by Mr. James S. Curlin, Head of UNEP OzonAction, the role of industry and the public in the promotion of Ozone2Climate safe alternative technologies to replace ODS and high-global warming potential refrigerants is critical for the success of achieving ozone layer protection and climate-friendly targets. He further called on “everybody in the Asia-Pacific region and world at large to take action and play their role” noting especially that "the procurement power of the public will guide the market to favour Ozone2Climate products.”

Mr. Alex Rendell, UNEP’s National Goodwill Ambassador for Thailand, whose video message was pre-recorded, invited everyone to join this art contest to learn more about the issue that is critical to our lives and our well-being by sharing their ideas through the contest to show how ozone layer depletion and climate change can be solved. He further shared his idea on how everyone can contribute to protecting the ozone layer and climate by making conscientious and more environmentally friendly choices such as buying refrigerators and air-conditioners that are energy efficient and use climate-friendly refrigerants and maintaining that equipment in good condition to minimize refrigerant leakage and enhance energy performance.

Other high-level participants who addressed the press and public, and responded to questions were, Ms. Megumi Seki, Executive Secretary of UNEP’s Ozone Secretariat, Ms. Isabelle Louis, Deputy Regional Director at UNEP’s Asia Pacific Office, Ms. Rika Yorozu, Head, Executive Office and Regional Programme Coordinator for UNESCO Bangkok, and Mr. Jackrit Suthakorn, Dean of the Faculty of Engineering, Mahidol University, a supporting partner of the regional contest.

As of today, 33 developing countries in the region – Bangladesh, Bhutan, Cambodia, China, Cook Islands, Fiji, India, Indonesia, Iran, Kiribati, Republic of Korea, Lao PDR, Malaysia, Maldives, Marshall Islands, Micronesia, Mongolia, Myanmar, Nauru, Niue, Palau, Pakistan, Papua New Guinea, Philippines, Samoa, Solomon Islands, Sri Lanka, Thailand, Timor-Leste, Tonga, Tuvalu, Vanuatu, and Viet Nam, have joined the regional initiative.

The art contest was organized as part of the Asia-Pacific Regional Networks of Ozone Officers, as part of UNEP's workplan under the Montreal Protocol's Multilateral Fund.

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.

Images: OzonAction

9. China takes aim at ozone depleting substances


CHINADAILY.COM.CN | Global Edition

China takes aim at ozone depleting substances

By HOU LIQIANG | CHINA DAILY | Updated: 2021-09-17 09:19

Despite challenges, China will endeavor to phase out ozone depleting substances and their planet-warming alternatives as required by international conventions, a leading environmental official said.

Despite challenges, China will endeavor to phase out ozone depleting substances and their planet-warming alternatives as required by international conventions, a leading environmental official said.

To date, China has phased out roughly 500,000 metric tons of ozone depleting substances, said Zhao Yingmin, vice-minister of ecology and environment, addressing an event to celebrate World Ozone Day on Thursday and the 30th anniversary of China joining the Montreal Protocol on Substances that Deplete the Ozone Layer.

With continuous efforts to control the substances in the past 30 years, China has made great contributions to not only the recovery of the ozone layer, but also global climate mitigation, he said.

Quoting a study by scholars from China and the United States, Zhao said China's endeavor to phase out ozone depleting substances from 1995 to 2014 avoided emissions of greenhouse gases equivalent to 11 billion tons of carbon dioxide.

The nation is also working to phase out 67.5 percent of hydrochlorofluorocarbons, or HCFCs—the last type of ozone depleting substances in China—by 2025, Zhao said.

He reiterated the country's zero tolerance for ozone depleting substances violations, saying China has unearthed almost 100 cases of illegal production, consumption and sale of ozone depleting substances since 2010.

On Wednesday, the country's ratification of the Kigali Amendment to the protocol went into effect, which aims to gradually reduce the consumption and production of hydrofluorocarbons, or HFCs.

While the substances don't deplete the ozone layer and are used as alternatives for ozone depleting substances in refrigeration and air conditioning, they are more potent than carbon dioxide in warming the planet.

The task of phasing out HFCs means that the country needs to revamp industrial chains in various sectors on a large scale.

"China has to bear a huge transition cost for it," Zhao said.

While the cost of technological upgrading will be high for many enterprises, he said a lot of workers may be laid off and need to be reemployed.

However, Zhao stressed the country's determination to phase out HFCs, vowing a series of measures to address the challenges.

Aside from amending laws and regulations according to the Kigali Amendment, the country will work on the 2020-22 national statistics for HFC emissions, which will provide the benchmark for the country to phase out 10 percent of the substances' emissions as required by 2029, he said.

He said the country will establish a network to monitor controlled substances in its effort to build up an early warning system, as well as the capability to assess progress in phasing out the substances.

China will make consistent effort to enhance local governments' capabilities in supervision and law enforcement for phasing out controlled substances, he said.

Devanand Ramiah, deputy resident representative of the United Nations Development Programme in China, said the UNDP commends the Chinese government's efforts to phase out 67.5 percent of HCFCs by 2025 and "remains confident of this goal being met".

The Kigali Amendment will be critical to address the global climate crisis, which is rapidly intensifying, he said, referring to floods in Europe and China this year as examples.

"The international community must urgently accelerate measures to deal with climate change and can take inspiration from the successes of the Montreal Protocol," Ramiah said.

China Daily, 17 September 2021, By Hou Liqiang

Images: China Daily

WEST ASIA

10. UNEP and Qatar hold technical workshop on development and adoption of international standards

The UN Environment Programme (UNEP) OzonAction Compliance Assistance Programme (CAP), West Asia Office, in cooperation with the National Ozone Unit (NOU) of the Government of State of Qatar, Ministry of Municipality and Environment, organized a successful online technical workshop for Stakeholders on the Development and Adoption of International Standards, as part of the country's efforts to accomplish the tasks under the Kigali Amendment Enabling Activities project.

The workshop was attended by various representatives from industries, academia, government agencies with the participation of NOUs of Kuwait, and Iraq as part of the interregional cooperation and exchange of experiences. After providing an overview about the related international standards, their scopes, and applicability, participants discussed the importance of developing/ adopting international standards relevant to refrigeration and air conditioning (RAC) as Qatar's preparation for the possible introduction of alternatives to hydrochlorofluorocarbons (HCFCs) that might be flammable, operate at high pressure, or be more toxic.

Mr. Ahmad Alabduljabar and Ms. Sarah Aljabri of Qatar's General Authority for Standardization and Metrology presented the status of the national standards adopted in the country related to RAC which are mainly to regulate the Energy Efficiency considerations.

Various International Standards relevant to product safety, servicing and maintenance procedures, and technician certification were presented by Mr. Manuel Azucena, on the possible applicable standards to the State of Qatar's context. The experience of the Philippines in developing and adopting international standards into national standards was shared by Mr. Augusto Quitco, a Technical Committee member of the Bureau of Philippines Standards.

During the open discussion, various questions and suggestions were made by the participants from different industries and government agencies such as the creation of an ad hoc committee in case a new standard is developed and adopted which will affect the RAC industry. Mr. Yaquob Almatouq from Kuwait's NOU further suggested the full utilization of the South-South cooperation in developing and adopting relevant standards for the GCC.

In closing, Ms. Mona Alemadi, from Qatar's NOU, thanked UNEP and all participants including guests from Kuwait and Iraq for their active participation and for sharing their experiences which will help in undertaking the tasks ahead in updating Qatar's national standards. Mr. Khaled Klaly, Montreal Protocol Regional Coordinator, UNEP West Asia,

extended his appreciation to all the participants, resource persons from Qatar and the Philippines, and the efforts of the NOU in organizing a fruitful and successful workshop.

Contact: Khaled Klaly, Montreal Protocol Regional Coordinator, UNEP, OzonAction Compliance Assistance Programme (CAP) West Asia

Image: OzonAction

LATIN AMERICA AND CARIBBEAN

11. Grenada opts for natural refrigerants in recently published 'National Cooling Action Plan'

The Caribbean Island nation of Grenada has identified the use of natural refrigerants, including propane (R290) in single-split air conditioners, as a key factor in reducing its greenhouse gas emissions, according to its new National Cooling Action Plan (NCAP), published in August 2021. The development of the NCAP was supported by the "Cool Contributions fighting Climate Change (C4)" project of GIZ. The NCAP outlines the core activities needed to help the country achieve its obligations under the Kigali Amendment to the Montreal Protocol, as well as its Nationally Determined Contributions (NDCs) under the Paris Agreement. Grenada ratified the Kigali Amendment in May 2018.

"R290 room air-conditioners have proven to be the technology of choice for Grenada with regards to meeting the country's obligations as a signatory to the Kigali Amendment of the Montreal Protocol, as well as the NDC commitments under the Paris Accord and the 2035 sustainable development plan for Grenada," said Leslie Smith, Head of Grenada's National Ozone Unit.

Download the 'National Cooling Action Plan' (NCAP)

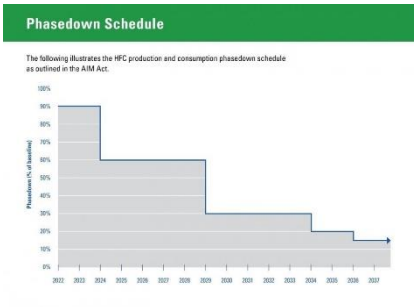
Related article on hydrocarbons21

Deutsche Gesellschaft für, Internationale Zusammenarbeit (giz) GmbH, August 2021

Image: GIZ

NORTH AMERICA

12. Final Rule - Phasedown of Hydrofluorocarbons: Establishing the Allowance Allocation and Trading Program under the AIM Act



The AIM Act, which was included in the Consolidated Appropriations Act, 2021, directs EPA to phase down production and consumption of HFCs in the United States by 85 percent over the next 15 years. A global HFC phasedown is expected to avoid up to 0.5° Celsius of global warming by 2100.

This final rule is the first regulation under the AIM Act to address HFCs, which are potent greenhouse gases commonly used in refrigerators, air conditioners, and other applications. This final rule sets the HFC production and consumption baseline levels from which reductions will be made, establishes an initial methodology for allocating and trading HFC allowances for 2022 and 2023, and creates a robust, agile, and innovative compliance and enforcement system.

The EPA Administrator, Michael S. Regan, signed the following notice on 09/23/2021, and EPA is submitting it for publication in the Federal Register (FR). While we have taken steps to ensure the accuracy of this Internet version of the rule, it is not the official version of the rule for purposes of compliance or effectiveness. Please refer to the official version in a forthcoming FR publication, which will appear on the Government Printing Office's govinfo **website** and on **Regulations.gov** in Docket ID number EPA-HQ-OAR-2021-0044. Once the official version of this document is published in the FR, this version will be removed from the Internet and replaced with a link to the official version.

The US Environmental Protection Agency (USEPA), 23 September 2021

Image: USEPA

***See also** >>> **Protection of Stratospheric Ozone: Standards Related to the Manufacture of Class II Ozone-Depleting Substances for Feedstock**; Notice of Proposed Rulemaking, federal Register, The daily journal of the United States Government, 29 September 2021*

13. How to make air conditioning less of an environmental nightmare


▲ Air conditioners use more electricity than any home appliance and leak potent greenhouse gases. Photograph: AKP Photos/Alamy

As the world heats up so does the demand for air conditioning, which itself is a contributor to the climate crisis

At first glance, the 32 panels on top of a grocery store in Stockton, California look like solar panels. But this installation is designed not to harness

the sun, but to defy it. Coated with a film technology that reflects radiation from the sun, the panels – and whatever lies beneath them – can drop to 15F (8C) below the ambient temperature, even in the middle of the day, with no electricity required.

It is “a fundamentally different way of achieving cooling and harnessing an untapped renewable resource”, said George Keiser, chief operating officer of SkyCool, the company behind the panels, which are glazed in a multilayer optical film developed by 3M. “We’re using the sky as this enormous heat sink,” said Keiser, sending excess heat from the surface of the Earth, through the atmosphere and into outer space.

At the grocery store, the panels are used to cool water running behind them, which is then piped into the condensers that run the store’s refrigerators. That lowers the temperature of the refrigerants inside, increasing efficiency and reducing yearly energy consumption by 15%.

3M’s film has also been applied directly on bus shelters in Tempe, Arizona, to keep commuters cool as they wait.

“The long-term goal is to see if we can come up with ways to use either the films or the panels to replace an air conditioner,” said Eli Goldstein, the startup’s co-founder, and chief executive.

Extremely hot weather kills about 700 people in the US each year – more than hurricanes and floods combined – and an estimated 356,000 around the world.

Air conditioning is the most obvious immediate response to the dangerous warming of the planet. It’s also making it worse.

Air conditioners use more electricity than any other appliance in the home. They consume 10% of global electricity (together with electric fans) and leak potent planet-warming gases into the atmosphere. On the hottest day of the year in some parts of the US and the Middle East, 70% of peak residential electricity demand is for cooling spaces.

As global temperatures rise and heatwaves become more common and more deadly, the demand for air conditioners is increasing, especially in emerging economies such as India, China and Indonesia.

The International Energy Agency (IEA) estimates that global demand for space cooling will more than triple by 2050. The growing cooling demand is “one of the most critical energy issues of our time”, according to the IEA’s 2018 report, which concludes that to keep people cool without spiraling energy demand, the answer “first and foremost” is to improve the efficiency of air conditioners.

But that’s not all it will take. To temper the effects of dangerous heat without heating up the world even more will require a spectrum of solutions, from more efficient ACs to shadier streets, to new technologies that fundamentally change the way we stay cool.

Solving the air conditioner conundrum

Most ACs are relatively cheap and extremely inefficient. The energy performance standards the machines are required to meet don’t come close to maximizing their potential, said Iain

Campbell, senior fellow at the sustainability nonprofit Rocky Mountain Institute, and 95% don't exceed the bare minimum.

Another big problem with air conditioners is that they leak hydrofluorocarbon refrigerants (HFCs), powerful planet-warming gases and a major contributor to global heating, into the atmosphere. The most commonly used – R-410A – is more than 2,000 times more potent than carbon dioxide.

As the machines work, the refrigerant travels in tubes between areas of low and high pressure, turning into a gas as it absorbs heat from inside and releases the heat outside as it condenses back into a liquid. In its gas form, HFCs can seep out through joints in the piping (a typical residential unit might lose 10% of its refrigerant each year) or can be released entirely if an air conditioner is thrown away without being properly drained.

In 2018, the Rocky Mountain Institute launched the Global Cooling prize, offering a $1m prize for new residential cooling technology that is five times more efficient and less polluting than today's standard machines, costs no more than twice as much for consumers and can be installed in existing homes.

The two winning prototypes, announced in April and produced by two of the world's largest cooling manufacturers – Daikin and Gree – work fundamentally the same way as today's air conditioners, but are engineered with better sensing and controls and are configured to use more environmentally friendly refrigerants than those found in standard residential AC units. They have also added features, such as engineering to remove excess moisture from the air to make it easier to cool (it takes more energy to heat humid air).

The winners say they will bring their designs to market by 2025. But until policymakers in the US and abroad raise the floor on efficiency standards for AC units, said Campbell, there's no clear way for consumers to discern the difference between these new machines and those that are less efficient and have a far greater climate impact.

Mechanical engineer Vince Romanin realized that few consumers research air conditioner efficiencies or specific refrigerants before buying, which is why he markets his AC technology on user experience, rather than environmental credentials.

"There are about 50 million people in the US with a window AC, and almost all of them hate them," said Romanin, CEO of Gradient. Configured to straddle the windowsill, with the noisy bits outside and the tech housed below the window, Gradient's machine is not "loud and ugly", said Romanin, and it doesn't block your view.

Gradient uses a lower-emissions refrigerant packed in factory-sealed, leak-proof tubing. Coming to market next year, it's two appliances in one: the heat pump system that replaces hot air with cool in the summer works in reverse to make it a space heater in the winter.

Campbell is excited about the potential of new materials to push cooling technology even further. Cooling prize finalist Transaera is developing a "novel sponge-like" material that could improve air conditioners' efficiency by passively sucking moisture out of the air. But until governments impose standards that rate ACs on how efficiently they reduce humidity, Campbell said, manufacturers lack incentive to include the tech in their products.

Irish clean tech company Exergyn is among those developing systems that replace harmful, leaky refrigerants with solid materials that contract and relax as they absorb and release

heat. Solid state refrigerants have “significant promise”, Campbell said, but they need more testing to prove they can last as long.

Design for heat

Better air conditioners alone can’t solve the growing heat crisis, but they’re an important part of the puzzle, said Campbell, especially for the growing urban populations around the world.

There are many other things you’d ideally do first, he said. That includes designing buildings that use less energy, have better ventilation and are better insulated from heat.

“If you want to cool people, you have to provide shade, period,” said V Kelly Turner, assistant professor of urban planning at UCLA’s Luskin School of Public Affairs. Whether that’s in the form of trees or canopies, people’s bodies need to be protected from the direct heat of the sun.

There’s also the indirect effect of the sun heating physical surfaces, such as streets and buildings. In cities, where the urban heat island effect can raise the temperature by as much as 20F (12C), the simple act of painting roofs white can reflect enough sunlight to reduce the heat by a few degrees.

A dozen US cities require or encourage light-colored roofs on new construction, and in August dark roofs were banned in the south-west suburbs of Sydney, Australia, where new rules mandate that every backyard must have a tree.

It’s necessary to tackle the fundamental problems that make cities hotter, said Turner. But “we will need some air conditioning because [without it], you can’t get your core temperature cool enough if you’re exposed to really extreme heat”. That’s especially important, she stressed, for vulnerable people, including outdoor agricultural and construction laborers, children, elderly people and low-income renters, who need not only access to cooling centers on the hottest days, but air conditioning in their homes. (Most places in the US, she said, have laws limiting how cold an apartment can be, but none that prevent landlords from letting homes get dangerously hot.)

The Cooling prize targets air conditioning – that last, necessary element. “If your living space is a very small apartment in a mid-rise tower and you have six members of the family living there and the temperature in the summer is peaking out at about 120F, 130F, you’re not gonna say: ‘Well I need to insulate my apartment, or I need to put some shading in,’” said Campbell. “You’re thinking, ‘I need a damn conditioner so we can all sleep at night.’”

People are going to keep buying air conditioners, he said, so we need to offer them better, safer, cleaner devices – and policymakers must impose regulations that take less efficient options off the table: “We can do better than this. And we’re doing a disservice to our citizenry when we let them buy something that is so expensive to operate, and so polluting that cooling is actually adding to the warming of the planet.”

The Guardian, 3 September 2021

Image: The Guardian website / Photograph: AKP Photos/Alamy

14. The Future of Life Award-Celebrating the Unsung Heroes of our Time: 2021 winners announced

The Future of Life Award recognizes individuals who have taken exceptional measures to protect the common future of humanity. Those who, without having received much recognition at the time, have helped make today dramatically better than it may otherwise have been.

On 16 September 1987, humanity took its first step towards saving the ozone layer, and thereby avoiding a climate catastrophe, by signing the Montreal Protocol. The 2021 Future of Life Award goes to Stephen Andersen, Susan Solomon, and the late Joseph Farman for their critical contributions to the most successful international environmental treaty to date. Dr. Jim Hansen, former Director of the NASA Goddard Institute for Space Studies and Director of Columbia University's Program on Climate Science, Awareness and Solutions said, *"In Farman, Solomon and Andersen we see the tremendous impact individuals can have not only on the course of human history, but on the course of our planet's history. My hope is that others like them will emerge in today's battle against climate change."* In addition to preventing millions of excess skin cancer deaths, ecosystem collapse and climate change, this treaty showed that international collaboration can overcome environmental challenges without sacrificing economic prosperity. *A*s Professor Brian Greene of Columbia University said, *"the 2021 Future of Life award winners show how science can work for the betterment of humanity."*.

High above our clouds, Earth's ozone layer protects us from the Sun's harmful ultraviolet radiation. In 1985, Joseph Farman and his team from the British Antarctic Survey made the most important geophysical discovery of the 20th century: an ozone hole above Antarctica. This provided a stunning confirmation of the Rowland-Molina hypothesis that human-made chlorofluorocarbons (CFCs) were destroying the ozone layer, and much faster than predicted, which galvanized efforts to do something about it.

In 1986-87, Susan Solomon led an Antarctic ozone research expedition. Her work confirmed that CFCs were causing ozone depletion and determined that sunlit cloudtops were catalysing additional ozone-destroying reactions, thereby speeding up the rate of depletion. In the years that followed, both Farman and Solomon became effective public advocates for the development of the Montreal Protocol that their scientific work inspired. Professor Guus Velders, a climate scientist at Utrecht University said, *"Susan Solomon is a deserving recipient of the Future of Life Award. Susan not only explained the processes behind*

the formation of the ozone hole, she also played an active role as an interface between the science and policy of the Montreal Protocol." MIT President L. Rafael Reif added: *"All of us at MIT congratulate Susan Solomon on her Future of Life Award, in recognition of all she did to save the ozone layer – and thereby save civilization as we know it. Her pioneering research and advocacy for the Montreal Protocol stand as a model for how the world can face hard facts and collaborate creatively to tackle the global climate crisis."*

With the signing of the Montreal Protocol in 1987, the hard work of phasing CFCs out of 240 industrial sectors began. Working at the Environmental Protection Agency (EPA), Stephen Andersen founded and from 1988 to 2012 co-chaired the Technology and Economic Assessment Panel (TEAP) for the Montreal Protocol. Andersen's tireless efforts brought together leaders from industry, government, and the scientific community to develop new, CFC-free technologies. His efforts played a critical role in making the Montreal Protocol a success. Professor Ted Parson from the UCLA Emmett Institute on Climate Change and the Environment said, *"For over a decade, Andersen brilliantly led the Montreal Protocol's Technology and Economic Assessment Panel process. Andersen made the Montreal Protocol happen."* Emphasizing the importance of the Montreal Protocol, Astronomer Royal Martin Rees added, *"In the face of threats to humanity's future, we need to think globally, rationally and long-term, empowered by technology. The story and success of the Montreal Protocol shows us that this is possible."*

In this special episode of the Future of Life Institute Podcast, Lucas Perry is joined by Susan Solomon and Stephen Andersen to discuss the story of the Montreal Protocol and their roles in pulling us back from the brink of disaster.

Learn more >>>

- An "award" video Focuses exclusively on the stories of the Ozone, Montreal Protocol, and FLA winners.
- An interview of Solomon and Andersen on popular science educator Neil deGrasse Tyson's podcast Startalk
- An interview of Solomon and Andersen on (FLA) Future of Life Institute Podcast.

The Future of Life Institute (FLA), 16 September 2021
Images: FLA

EUROPE & CENTRAL ASIA

15. EU funded project regional quantification of emissions of substances controlled under the Montreal Protocol: A Pilot Project

Background In 2018, a study published in Nature showed that global emissions of trichlorofluoromethane (CFC-11) had been increasing unexpectedly since 2012, after the consumption and production phase-out date for that substance established under the Montreal Protocol on Substances that Deplete the Ozone Layer. The parties to the Montreal Protocol mobilized themselves and their institutions as well as related entities to take action to identify and address the unexpected emissions. One of the actions was the convening of an international symposium1 on the unexpected increase in emissions of CFC 11, held in Vienna in March 2019, among scientists and experts. In May 2019, another article was published on the possible regions of emissions. Both the Scientific Assessment Panel (SAP) and the Technology and Economic Assessment Panel (TEAP) have provided reports to the parties on the unexpected emissions and potential sources of emissions of CFC-11. During 2018 and 2019, parties discussed the matter extensively.

In November 2019, parties to the Montreal Protocol, at their Thirty-First Meeting, took decision XXXI/3, in which they decided: “To request the Scientific Assessment Panel to work with the Ozone Research Managers at their meeting in 2020 to identify gaps in global coverage of atmospheric monitoring of controlled substances and to provide options on ways to enhance such monitoring as well as exploring options for informing the parties of preliminary information indicating unexpected emissions of controlled substances for the consideration of the Thirty-Second Meeting of Parties and the Twelfth Conference of Parties, in 2020.” (para. 8) In accordance with the decision, the SAP in cooperation with experts in the atmospheric monitoring of substances controlled under the Montreal Protocol, prepared a white paper entitled “Closing the Gaps in Top-Down Regional Emissions Quantification: Needs and Action Plan” for discussion at the eleventh meeting of the Ozone Research Managers (ORM11), which had been scheduled to take place in April 2020.

Owing to the coronavirus pandemic, the meeting has been rescheduled to be held in July 2021. However, as the paper had already been prepared, and to keep up the momentum, the co-chairs of ORM11 decided to convene an online meeting of the ORM11 on 7 and 8 October 2020 to discuss that paper in particular (see the report of the online meeting, UNEP/OzL/Conv.ResMagr/11(I)/2). The second part of the ORM11, with a full agenda comprising all the issues that the ORM was to address, was held online from 19 to 23 July 2021. The ORM finalized their recommendations on the issue of gaps in atmospheric monitoring of controlled substances, as an additional category to the usual set of recommendations.

The report of ORM11 contains the recommendations which have also been posted as a separate document in the ORM meeting portal. The recommendations are also reproduced as a meeting document (UNEP/OzL.Conv.12/7) for the combined Twelfth Meeting (part II) of the Conference of the Parties to the Vienna Convention and the Thirty-Third Meeting of the Parties to the Montreal Protocol, October 2021.

The **Meeting of the Parties to the Montreal Protocol** is expected to discuss the issue of gaps in monitoring with a view to taking a decision on the way forward. cooperation with atmospheric monitoring experts and discussed and endorsed by the ORM. [...]

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[1] The report of the symposium was published in the July 2019 newsletter of the "Stratosphere-troposphere Processes and Their Role in Climate" project and is available on the Ozone Secretariat **website**

The United Nations Environment Programme (UNEP), Ozone Secretariat, 11 September 2021

Image: Ray Weiss

16. £1 Million penalty for F-gas offender

The UK's primary F-Gas register REFCOM has welcomed the Environment Agency's decision to hammer a company with a fine of more than £1 million for breaching the F-gas Regulations.

The London-based firm IMO Gas Supplies Ltd was found guilty of seven separate offences all linked to breaches of regulation 31A of the Fluorinated Greenhouse Gases Regulations over a two-year period.

It was given five separate fines of £200,000 each for failing to ensure that the quantity of HFCs it was using did not exceed its f-gas quota. It also received a £10,000 fine for failing to sufficiently report imports of HFCs to the European Commission, and a £1,500 penalty for not keeping proper records.

The company is reported to have been using refrigerants R134A, R404A, R410A and R407C, which are all subject to restrictions under the F-Gas regulations.

"This is precisely the kind of tough action we have been urging from the Environment Agency," said REFCOM's Head of Technical Graeme Fox. "It is the direct result of a tip-off from a REFCOM member who had become exasperated by this kind of irresponsible behaviour that gives the whole sector a bad name.

"This is only the second fine issued to an F-Gas offender, but it is a huge statement of intent from the EA. However, we know this is not an isolated incident and the battle goes on against rogue traders who seem bent on flouting this vital environmental law for financial gain."

REFCOM said its members had been frustrated by the apparent lack of enforcement of the F-Gas regulations that puts them at a commercial disadvantage because unregistered

firms were getting away with not investing in training, and the systems needed to keep track of their gas usage.

“We have been telling the authorities about the need for visible policing for years and, hopefully, other offenders will take note and mend their ways,” said Fox. “We are delighted to see an example being made of this company and hope this will make others think again about putting the quality of services and products at risk, endangering lives and property, and undermining the UK’s commitment to reducing greenhouse gas emissions.”

REFCOM said it was also closely monitoring the use of illegally imported refrigerant gas in the UK. [...]

The UK continues to ‘mirror’ EU Regulation despite its departure from the Union, which means that all personnel carrying out installation, commissioning, decommissioning, repairing, maintenance, or servicing of stationary refrigeration, air-conditioning or heat pump equipment that contains or is designed to contain F-Gas refrigerants must hold the relevant designated qualifications.

“We are making it as easy as possible for firms to be compliant with the law so there really is no excuse for not being registered,” said Fox.

Heating Ventilating & Plumbing (HVP), 27 September 2021
Image: HVP

17. 2021 HFC consumption limit reached in Russia. Call for applications for 2022 is open

At an interdepartmental meeting held at the Ministry of Natural Resources and Environment of the Russian Federation with the participation of the Ministry of Industry and Trade, Federal Customs Service and Federal Service for Supervision of Natural Resource Usage, it was confirmed that the HFC consumption limit established in Russia for 2021—46,292,794 t CO_2-eq.—was reached.

The decision was accepted based upon the fact that in 2021, the Federal Service for Supervision of Natural Resource Usage provided a state service on the issuance of HFC import permits to legal entities and individual entrepreneurs for the total amount equal to the amount established by the order of the Ministry of Natural Resources and Environment of the Russian Federation for 2021.

According to the Ministry of Industry and Trade, the amounts in the issued permits and the order agree.

With the purpose of HFC quota allocation for 2022, the Ministry of Natural Resources and Environment of the Russian Federation communicates that legal entities and individual entrepreneurs that intend to import HFCs in 2022 should apply specifying in their requests a name of HFC (pure or in blend), and amount in metric and CO_2 tons (by substances and total).

Metric tons should be converted into tons of CO_2-equivalent with coefficients according to annex E to the Kigali amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer should be applied.

The applications should also include data on amounts of HFCs effectively imported in 2019–2021 with respective purposes.

Ministry of Natural Resources and Environment of the Russian Federation, 20 September 2021 / Original text in **Russian** language
Image: Russian Ministry of Natural Resources website

18. Let's get practical: Understanding Measurement, Reporting, and Verification (MRV) in the cooling sector

Online Event 8 October 2021, 8:00AM - 9:00AM UTC ***(Time Zone converter)***

REGISTER NOW

The event takes place virtually via MS Teams and is organised by GIZ Proklima on behalf of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety.

When it comes to climate action in the refrigeration and air conditioning sector, effective measurement, reporting and verification (MRV) of emissions is critical. It helps countries understand from which sub-sectors emissions are coming and how they can best be tackled. This forms the basis for developing and implementing effective mitigation strategies.

Furthermore, it's important to collect reliable data for international reporting requirements such as under the United Nations Framework Convention on Climate Change (UNFCCC) as well as under the Montreal Protocol and its Kigali Amendment.

The challenge: Data collection is often not systematic and the MRV approach not clear. For this reason, GIZ Proklima developed under its project **"Cool Contributions fighting Climate Change (C4)"** and on behalf of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety an interactive handbook on the topic.

Download the handbook: MRV in practice >

Launch of the MRV handbook: The interactive handbook outlines a blueprint MRV system based on international best practices and is applicable to different national contexts. It provides a practical step-by-step approach for policy makers and enforcement bodies.

Deutsche Gesellschaft für, Internationale Zusammenarbeit (giz) GmbH, September 2021
Image: GIZ

FEATURED

OZONE SECRETARIAT

[Overview for the meetings of the ozone treaties in 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 >>>

World Ozone Day 2021
Celebrating the Montreal Protocol that is:
Keeping us, our food and vaccines cool

THE MULTILATERAL FUND
FOR THE IMPLEMENTATION OF THE
MONTREAL PROTOCOL

- The Executive Committee Eighty-seventh Meeting, Montreal, 28 June-2 July 2021

  REPORT OF THE INTERSESSIONAL APPROVAL PROCESS AND ONLINE MEETINGS FOR THE 87TH MEETING

  The present document consists of the following two parts:

I. Process for the 87th meeting, describing the agreed process followed by the Executive Committee for conducting the 87th meeting, which included consideration of several items of the agenda through an intersessional approval process (IAP) and several other items through online meetings.

II. Comments, discussions and decisions by the Executive Committee, containing a compilation of comments and discussions where applicable, and decisions on each of the documents considered during the 87th meeting, presented in the order of the agenda of the meeting.

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

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:

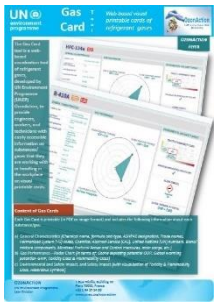
Refrigeration, Air-Conditioning, and Heat Pumps (RACHP) Associations & Organizations: This Knowledge Map provides a global directory of RACHP associations, societies, and organisations around the world. These are key stakeholders for ensuring safe and efficient refrigerant transitions, for the training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



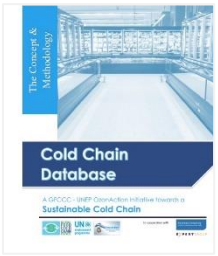
Gas Card Tool: Web-based Visual Printable Cards of Refrigerant Gases developed by the UN Environment Programme (UNEP) OzonAction, to provide engineers, workers, and technicians with easily accessible information on substances/ gases that they are working with or handling in the workplace on visual printable 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.

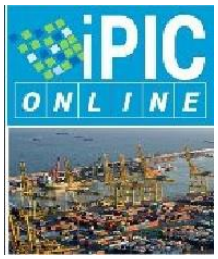
The purpose is to provide an update on ASHRAE standards for refrigerants and to introduce the new refrigerants that have been awarded an "R" number (or ASHRAE designation) over the last few years and which have been introduced into the international market.

Read/download the **factsheet**

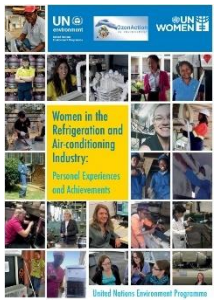
The factsheet, as well as more information on ASHRAE-UNEP joint activities and tools, is also available on the **ASHRAE UNEP Portal**.

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.

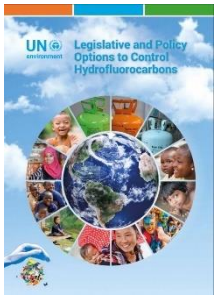


Women in the refrigeration and air-conditioning industry: Personal experiences and achievements The United Nations Environment Programme's (UNEP), OzonAction, in cooperation with UN Women, has compiled this booklet to raise awareness of the opportunities available to women and to highlight the particular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



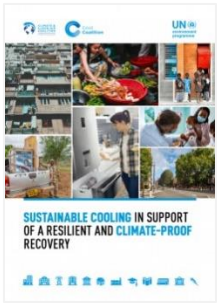
PUBLICATIONS

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. 7-2021
(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), 40th 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.

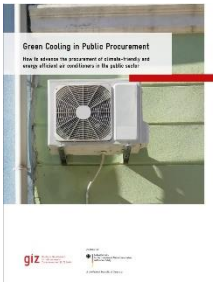
International Institute of Refrigeration, March 2021

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.

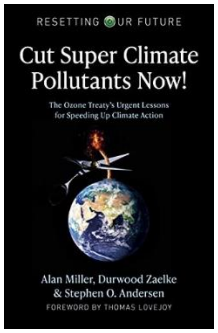
The research was supported by an extensive survey of international and domestic literature included as Appendix B to the report.

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*

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Prepared by: Samira Korban-de Gobert
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If you wish to submit articles, invite new subscribers, please contact:
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