



OzonAction

OZONNEWS



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Multilateral Fund
for the Implementation of the Montreal Protocol

A fortnightly electronic news update on ozone and climate protection and the implementation of the Montreal Protocol



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

The United Nations Environment, OzonAction, in collaboration with Marco Gonzalez and Stephen O. Andersen are updating and expanding the "Montreal Protocol Who's Who" as part of the 30th Anniversary of the Montreal Protocol celebration.

The new website was launched during the 29th Meeting of the Parties to the Montreal Protocol, Montreal, Canada, 20-24 November 2017.

We are pleased to 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 men and women 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, OzonAction – Montreal Protocol

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

GWP-ODP Calculator SmartPhone Application



The application allow you to easily convert ODP, CO₂-eq and metric quantities of refrigerants and other chemicals

- Helps in understanding and reporting under the Montreal Protocol (and future commitments under the Kigali Amendment)
- The calculator will automatically perform the conversion between metric tonnes, ODP tonnes and/or CO₂-equivalent tonnes (or kg) and display the corresponding converted values
- The app includes both single component substances and refrigerant blends
- The components of a mixture and their relative proportions (metric, ODP, CO₂-eq) are also displayed.

Available for **free** from the Apple IOS store and Google PlayStore
Search for "GWP ODP CALC" in the Playstore to install!



Down load it Now !

OzonAction Smartphone Application

WhatGas?

NEW



Quickly search for the information you need

- Chemical name
- Chemical formula
- Chemical type
- ASHRAE designation
- Trade names
- HS code
- CAS number
- UN number
- Montreal Protocol Annex and Control measures
- Ozone depleting potential (ODP)
- Global warming potential (GWP)
- Blend components
- Toxicity and flammability class
- Main uses



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Scan the QR code or search for "UNEP", "OzonAction" or "WhatGas?"





GLOBAL

1. Rapid, Large-scale, Coordinated Action Needed to Beat Pollution – UN Chief



Photo: UNEP

4 December 2017 – Noting the severity of the threats posed by pollution to both people and the planet, United Nations Secretary-General António Guterres highlighted the need for rapid, large-scale and coordinated action by all actors to make the world pollution-free. “We already have much of the knowledge and technical solutions we need to prevent, mitigate and manage pollution,” said the Secretary-General, in a message to the UN Environment Assembly, currently under way in Nairobi, Kenya.

“Beating pollution will help reduce poverty, improve public health, create decent jobs, address climate change and protect life on land and sea,” he added.

Being held from 4 to 6 December, the UN Environment Assembly brings together Governments, entrepreneurs, activists and others to share ideas and commit to action to protect on environment.

In his remarks, Mr. Guterres noted the assembly’s focus this year on tackling pollution and said that important successes have been achieved towards that target, including the entry into force of the Minamata Convention on Mercury (a global treaty to protect human health and the environment from the adverse effects of mercury), as well as the announcement that the [Kigali Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer](#) will enter into force on in January 2019, having obtained the required threshold of 20 ratifications.

“Making our planet pollution-free is a long-term necessary endeavour. The world counts on this Assembly to show strong leadership by sounding the alarm and calling on all Governments to act to beat pollution,” he said.

Discussions at the Environment Assembly are focused on a new UN Environment Programme (UNEP) report, [Towards a Pollution-Free Planet](#) that urges greater political leadership and partnerships at all levels; strengthened environmental governance; improved resource efficiency and lifestyle changes; low-carbon tech investments; and advocacy to combat pollution in all its forms.

According to UNEP, environmental degradation causes nearly one in four of all deaths worldwide, or 12.6 million people a year, and the widespread destruction of key ecosystems.

In addition to the impact on health and environment, pollution also extracts a high economic cost – estimated at over \$4.6 trillion (equivalent to 6.2 per cent of global economic output) each year in welfare losses due to pollution.



Erik Solheim, the head of UNEP, speaks at the UN Environment Assembly opening. Photo: UNEP/Cyril Villemain

“Given the grim statistics on how we are poisoning ourselves and our planet, bold decisions from the UN Environment Assembly are critical,” said Erik Solheim, the Executive Director of UNEP.

“That is as true for threats like pollution as it is for climate change and the many other environmental threats we face,” he added, noting that all global processes linked to the environment, such as the [2030 Agenda](#) for Sustainable Development and the [Paris Agreement](#) on Climate Change distil to one simple message, “we must take care of people and planet.”



[United Nations News Centre](#), 4 December 2017

2. Inspirational Environmental Leaders from Chile, China and United States win UN's Top Environmental Honour



Nairobi, 5 December 2017 – Six inspirational environmental leaders today received the United Nations' highest environmental honour, the Champions of the Earth award, during the UN Environment Assembly in Nairobi, Kenya.

President of Chile Michelle Bachelet, Paul A. Newman and his team at NASA's Goddard Space Flight Center, American filmmaker Jeff Orlowski, bike-sharing startup Mobike, Chairman of Elion Resources Group Wang Wenbiao, and the Saihanba Afforestation Community were all lauded for actions that had a significant positive impact on the environment.

"As we face unprecedented threats to our environment, strong leadership at all levels is more

important than ever," said Erik Solheim, head of UN Environment. "This year's Champions embody the commitment, vision and energy we so desperately need."

The awards were presented during the third UN Environment Assembly, which brings together over 4,000 heads of state, ministers, business leaders, UN officials and civil society representatives to tackle the global menace of pollution.

The 2017 winners received the awards for action in the following categories:



SCIENCE AND INNOVATION

Paul A. Newman & NASA's Goddard Space Flight Center, for outstanding contributions to the Montreal Protocol – which has phased out 99 per cent of ozone-depleting substances and led to the healing of the ozone layer.

The first satellite instrument to measure ozone was put into space by the Goddard centre in 1970, and the first Antarctic ozone hole pictures were made using Goddard satellite data in 1985. Since the early 90s, the center has been instrumental in leading updates to the Scientific Assessment of Ozone Depletion, looking at how policies impact the atmosphere and setting a new high-water mark for

international scientific cooperation. The ozone layer is now healing and will return to 1980 levels by mid-century. As a result, up to 2 million cases of skin cancer may be prevented each year by 2030. The Kigali Amendment to the protocol, signed in 2016, is now targeting hydrofluorocarbons (HFCs), which are climate-warming gases with significant global-warming potential. Action in this area can help avoid up to 0.5° Celsius in global warming by the end of the century.

"Ozone is our unseen natural sunscreen," said Dr. Newman. "It's crucial to understand and carefully watch this vital Earth resource."

POLICY LEADERSHIP

Michelle Bachelet, President of Chile, for outstanding leadership in creating marine protected areas and boosting renewable energy. [...]

ENTREPRENEURIAL VISION

Mobike, for exploring market-driven solutions to air pollution and climate change. [...]

INSPIRATION AND ACTION

Jeff Orlowski, Emmy Award-winning filmmaker founder of Exposure Labs, for his work on spreading powerful environmental messages to a global audience [...]

Saihanba Afforestation Community, for transforming degraded land into a lush paradise. [...]

LIFETIME ACHIEVEMENT AWARD

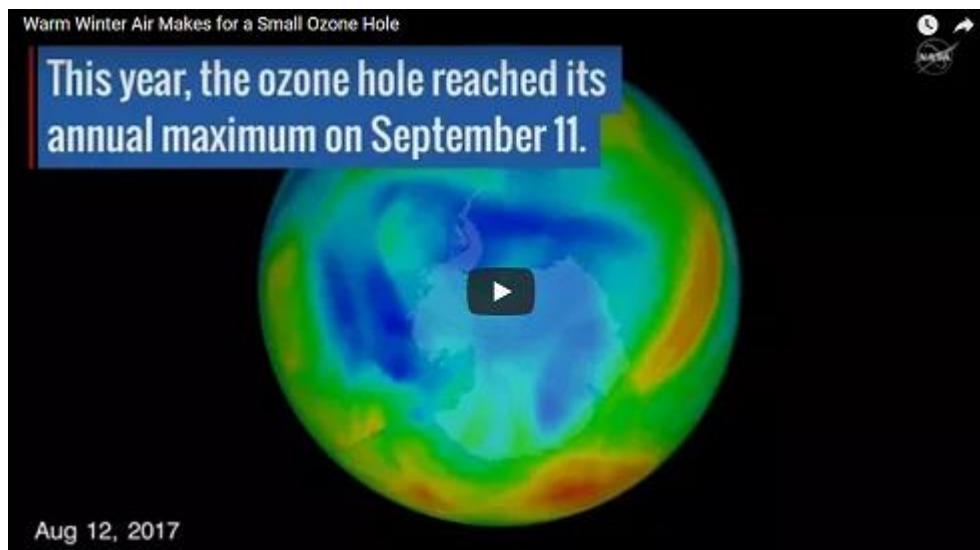
Wang Wenbiao, Chairman of Elion Resources Group, for a lifetime of leadership in green industry. [...]

About Champions of the Earth - The annual Champions of the Earth prize is awarded to outstanding leaders from government, civil society and the private sector whose actions have had a positive impact on the environment. Since being founded thirteen years ago, the awards have recognized 84 laureates – ranging from leaders of nations to grassroots activists – in the categories of policy, science, business and civil society.

- ▶ Visit the Champions of the Earth [website](#) | Videos of the Champions will be uploaded [here](#)
- ▶ For more information and to arrange interviews, please contact: [Robert Few](#), Head of News and Media, UN Environment

3. Warm Air Helped Make 2017 Ozone Hole Smallest Since 1988

Measurements from satellites this year showed the hole in Earth's ozone layer that forms over Antarctica each September was the smallest observed since 1988, scientists from NASA and NOAA announced today.



This year's ozone hole was similar in area to the hole in 1988, about 1 million miles smaller than in 2016. Although scientists predict the ozone hole will continue to shrink, this year's smaller ozone hole had more to do with weather conditions than human intervention.

Credits: NASA's Goddard Space Flight Center/Kathryn Mersmann

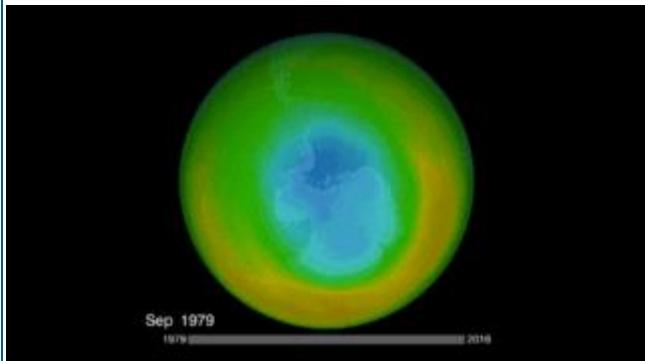
[Scientific Visualization Studio](#)

According to NASA, the ozone hole reached its peak extent on Sept. 11, covering an area about two and a half times the size of the United States – 7.6 million square miles in extent - and then declined through the remainder of September and into October.

NOAA ground- and balloon-based measurements also showed the least amount of ozone depletion above the continent during the peak of the ozone depletion cycle since 1988. NOAA and NASA collaborate to monitor the growth and recovery of the ozone hole every year.

"The Antarctic ozone hole was exceptionally weak this year," said Paul A. Newman, chief scientist for Earth Sciences at NASA's Goddard Space Flight Center in Greenbelt, Maryland. "This is what we would expect to see given the weather conditions in the Antarctic stratosphere."

The smaller ozone hole in 2017 was strongly influenced by an unstable and warmer Antarctic vortex – the stratospheric low pressure system that rotates clockwise in the atmosphere above Antarctica. This helped minimize polar stratospheric cloud formation in the lower stratosphere. The formation and persistence of these clouds are important first steps leading to the chlorine- and bromine-catalyzed reactions that destroy ozone, scientists said. These Antarctic conditions resemble those found in the Arctic, where ozone depletion is much less severe.



Ozone depletion occurs in cold temperatures, so the ozone hole reaches its annual maximum in September or October, at the end of winter in the Southern Hemisphere.
Credits: NASA/NASA Ozone Watch/Katy Mersmann

In 2016, warmer stratospheric temperatures also constrained the growth of the ozone hole. Last year, the ozone hole reached a maximum 8.9 million square miles, 2 million square miles less than in 2015. The average area of these daily ozone hole maximums observed since 1991 has been roughly 10 million square miles.

Although warmer-than-average stratospheric weather conditions have reduced ozone depletion during the past two years, the current ozone hole area is still large because levels of ozone-depleting substances like chlorine and bromine remain high enough to produce significant ozone loss.

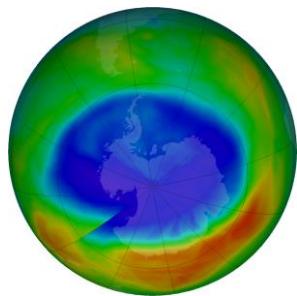
Scientists said the smaller ozone hole extent in 2016 and 2017 is due to natural variability and not a signal of rapid healing.

First detected in 1985, the Antarctic ozone hole forms during the Southern Hemisphere's late winter as the returning sun's rays catalyze reactions involving man-made, chemically active forms of chlorine and bromine. These reactions destroy ozone molecules.

Thirty years ago, the international community signed the Montreal Protocol on Substances that Deplete the Ozone Layer and began regulating ozone-depleting compounds. The ozone hole over Antarctica is expected to gradually become less severe as chlorofluorocarbons—chlorine-containing synthetic compounds once frequently used as refrigerants — continue to decline. Scientists expect the Antarctic ozone hole to recover back to 1980 levels around 2070.

Ozone is a molecule comprised of three oxygen atoms that occurs naturally in small amounts. In the stratosphere, roughly 7 to 25 miles above Earth's surface, the ozone layer acts like sunscreen, shielding the planet from potentially harmful ultraviolet radiation that can cause skin cancer and cataracts, suppress immune systems and also damage plants. Closer to the ground, ozone can also be created by photochemical reactions between the sun and pollution from vehicle emissions and other sources, forming harmful smog.

Although warmer-than-average stratospheric weather conditions have reduced ozone depletion during the past two years, the current ozone hole area is still large compared to the 1980s, when the depletion of the ozone layer above Antarctica was first detected. This is because levels of ozone-depleting substances like chlorine and bromine remain high enough to produce significant ozone loss.



At its peak on Sept. 11, 2017, the ozone hole extended across an area nearly two and a half times the size of the continental United States. The purple and blue colors are areas with the least ozone.

Credits: NASA/NASA Ozone Watch/Katy Mersmann

NASA and NOAA monitor the ozone hole via three complementary instrumental methods. Satellites, like NASA's Aura satellite and NASA-NOAA Suomi National Polar-orbiting Partnership satellite measure ozone from space. The Aura satellite's Microwave Limb Sounder also measures certain chlorine-containing gases, providing estimates of total chlorine levels.

NOAA scientists monitor the thickness of the ozone layer and its vertical distribution above the South Pole station by regularly releasing weather balloons carrying ozone-measuring "sondes" up to 21 miles in altitude, and with a ground-based instrument called a Dobson spectrophotometer.

The Dobson spectrophotometer measures the total amount of ozone in a column extending from Earth's surface to the edge of space in Dobson Units, defined as the number of ozone molecules that would be required to create a layer of pure ozone 0.01 millimeters thick at a temperature of 32 degrees Fahrenheit at an atmospheric pressure equivalent to Earth's surface.

This year, the ozone concentration reached a minimum over the South Pole of 136 Dobson Units on September 25 - the highest minimum seen since 1988. During the 1960s, before the Antarctic ozone hole occurred, average ozone concentrations above the South Pole ranged from 250 to 350 Dobson units. Earth's ozone layer averages 300 to 500 Dobson units, which is equivalent to about 3 millimeters, or about the same as two pennies stacked one on top of the other.

"In the past, we've always seen ozone at some stratospheric altitudes go to zero by the end of September," said Bryan Johnson, NOAA atmospheric chemist. "This year our balloon measurements showed the ozone loss rate stalled by the middle of September and ozone levels never reached zero."

- ▶ Contact: [Katy Mersmann](#), NASA's Earth Science News Team, [Theo Stein](#), NOAA Office of Oceanic and Atmospheric Research, Boulder, Co.
- ▶ [National Aeronautics and Space Administration](#) (NASA), 2 November 2017

4. Concerns for Ozone Recovery



Reactive halogen gases containing chlorine (Cl) or bromine (Br) can destroy stratospheric ozone via catalytic cycles. The main sources of atmospheric reactive halogen are the long-lived synthetic chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), carbon tetrachloride (CCl_4), methyl chloroform (CH_3CCl_3), and bromine-containing halons, all of which persist in the atmosphere for years. These ozone-depleting substances are now controlled under the Montreal Protocol and its amendments. Natural methyl bromide (CH_3Br) and methyl chloride (CH_3Cl) emissions are also important long-lived sources of atmospheric reactive halogen. Rising concentrations of very-short-lived substances (VSLSSs) with atmospheric lifetimes of less than half a year may also contribute to future stratospheric ozone depletion. A greater concern for ozone layer recovery is incomplete compliance with the Montreal Protocol, which will impact stratospheric ozone for many decades, as well as rising natural emissions as a result of climate change.

A Rising Threat?

VSLSSs include synthetic chlorinated and natural brominated compounds. The amount of halogen that a VSLSS contributes to the stratosphere is determined by its lifetime, the solubility of its product gases, and how quickly emissions are transported to the stratosphere. The fastest and most important pathway into the stratosphere is via tropical convective lofting through the tropopause layer. The Asian summer monsoon (1–3) and North American deep convection (1) are also important.

Roughly 80 to 90% of the brominated VSLSSs enter the stratosphere because their oceanic emissions occur in regions where surface air is rapidly lofted to the tropopause layer via deep convection. Only a small fraction of their degradation products is removed by clouds (1). In contrast, only about 50 to 70% of chlorinated VSLSSs reach the tropopause layer (4), because the two main chlorinated VSLSSs—dichloromethane (DCM; CH_2Cl_2) and chloroform (CHCl_3)—are mostly emitted from subtropical and midlatitude continental regions where transit to the tropopause layer is much slower; most of their degradation products are removed by clouds before reaching the stratosphere.

The Atmospheric Halogen Budget

The tropospheric equivalent chlorine (EC) abundance is the starting point for calculating the stratospheric halogen budget (5). EC is the sum of the volume mixing ratios of chlorine and bromine from all halogen source gases; the bromine mixing ratio is multiplied by 60 because it is 60 times more efficient than chlorine at destroying ozone (6). The equivalent effective stratospheric chlorine (EESC) in the Antarctic lower stratosphere is a key measure of stratospheric ozone depletion. Antarctic EESC is calculated from the tropospheric EC, lagged by the transport time from the troposphere to the Antarctic stratosphere and adjusted to reflect the gradual release of Cl and Br from their source gases. Long-lived ozone-depleting substances enter the stratosphere with little degradation and contribute fully to the EESC, but only 50 to 90% of tropospheric VSLSS EC enters the stratosphere.

Tropospheric EC rapidly increased after 1950 (see the figure). The 1987 Montreal Protocol and its amendments control the production and consumption of many ozone-depleting substances, which were phased out in developed countries in the early 1990s, with some production and consumption allowed in developing countries until the 2000s. As a result of these controls, tropospheric EC has fallen since the mid-1990s, but CCl_4 concentrations are declining much more slowly than expected (4).

The concentrations of CH_3Br and CH_3Cl , as well as those of the oceanic brominated VSLSSs, have remained relatively stable for the past few decades. CH_3Br concentrations are dominated by natural sources. Anthropogenic CH_3Br is controlled under the Montreal Protocol, but with some critical usage exemptions. CH_3Cl is also mostly natural and is not controlled.

DCM and CHCl_3 are mainly synthetic VSLSSs that are not controlled by the Montreal Protocol. Whereas the CHCl_3 concentration has remained relatively unchanged since the 1990s, the global mean surface DCM mixing ratios doubled between 2005 and 2014, with highly enhanced local DCM concentrations over India and China (4, 7). Natural sources contribute about 100 to 200 gigagrams per year (Gg/year) to the atmospheric DCM budget, or about 10 to 20% of the global DCM emissions in 2014. Synthetic DCM is used, for example, as an industrial solvent, as an aerosol propellant, and as a fumigant in the food industry. It can be used as a substitute for regulated ozone-depleting substances such as CFCs, CCl_4 , and CH_3CCl_3 . The observed increase in atmospheric DCM concentration reflects the rapid increase in DCM emissions since the mid-2000s from China and India, following the phase-out of compounds controlled under the Montreal Protocol.

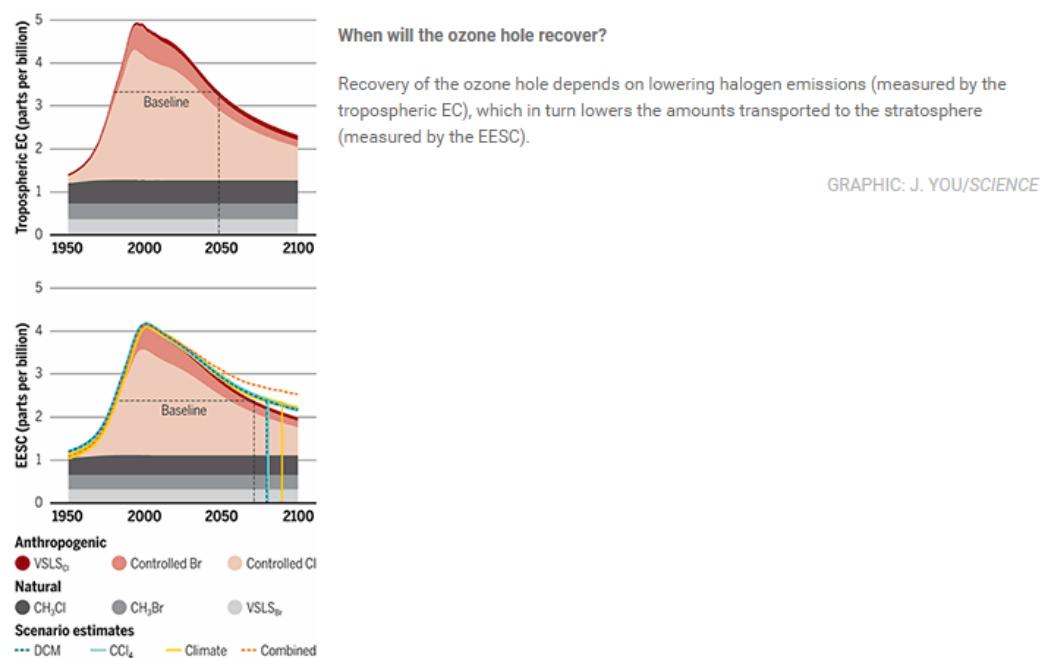
Tropospheric EC abundances remain far above those in 1980. However, as a result of successful regulation by the Montreal Protocol, atmospheric halogen concentrations have been decreasing since the 1990s at nearly the expected

rate. Recent observations of the rapid increase in DCM and a slower-than-expected decline rate in CCl₄ (4) have led to concerns that continued or rising emissions of these gases could affect the rate of stratospheric ozone recovery.

An Uncertain Future

As long-lived ozone-depleting substances continue to decline throughout the 21st century, the tropospheric EC is expected to return to the 1980 level by ~2050 (see the figure); EESC and stratospheric ozone are projected to return to 1980s levels by ~2060 (8). Globally, stratospheric ozone will return faster than EESC mainly due to rising CO₂ concentrations, which cool the upper stratosphere and thereby reduce the ozone loss rate. Hossaini *et al.* (9) recently argued that stratospheric ozone recovery could slow substantially if the recently observed global mean DCM growth rate of 2 parts per trillion (ppt)/year continues. However, maintaining this growth rate requires global emissions by 2100 that greatly exceed the current global production capacity for CHCl₃, DCM, and CCl₄ (10).

In the unlikely case of such large DCM emissions, the global mean tropospheric DCM concentration would be ~100 ppt by 2050. Assuming that ~60% of the surface DCM enters the stratosphere, this would contribute ~120 ppt Cl to EESC, or ~4% of the projected EESC in 2050. This additional Cl from DCM would delay Antarctic ozone recovery to the 1980 level by 8 years.



Limited compliance with the Montreal Protocol is a greater concern for stratospheric ozone recovery. Controlled substances are projected to contribute ~56% to the EESC in 2050. Currently, ~35 Gg/year of the global CCl₄ emissions are not accounted for in the United Nations Environment Programme (UNEP) inventories (10). If these emissions continue, they will add ~135 ppt Cl to Antarctic EESC by 2050 and delay Antarctic ozone layer recovery by 10 years.

The biggest uncertainty in stratospheric ozone recovery comes from human-induced perturbations to climate that may increase natural emissions of CH₃Cl, CH₃Br, and the brominated VSLSSs from oceanic and terrestrial sources. Past studies suggest that a warming climate will greatly enhance oceanic CH₃Br emissions (11). Oceanic brominated VSLSS emissions could increase by ~30% from 2010 to 2100 under the Representative Concentration Pathway 8.5, a scenario of high greenhouse gas emissions (12). Biomass burning emissions of CH₃Cl and CH₃Br will also likely increase in the future. Climate change may also lead to rising natural emissions of another halogen, iodine.

A climate-induced increase of 0.2% per year in atmospheric concentrations of CH₃Cl, CH₃Br, and brominated VSLSSs would increase EESC by 100 to 200 ppt between 2050 and 2100. This would lead to a ~20-year delay of the Antarctic ozone recovery and a ~4% reduction in the Antarctic total ozone column. Ozone recovery will be accelerated because of increasing CO₂ (8), offsetting the impact on ozone from climate-induced emissions increases.

As a result of successful regulation by the Montreal Protocol, atmospheric halogen concentrations have declined and will continue to decline. In the latter half of the 21st century, the ozone layer will be mainly controlled by the atmospheric CO₂ concentration. The individual contributions from DCM, CCl₄, and climate-induced increases in natural emissions to EESC and hence ozone layer recovery are relatively small, but together they will decrease the Antarctic total column ozone by ~10% between 2050 and 2100, posing a substantial concern (see the figure). With a lifetime of a few months, DCM impact will dissipate within a few years if emissions slow down or stop, whereas emissions of long-lived

compounds such as CCl₄ will last for many decades. To counter this threat, improved compliance and monitoring of controlled substances and successful efforts to limit climate change are crucial.

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2. Susan E. Strahan^{1,2},
3. Eric L. Fleming^{1,3}

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► [Science](#), 8 December 2017, Vol. 358, Issue 6368, pp. 1257-1258, DOI: 10.1126/science.aaq0145



5. The International Institute of Refrigeration (IIR) Launches Quiz on the Impact of Refrigeration on the Climate Change

The 10-question quiz on “Refrigeration and the environment” by the International Institute of Refrigeration (IIR) is based on the recently published IIR Informatory Note on The Impact of the Refrigeration Sector on Climate Change.

In conjunction with the newly released 35th IIR Informatory Note on The Impact of the Refrigeration Sector on Climate Change, the International Institute of Refrigeration (IIR) has launched a quiz on “Refrigeration and the environment”, which enables participants from all fields and backgrounds to gain rapid insight on the key environmental issues at stake in connection to refrigeration.

The 35th IIR Informatory Note reviews existing data to estimate past greenhouse gas emissions generated by refrigeration systems and make projections for the future.

As ascertained by the Note, the refrigeration sector is responsible for 7.8% of global greenhouse gas emissions, almost two thirds of which are generated by the electricity used by refrigeration systems. This presents two challenges: reducing refrigerant emissions, particularly HFCs, in accordance with the application of the Kigali Amendment to the Montreal Protocol, which enters into force on January 1, 2019, and making equipment more energy efficient while developing the use of renewable energy.

Focusing on the impact the refrigeration sector can have on the environment from a technical, scientific and societal point of view, the 10-question quiz is an informal and amusing way for individuals to familiarise themselves with and test their knowledge on this issue.

As such, the quiz provides detailed explanations to questions giving participants the opportunity to further expand their understanding on a matter that is currently at the heart of international concerns.

Test your knowledge on refrigeration and the environment with the IIR 10-question quiz:

[**Begin the quiz!**](#)

► For more information visit www.iifir.org

6. Thirty Years Later: How the Montreal Protocol Changed the World - A Look at How the Protocol Became the Benchmark for International Co-operation



The Montreal Protocol is the first-ever universally ratified treaty by the United Nations, encompassing all 197 countries. On September 16 of this year, it turned 30 years old.

Having entered into force on New Year's Day in 1989, the Montreal Protocol was signed during a time where drastic and immediate change needed to be agreed upon. The protocol curbed the growth of the hole in the ozone layer significantly and most likely prevented a serious environmental crisis.

The treaty prevented damage to the ozone layer that would have been 10 times worse had it not been enforced, according to a 2009 NASA study. That would have meant increased damage to animals, plants, and humans. Skin cancer rates would've risen.

By 2065, the amount of DNA-mutating UV radiation would have been up 500 per cent and two-thirds of the world's ozone would be gone.

Not only did the Montreal Protocol effectively mitigate some of the most dangerous effects that would have come up without properly addressing the amount of ozone, it was also a landmark moment for international diplomacy. Being

the first universally agreed upon treaty in the history of the United Nations, it showed that, regardless of international tensions, the future of our planet should be above conflicts or disagreements.

By sharing the burden among all nations and applying a localized effort in order to limit and the ultimately shut down the use of chlorofluorocarbons and other ozone depleting substances, the main catalysts for ozone depletion.

The narrowed-down approach of the Montreal Protocol is one of its most effective clauses, especially compared to the Kyoto Protocol. The fact that the Kyoto Protocol adopted a more global approach of international regulation is one of the reasons why it failed to attack some of the more local issues that would have been better addressed through a framework similar to that of the Montreal Protocol.

It's not the fact that all the countries came together that is most impressive out of all. What really makes it the pinnacle of diplomacy was the brutal simplicity with which the treaty and its negotiations were undertaken.

In 1979, scientists were just starting to understand the potential damage that a depleted ozone layer could cause. Their worries were intensified when they saw the hole in the ozone layer above the South Pole had gone from 1.1 million square kilometers in 1979 to 22.4 million when the Montreal Protocol was signed in 1987.

Seeing this problem, governments did not entertain anti-science thinkers or reject an international crisis for the sake of “the economy” by blowing up one of the planet’s last chances at saving an environment, as was the case with the United States pulling out of the Paris Agreement. Today, the Montreal Protocol would likely have been met by much more skepticism by American republicans and climate change deniers.

Policymakers and scientists got to work and drew up a long-term plan that would slowly phase out harmful ozone-depleting substances that curbed the growth rate of the hole so drastically that in the 24 years following the Montreal Protocol, the hole only grew an additional 3.6 million square kilometres—an enormous reduction in growth from the 21.3 million square kilometres between 1979 and 1987.

Thanks to this agreement, the ozone hole is now currently healing and has closed up by roughly 4 million square kilometres since 2000, according to Susan Solomon, a professor of atmospheric chemistry and climate science at MIT.

“It gives us hope that we shouldn’t be afraid to tackle large environmental problems,” said Solomon.

All this progress because 30 years ago, the world decided that, as a global community and as species, the only solution to an inevitable global crisis affecting everyone would be to work together.

Hopefully, we can find that spirit again sometime in the future.

► [The Link](#), 5 December 2017, By: Elias Grigoriadis



AFRICA

7. Report Tackles African Response to Kigali Amendment



Photo: Near Cape Town, South Africa

A new report aims to support African countries in identifying priority areas for the successful implementation of the HFC phase-down under the Kigali Amendment to the Montreal Protocol.

A report on '[Africa and the Kigali Amendment](#)', produced by the United Nations Industrial Development Organization (UNIDO) with the support of the government of Italy, aims to help African countries in identifying priority areas for the successful implementation of the HFC phase-down under the Kigali Amendment to the Montreal Protocol.

Francesco La Camera, director-general for sustainable development, energy and climate at the Italian Ministry of Environment, Land & Sea, wrote in the report, “the scope of the present work is to hear the voices of African countries, and to identify their specific needs, concerns and challenges in effectively implementing the Kigali Amendment”.

“The demand for air conditioning and refrigeration is constantly growing, particularly from developing countries. The introduction of environmentally friendly solutions will allow the Parties to comply with the downstream obligations under the Montreal Protocol,” La Camera stated.

Challenges cited in the report – presented by international natural refrigerants expert Nina Masson at the 29th Meeting of the Parties to the Montreal Protocol (20-24 November 2017) in Montreal, Canada, focused on African countries' reliance on second-hand imported residential air-conditioning and refrigeration equipment and the lack of infrastructure to make its own equipment.

African countries are in the developing-country (Article 5) pathway of Kigali and will only start phasing down HFCs by 10% in 2029, while developed (non-Article 5) countries like Australia, the USA and EU member states will start in 2019.

"As a consequence, product strategies adopted by major RAC exporters – in China, Japan, Europe or the USA – have a decisive impact on the adoption of low-GWP technologies," the report notes.

Masson, who was lead author on the report, said there is an infrastructure of RAC associations and training institutes in most African countries, describing it as a "stable basis for raising the skills level of the RAC sector and policymakers".

African policymakers will need help constructing the regulatory framework necessary for Kigali, support in adopting low-GWP substances and technologies, and help from the Multilateral Fund (a Montreal Protocol fund for installations that harness sustainable refrigeration and air-conditioning technologies), the report argues.

A lack of available low-GWP refrigerant-based equipment "poses a strong challenge to African countries," according to the report.

"It's very obvious we have a lot of alternatives," notes Juliet Kabera of the Rwanda Environment Management Authority in the report. "The use of carbon dioxide should be really common compared to what it is right now. In my country, we have it as a byproduct from one big project of extracting methane gas and I was wondering why we have to always import instead of using what we already have."

Countries should therefore not only start exploring existing sources of propane, CO₂ or ammonia as byproducts from industrial processes to refine them as high purity refrigerants, but should also build a regional supply chain for sustainable refrigerants. A plant in Nigeria is about to start producing propane refrigerant, to reduce dependency on hydrocarbon imports from Europe or China.

It is easier to switch to some technologies than others. "Converting domestic refrigeration to low-GWP (mostly R600a) will be rather easy," said Masson.

The report notes, "trends indicate that by 2020 around 75% of the domestic refrigerators on the global market will be equipped with R600a".

Many projects have also been implemented by UNIDO, an implementing agency of the Multilateral Fund of the Montreal Protocol, for training "on alternative refrigerants in Eritrea, the Gambia, and Tunisia".

The report also covers how Africa will face up to the Kigali requirements and pay attention to literacy and training, energy efficiency, partnerships between public and private bodies, socio-economic effects, gender balance, and technical specifications.

A French version of the report will be available in early 2018, to reach all African policymakers.

► [Ammonia21](#), 12 December 2017, By: Charlotte McLaughlin

8. Seychelles Joins Initiative Mandating Use of Ozone-friendly Appliances



Through the initiative, Seychelles will be able to replace appliances such as refrigerators with HCFCs and CFCs with those using natural gases. (Salifa Karapetyan)

Seychelles is focusing on ozone-layer-friendly technological appliances as it joins the second phase of the Green Cooling Africa Initiative. Through the initiative, Seychelles will be able to replace appliances such as refrigerators and air conditioning units containing hydrochlorofluorocarbon (HCFCs) and chlorofluorocarbons (CFCs) with those using natural gases.

The principal secretary for energy and climate change, Wills Agricole, said that applications for refrigeration and air conditioning are increasing as they are essential in areas such as the preservation of food and medicine.

"As a result, greenhouse gas emissions also rise, because these applications consume electricity and most of these applications use fluorinated gases as refrigerants in their functioning," said Agricole. The principal secretary added that

"as these gases leak during operation, servicing or when an appliance is dismantled or disposed of, cause substantial emissions of greenhouse gases."

The project has been financed by the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB). It is being implemented by the German development agency GIZ in collaboration with the Seychelles Ozone Unit in the Ministry of Environment, Energy and Climate Change.

The project manager of GIZ, Nika Greger, said that although Seychelles is a low consuming country, the island nation must join other countries in helping phase out these destruncting gases.

"The project will also be collecting data appliances used by consumers in Seychelles. The result will be presented in the form of a roadmap that can serve as a strategy for the market and draft energy-friendly policies," said Greger.

Seychelles, a group of 115 islands in the western Indian Ocean, became the 5th country in Africa to be part of the Green Cooling Africa Initiative after Ghana, Namibia, Kenya and neighbouring island Mauritius.

The Green Cooling Africa Initiative is a programme supporting its partner countries to create a shift in the cooling sector towards more sustainable technology and a low mitigation pathway. It will enable all five countries to develop a clear understanding of how the cooling sector contributes to their national energy consumption and total Green House Gas emissions and where appropriate policy measures are required.

In an effort to reduce energy use in Seychelles, the Energy Commission is also setting energy efficiency standards for five types of electrical home appliances entering the country as of next year.

With the new standards, it will be mandatory for bulbs, freezers and refrigerators, air conditioners, electric water heaters and washing machines to meet the required minimum standard. The announcement was made by Minister of Finance Peter Larose in his budget address in October.

► [Seychelles News Agency](#), 5 December 2017, By: Daniel Laurence, Edited by: Betymie Bonnelame

ASIA PACIFIC

9. UN Office in Bangkok Welcomes School Children Who Won 1st Prize in Maldives' World Ozone Day Competition



8 December, Bangkok - A small delegation of school children from the Maldives paid a visit to the UN Office in Bangkok. The delegation included winners of the first prize in Maldives' World Ozone Day competition: Mohamed Viam Abdulla and Mohamed Ahil Ahmed Isthafa, both nine-year-old 3rd grade pupils, and their teacher Ms. Thahumeena Rasheed.

In this year's model-making competition on Ozone and Climate issues among students from the first to 12th grade, Viam Abdulla and Ahil Ahmed's 'Energy Saving' project competed against 26 other entries. The winning model was made by the children at home with the help of their parents using nine diverse types of recycled materials (sponge, plastic, cardboard, etc). Their model represents the future of energy.

The children had a chat with UN Environment OzonAction team in Bangkok as well as various colleagues within the UN Environment office. When asked: "What should we all do for the environment?" Viam Abdulla quickly responded: "We should pollute less, especially hazardous poisonous chemicals".

The children also had an insightful meeting with Mr. Jaco Cilliers, Chief of the UNDP Regional Policy and Programme for Asia and the Pacific. He was impressed by their model and asked them to help to implement renewable energy solutions in their country in the future.

On the occasion of the 30th Anniversary of the Montreal Protocol, the National Ozone Unit at the Ministry of Environment, Maldives conducted a series of events including the creation of an ozone logo and a festival using the thematic Ozone Heroes campaign.

► Contact: [Liazzat Rabbiosi](#), Programme Officer, OzonAction - Montreal Protocol Asia and the Pacific Office, UN Environment



UN Environment and UNDP colleagues working in Maldives with the 1st prize winners



With Jaco Cilliers, Chief UNDP Asia and Pacific Office, Bangkok



With UN Environment OzonAction-Montreal Protocol team in Bangkok

10. Household Electric Appliances that Contain HCFC to be Banned (SriLanka)



Mahaweli Development and Environment Ministry will ban importing of household electric appliances that contain Hydrochloro-fluorocarbon (HCFC) effective from January 1st, 2018 as the use of HCFC is extremely harmful to the environment and to the ozone layer, a senior official of the Ministry said yesterday.

The electric equipments thus banned from next year are: Freezer or Refrigerated trucks or Refrigerated containers, Refrigerators, Freezers, Water coolers, Ice machines, Air conditioning and heat pumping units.

Introducing of additional regulations for further strengthening of phasing out of Hydrochloro-fluorocarbon (HCFC).

The Ministry of Mahaweli Development and Environment, which is the focal point for Vienna Convention and Montreal Protocol on protection of ozone layer has been entrusted with responsibility in resolving of environment related problems for granting comfortable and healthy environment for the nation. As a party to the Montreal Protocol since 1989, Sri Lanka worked on gradual phase out of ozone depleting substances (ODSs) within the stipulated time frame and has taken initiative in introducing of ozone friendly alternative substances and technologies, Secretary of the Mahaweli Development and Environment, Anura Dissanayaka said.

Some 96 chemicals have been identified as ODSs and out of which import of 56 high aggressive chemicals such as Chlorofluorocarbons (CFC), Bromofluoromethane (Halon) Carbontetrachloride (CTC) etc. were banned since 2010. At present, remaining 40 chemicals that are less aggressive on ozone depletion, named Hydrochlorofluorocarbons (HCFC) are being phased out. Several gazette notifications had been published time to time since 1996 for regulating the use of Ozone Depleting Substances, complying with the Montreal Protocol regulations, Mr. Dissanayaka told Daily Mirror.

The relevant gazette notification banning the electric items carrying HCFC chemicals will be issued in the next fortnight, he added.

"The last Extraordinary Gazette Notification was issued under the Import and Export (control) Act of 1969 on 01.08.2013 to introduce measures in order to control HCFC import. Under the new regulations, import quota system was introduced with effect from 01.01.2013," Mr. Dissanayaka pointed out.

With the ongoing phase-out of HCFC programme (Gradual reduction of import of HCFCs), import of HCFC will be cut down by 35% of the quantity imported in 2013. Hence, there will be a shortage of HCFCs in the market for service and maintain of existing equipment, if the import of HCFC based equipment are allowed to continue.

In addition, Sri Lanka has agreed to the resolution adopted at the United Nations Climate Change Conference held in Paris, in December 2015 and subsequently signed in New York on 22nd April 2016 to contribute for the global effort to achieve the long-term goal of keeping the increase in global average temperature to well below 2°C above pre-industrial levels. Global Warming Potential of Hydrochlorofluorocarbons are greater than carbon dioxide by 1,800 times have direct impact on global warming. Therefore, controlling of ozone depleting substances in order to protect the ozone layer is directly involved to control the global warming, he stressed.

▶ [Daily Mirror](#), 12 December 2017, By: Sandun A Jayasekera

11. HFC Phase-down will be Climate Win for India



The world has won a major battle against pollutants, by phasing out chemicals that caused a hole in the earth's ozone layer. The next challenge in this area is to phase down the chemicals that are being used as alternatives, because these chemicals are heating up the atmosphere.

The Kigali Amendment to the Montreal Protocol (meant to deal with such chemicals) will come into force on January 1, 2019, with over 20 countries ratifying the Amendment. The Amendment was adopted a little more than a year ago, when delegates from over 190 countries gathered in Kigali, Rwanda, and agreed to phase out hydrofluorocarbons (HFCs) within the ambit of the protocol.

Under the Amendment, all countries will gradually phase down HFCs by more than 80% over the next 30 years and replace them with more eco-friendly alternatives. HFCs, which are commonly used as coolants in air conditioning and refrigeration, do not deplete the ozone layer like hydrochlorofluorocarbons (HCFCs), but are extremely potent greenhouse gases. HCFCs were the gases causing the ozone hole, and have been almost totally phased out.

Last year, on the eve of the agreement, India's then Environment Minister Anil Madhav Dave had said, "The Amendment facilitates adequate carbon space for growth on domestic industries while minimising the cost to the economy during the transition period." Many crucial decisions for India, under the Amendment, were, however, deferred to future meetings: including the two most important — the replenishment of the Multilateral Fund (MLF) for phase-down enabling activities, and the promotion of energy efficiency while phasing down HFCs.

At the most recent meeting of the Parties to the Montreal Protocol that concluded last week, countries agreed to replenish the MLF for HCFC phase-out activities, and further progress was made on the form and substance of energy efficiency promotion under the Montreal Protocol.

Balancing phasedown and consumption

While these issues continue to be discussed at international forums, it is crucial to note that not all domestic actions depend solely on MLF funding. Under the terms of the Amendment, India, along with a few other countries, has about 10 years to prepare its industries and governing institutions for HFC phasedown. In reality, the available time period will be much shorter due to the nature of the phasedown and the large projected growth in HFC consumption in India. Nonetheless, India has already introduced policies to begin a successful transition to low global-warming potential (GWP) refrigerants.

Furthermore, many Indian manufacturers are already experimenting and switching to low and medium GWP refrigerants. Tata Motors and Godrej Appliances are among the few companies in the world that are testing and manufacturing equipment with low-GWP refrigerants, R152a and R290, respectively. Kirloskar Chillers has opted for Honeywell's low-GWP refrigerant, R1234ze, in its new line of large central air-conditioning units, targeted for installation in industrial and commercial buildings.

Danfoss Industries is planning to partner with UN's [Sustainable Energy for All](#) initiative, and others, to develop a district cooling project in India. Chilled water from the Danfoss facility would run into consumers' premises where it would be used to generate cold air similar to an air conditioner. Finally, six major AC manufacturers have committed to manufacturing ACs with R32, a medium-GWP refrigerant, in addition to their regular AC series. R32-based ACs can also offer improved energy efficiency benefits for consumers.

While these actions are commendable, there is extensive need for concerted action supporting the transition from HFCs towards climate-friendly refrigerants. This includes research and development, skill development and training of technicians, standardisation and safety specification of technologies, incentivising these climate-friendly technologies, and other regulatory measures.

Collaborative research platform

Just ahead of the Kigali negotiations in 2016, the Government of India committed to establish a collaborative R&D platform to develop and foster low-GWP solutions for India. However, this platform is yet to be set up. The [Council on Energy, Environment and Water](#) (CEEW), in its recent study titled [Developing an Ecosystem to Phase Out HFCs in India](#) has emphasised the relevance of a dedicated multi-stakeholder R&D platform to facilitate the phase-out of HFCs in India.

Based on discussions with government and industry experts, the CEEW study found that setting up a collaborative R&D platform to support industry in this transition would be a positive signal of support for all relevant stakeholders, as well as for the market at large. It would be in line with domestic ambitions of Make in India, Skill India, and a sustainable India.

Moreover, a concerted effort to develop such expertise domestically will benefit Indian industry and contribute to the economy, as India is among the largest anticipated growth markets globally for air conditioners and refrigeration.

Moreover, as the Ministry of Environment, Forest and Climate Change ([MOEFCC](#)) prepares to begin the next stage of the on-going HCFC phase-out, much-needed attention is being given to the AC servicing sector. The servicing sector is responsible for as much as 40% of all refrigerant consumption. Refrigerants are released into the atmosphere due to faulty servicing, lack of leak detection and recovery, or due to lack of appropriate tools.

The syllabus at the Industrial Training Institutes has been revamped to include latest air conditioning technology modules, as well as information on the environmental impacts of refrigerants. However, according to another recent CEEW study titled [Can India's Air Conditioning Service Sector Turn Climate Friendly?](#), within the servicing sector, much remains to be done. Re-skilling or skilling up of technicians is only one part of the challenge. Others include employment security and wage stability for technicians, addressing the lack of customer knowledge (which, in turn, results in customers seeking to cut corners while getting their equipment serviced), and standardising service practices across the country.

Globally, as the rulebook and enhanced ambitions within the Paris Agreement continue to develop at a glacial pace, the opportunity for a successful technological transition from HFCs to showcase India's industrial capabilities, environmental leadership, and innovation-at-large, is well-timed.

The tripod of energy efficiency benefits to consumers, industry profits and market shares within India and for exports, as well as financing available through the MLF of the Montreal Protocol, is a unique juxtaposition of critical factors that may enable a climate and industrial win-win for India by phasing-out HFC consumption — one that could be a true testament marking India's global environmental leadership, and domestic actions, to mitigate climate change.

► [India Climate Dialogue](#), 1 December 2017, By: Lekha Sridhar, Shikha Bhasin



LATIN AMERICA AND CARIBBEAN



12. CO₂ Gaining Ground in Argentina

As part of the bilateral cooperation between the Italian Ministry for the Environment, Land and Sea and the Argentinian Ministry of Environment and Sustainable Development, two workshops on low GWP alternatives for the commercial refrigeration sector were organized by the National Ozone Office with UNIDO as Implementing Agency and the assistance of the Centro Studi Galileo (CSG).

The first one took place on the 4th of December in Buenos Aires, and the second one on the 6th in Rosario, known as the Cold Capital of the country, because it's the city in Argentina where there is a high number of refrigeration equipment manufacturers.

Leapfrogging to CO₂?

Argentina, which under the Kigali Amendment to the Montreal Protocol is an Article 5 Group 1 country, will start phasing down HFCs in 7 years' time under the Kigali Amendment.

HCFC R-22 is still widely used in commercial refrigeration in Argentina, in 2016, the usage of R-22 amounted to 2,290 tons, while the total for HFCs was more than 5,700 tons, according to the Ministry of Environment figures.

"We would like to move directly to alternative refrigerants without passing through HFCs," Laura Berón, coordinator of Argentina's Ozone Office for the Ministry of Environment told the conference.

Francesco Mastrapasqua, EPTA's refrigeration systems sales and marketing manager, revealed: "We already have 10 supermarkets with alternative refrigerants in this country working with CO₂ transcritical systems. They could be a leading example for the widely expanded network of supermarkets in the country, which is mostly condensed in the three provinces of Buenos Aires, Cordoba and Mendoza."

One European retailer working in Argentina announced that due to the HFC phase-down, all future installations in its supermarkets will use alternative refrigerants like CO₂ or other low-GWP options, depending on the cost and technical requirements. They expect 50% of new installations to be either CO₂ only or cascades.

Supermarket chains like Walmart, Carrefour and Argentinian retailer La Anonima were also in attendance at the conference.

Adrian Muresan, application engineer at Dorin, explained how sub-critical carbon dioxide systems for medium and large supermarkets and systems with hydrocarbons could be used in Argentina and have already been used elsewhere.

Leading manufacturers such as Alfa Laval, the CAREL Group, and Officine Mario Dorin, Epta, Embraco, LUVE, and end users such as Inres Coop presented their innovations at the conferences.

The Argentinian Ministry also announced that they will continue with the training sessions, as part of the HCFC National Phase-out Plan (HPMP) to prepare technicians to move towards low-GWP refrigerants.

Also, specific training for a certification scheme for low-GWP refrigerants, starting with flammable refrigerants, is being developed by the Government of Argentina.

Italian research institution Centro Studi Galileo (CSG) announced that, inspired by the European contractors group AREA and the EU-funded Real Alternatives 4 Life project, training sessions will start in 2018 with the private sector.

- ▶ Contact: [Laura Estela Berón](#), Coordinadora , Oficina Programa Ozono, Subsecretaría de Cambio Climático y Desarrollo Sustentable - Argentina

13. Grenada Technicians Train on NatRefs in Germany



Grenada is sending technicians to Germany as part of the C4 project, to train them on using natural refrigerants.

Thanks to collaboration between Germany and the Caribbean nation of Grenada, two local technicians have returned to Grenada after an October training session on natural refrigerants in Germany.

They went abroad to complete a two-week training programme on using natural refrigerant-based HVAC&R technologies. A total of five Grenadian technicians have now taken the trip to Europe.

Upon their return they paid a visit to Leslie Smith, national ozone officer in Grenada's NOU (National Ozone Unit), to report on their experience. They will now share their knowledge with other technicians to increase the number of technicians trained on natural refrigerants.

The C4 (Cool Contributions fighting Climate Change) project, executed by the NOU with the support of the German Federal Ministry for the Environment, will train more Grenadian technicians in the coming years. Five technicians have already been selected to attend next year's training programme.

The aim of the project is to expose and train local technicians on the handling of low-GWP flammable refrigerants. The programme covers natural refrigerants such as hydrocarbons.

"The policy of the NOU in the phasing out of HCFCs is to transition to a longer term refrigerant/technology alternative, that has zero ODP, zero/negligible GWP, and is energy-efficient," said Smith.

Two fisheries in Grenada recently switched from HFC systems to ammonia ones.

"The idea is to use natural refrigerants in all applications where applicable. This includes other applications such as domestic, commercial and industrial refrigeration," he said.

"Over the last year, two major government fisheries complexes have transitioned from HFCs to ammonia as the refrigerant used."

Projects underway in Grenada to facilitate technician training include:

- Cool Contributions fighting Climate Change (C4): Project with approximately 30 hydrocarbons-based air-conditioning demonstration sites.
- Capacity building and training on international standards.
- Hydrocarbons demonstration caravan.
- Regional project on the safe handling of low-GWP flammable refrigerants.

On 25 August Grenada opened a pilot training centre equipped with two hydrocarbons-based air-conditioning units as part of a regional demonstration project implemented by the United Nations Industrial Development Organization (UNIDO).

The demonstration essentially compared the energy performance of similar-sized air-conditioning units using R22, R410A and R290. The results revealed that the propane unit consumed the lowest amount of energy.

Leslie Smith was among 24 people to receive an award for 'policy and implementation leadership' organised by the Ozone Secretariat in collaboration with the Government of Canada to commemorate the 30th Anniversary of the Montreal Protocol, awarded during the recent Meeting of the Parties in Montreal, Canada.

► [Hydrocarbons21](#), 14 December 2017, By: Daniel De Greef



NORTH AMERICA

14. U.S. Seafoods Takes Action to Prevent Further Releases of Ozone-Depleting Substances

SEATTLE – U.S. Seafoods of Seattle will implement enhanced leak detection practices and replace freezer equipment to address violations of the Clean Air Act resulting from releases of ozone-depleting substances from two of its fish processing vessels in Alaska.

EPA investigators discovered that in 2012 the freezers on two vessels owned by U.S. Seafoods — the F/V Seafreeze Alaska and the F/V Alliance — were leaking an ozone-depleting refrigerant called R-22. EPA found that the vessel owners and operators failed to repair the leaks in a timely manner and failed to confirm that the freezers were not leaking when finally repaired.



Bottles of R-22 refrigerant.

Releases of refrigerants like R-22 deplete stratospheric ozone and violate requirements under the Clean Air Act National Recycling and Emission Reduction Program. The National Recycling and Emission Reduction Program governs the management of ozone-depleting substances and implements the United States' mandates under the 1991 Montreal Protocol on Substances that Deplete the Ozone Layer.

The ozone layer protects the earth and its inhabitants from the adverse effects of ultra-violet or UV radiation which is known to cause cancers, immune system suppression, and cataracts. In addition, excessive UV radiation can harm crops, plankton production, and the marine food chain.

► [Alaska Native News](#), 16 November 2017, By: Suzanne Skadowski



EUROPE & CENTRAL ASIA

15. EU Fluorinated Gases Phase-down Remains on Track

European Environment Agency



European Union efforts to phase-down the production and import of fluorinated greenhouse-gases (F-gases) made good progress in 2016, according to the latest annual update published by the European Environment Agency (EEA) today.

The EEA report '[Fluorinated greenhouse gases 2017](#)', tracks progress in the phase-down based on data reported by European companies on their activities involving F-gases in 2016. It assesses the progress made under the ongoing EU-wide hydrofluorocarbons (HFC) phase-down and provides an outlook towards the global HFC phase-down, which is due to begin in 2019 under the Kigali Amendment to the Montreal Protocol. The report also details the amount of F-gases supplied to industry. The report assesses both the physical amounts (in tonnes) and in amounts weighted by the global warming potential of hydrofluorocarbon gas, which is measured in CO₂-equivalent tonnes (CO₂e).

Hydrofluorocarbons are synthetic chemicals mainly used in refrigerators, heat pumps and air conditioners in buildings and cars. They were in many cases introduced to replace other chemicals that were found to be harming the ozone layer. However, these F-gases have also been found to be harmful to the environment and to contribute to climate change. Curbing F-gas emissions is an important part of the EU's commitment to reduce greenhouse gas emissions by 40 % by 2030, compared to 1990 levels.

Phase-down of HFCs under the EU F-Gas Regulation

The phase-down of F-gases is implemented through a system of annual quotas allocated to producers and importers. In 2016, EU-wide placing on the market of HFCs was 4 % below the 2016 market limit. By comparison, in 2015, companies remained 8 % under the limit.

EU Contribution to the global phase-down of HFCs under the Kigali Amendment

In 2016, HFC consumption in the EU was the lowest since reporting started in 2007 and was already 14 % below the first limit for the EU under the Montreal Protocol's Kigali Amendment. The Montreal Protocol to reduce the production and consumption of ozone depleting substances, was amended to regulate HFCs, in October 2016.

Key Figures:

- Production of F-gases reported in tonnes went up by 2 % in 2016 compared to 2015. While the production of F-gases in the EU has increased (in tonnage) since 2014, the gases produced are relatively less harmful for the

climate. The supply of F-gases in the EU increased by 2% but the overall warming effect actually decreased by 2 % (CO₂e).

- Imports of F-gases to the EU in 2016 increased by 5 % compared with 2015 or by 2 % if measured in CO₂e. This increase is primarily due to an 80 % rise in HFCs with low global warming potential.

► [European Environment Agency \(EEA\)](#), 8 December 2017

16. EU F-gas Imports up by 5%



Imports of HFCs in Europe have gone up slightly, according to a new report from the European Environment Agency (EEA).

Ahead of an upcoming cut to the HFC quota in 2018, the '[Fluorinated greenhouse gases 2016](#)' report – published last week by the European Environment Agency (EEA) – reveals that bulk imports of fluorinated gases rose by 2% in 2016 compared to the previous year.

Under the EU F-Gas Regulation, on 1 January 2018 the overall allocated quota of HFCs is set to fall from 93% of the original baseline to just 63%

The increase, reported by the EEA (an agency of the European Union), contrasts starkly with the decrease reported in 2015 – the date of the entry into force of the EU's new F-Gas Regulation on phasing down HFC consumption – when bulk imports fell by 40%.

The EEA report cites the import increase as “primarily due to an 80% rise in HFCs with low global warming potential” as imports of F-gases went up by only 2% if measured in CO₂ equivalent (CO₂e).

Production of f-gases, reported in tonnes, also went up by 2% in 2016 compared to 2015 levels. These gases had less global warming effect than previously used HFCs, according to the report, as CO₂e decreased by 2%.

In comparison to the Kigali Amendment to the Montreal Protocol, which is a global agreement to limit HFCs, the EU is well ahead of its targets.

In 2016, HFC consumption in the EU was the lowest since reporting began in 2007 and is already 14% below the required limit enshrined in the Kigali Amendment, the EEA claims.

Arno Kaschl of DG CLIMA at the European Commission, whose principal objectives are implementing the EU's fluorinated gas policies and supporting the international negotiations under the Montreal Protocol to put into effect a global phase-down of HFCs, recently stated in [Accelerate Europe](#) that the F-Gas Regulation is on track as prices of HFCs are set to increase.

“We are first movers in Europe, but with the Kigali Amendment to the Montreal Protocol, we have now also created a level playing field in a globally-agreed, worldwide technology conversion which should create significant new business opportunities for European companies,” Kaschl said.

► [R744](#), 11 December 2017, By: Charlotte McLaughlin

17. F-gas Subject of Public Sector Forum (UK)



BESA's new hq near Tower Bridge will be the venue for the new forum

UK: The implications of the European F-gas regulations and phase down will be discussed in a new forum set up for public sector employees in London and the South East.

The forum is the brainchild of the Building Engineering Services Association (BESA) and has been created for those involved in the specification, maintenance and management of equipment and services for buildings.

It is said to have been set up in response to demand from estates, facilities and property managers for expert advice and technical support to help them improve the operating performance of their building services and meet challenging mandatory energy efficiency and sustainability targets.

BESA will host a series of meetings at its new Grade-II listed headquarters in St Katharine's Dock, London each with an industry expert focussed on a specific area of building engineering.

The first meeting, taking place on February 22, will look at the considerable challenges posed by the European F-gas Regulations. Some owners will either have to convert their systems to work with the new gases or replace them completely. Graeme Fox, BESA's senior mechanical engineer, will explain the changes to the public sector group and outline the options open to them.

Faced with rising refrigerant gas prices and reduced availability, Graeme Fox will look at the implications of switching from widely used HFC gases to "natural" alternatives like CO₂ and hydrocarbons, or newly emerging refrigerants like HFOs.

"2018 is going to be a pivotal year for anyone owning and operating acr equipment," said Graeme Fox. "There will be a 'cliff edge' fall in the availability of R404A, for example, and unless users are prepared they face the nightmare scenario of having to shut down equipment or paying through the nose for diminishing supplies of top up gas for essential maintenance."

"The most important piece of advice we will be giving to the public sector attendees will be to ensure they are using properly qualified and certified refrigeration engineers," said BESA's key accounts manager Kevin Kingaby, who is organising the Forum.

BESA is already operating a public sector forum in Scotland, which holds regular meetings attended by all the major local councils.

"We will be looking to replicate the success of BESA Scotland by providing support and advice to public sector employees across the South before expanding into other parts of the country," said Mr Kingaby. "We will cover a range of building engineering issues vital to all public sector building managers."

- ▶ [CoolingPost](#), 13 Dec 2017, By: Neil Everitt

FEATURED

OZONE SECRETARIAT

- ▶ Vienna Convention and Montreal Protocol Meetings: A Primer - [Read/Download](#)
 - ▶ [29th Meeting of the Parties to the Montreal Protocol](#)
 - ▶ [28th Meeting of the Parties to the Montreal Protocol](#)
 - ▶ Final text of the Kigali Amendment to the Montreal Protocol available in all the six official UN languages ([A C E F R S](#))
 - ▶ OEWG 39: The 39th Session of the Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, preceded by the 58th meeting of the Implementation Committee under the Non-Compliance Procedure for the Montreal Protocol, held on 9 July and a workshop on safety standards relevant to the use of low-GWP alternatives to HFCs, held on 10 July 2017.
 - [Draft report of the thirty-ninth meeting of the Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer - Addendum](#)
 - [Draft report of the thirty-ninth meeting of the Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer](#)
 - ▶ Click [here](#) for further information.
- Browse through the Ozone Secretariat "[In Focus](#)" to learn about latest updates.
 - Click [here](#) for Montreal Protocol Meetings Dates and Venues

The UN Environment Assessment Panels have been the pillars of the ozone protection regime since the very beginning of the implementation of the Montreal Protocol. Through provision of independent technical and scientific assessments

and information, the Panels have helped the Parties reach informed decisions that have made the Montreal Protocol a world-recognized success.

UNEP initiated the process of setting up the assessment panels in 1988, pursuant to Article 6 of the Montreal Protocol, to assess the scientific issues of ozone depletion, environmental effects of ozone depletion, and the status of alternative substances and technologies and their economic implications.

Four panels, namely the panels for Scientific, Environmental Effects, Technology, and Economic Assessments were formally established and approved at the First Meeting of the Parties to the Montreal Protocol in 1989 where their first set of Terms of Reference were adopted. Shortly after the Second Meeting of the Parties in 1990, the Panels for Technical Assessment and the Panel for Economic Assessment were merged into one Panel called the Technology and Economic Assessment Panel (TEAP), which together with the Scientific Assessment Panel (SAP) and the Environmental Effects Assessment Panel (EEAP) make up the three assessment panels active today.

In accordance with Article 6 of the Montreal Protocol and subsequent decisions of the Parties, the three panels carry out a periodic assessment at least every 4 years. The first assessment reports were published in 1989 and since then major periodic assessments have been published by all three panels in 1991, 1994, 1998, 2002, 2006 and 2010. For each periodic assessment, the key findings of the panels are synthesized into a short report. The full SAP assessment report for 2014 was published in December 2014, while the EEAP assessment report for 2014 was published in January 2015.

PROGRESS & QUADRENNIAL ASSESSMENT REPORTS

- [EEAP](#)
- [SAP](#)
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THE MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL



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OzonAction Scoop- A tri-annual newsletter by UN Environment, OzonAction under the Multilateral Fund for the Implementation of the Montreal Protocol.



Issue #1



Issue #2



OzonAction MEETINGS

An online portal that provides **National Ozone Units and other participants** access to the documentation for meetings, workshops and side events organised by **OzonAction's Compliance Assistance Programme**

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[The Kigali Amendment to the Montreal Protocol - Opportunities and Next Steps - OzonAction Video](#)



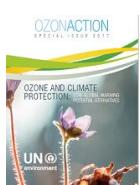
The Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer reached agreement at their 28th Meeting of the Parties on 15 October 2016 in Kigali, Rwanda to phase down hydrofluorocarbons (HFCs). The UN Environment, OzonAction developed a video to find out from renowned international scientific, health, technical, financial and national experts about background and significance of this Kigali amendment.

The amendment presents many opportunities: improving the environment, refrigeration and air-conditioning systems and especially energy efficiency. It also presents new challenges. It is absolutely critical now for industry, governmental bodies and civil society to work together to adopt greener technologies in each country of the world and fight global warming.



[OzonAction YouTube](#)

| See also: [United Nations Treaty Collection](#)



Ozone and Climate Protection: Low-Global Warming Potential Alternatives - OzonAction Special Issue 2017

OzonAction Factsheets:

[HS codes for HCFCs and certain other Ozone Depleting Substances ODS](#) (post Kigali update)



The Kigali Amendment to the Montreal Protocol: HFC Phase-down - The phase-down of HFCs under the Montreal Protocol on Substances that Deplete the Ozone Layer has been under negotiation by the Parties since 2009 and the successful agreement on the Kigali Amendment at the 28th Meeting of the Parties on 15 October 2016 in Kigali, Rwanda to phase-down hydrofluorocarbons (HFCs) continues the historic legacy of the Montreal Protocol. This factsheet summarises and highlights the main elements of the Amendment of particular interest to countries operating under Article 5 of the Protocol (Article 5 Parties).

OzonAction Factsheet: Refrigerant Blends: Calculating Global Warming Potentials (post-Kigali update)



OzonAction Factsheet: Global Warming Potential (GWP) of Refrigerants: Why are Particular Values Used? (post-Kigali update).



OzonAction Factsheet: Tools Commonly used by Refrigeration and Air-Conditioning Technicians



OzonAction Multimedia Video Application: Refrigeration and Air-conditioning Technician Video Series - OzonAction has launched an exciting new application which hosts series of short instructional videos on techniques, safety and best practice for refrigeration and air-conditioning technicians. This application, consisting of short instructional videos on techniques, safety and best practice, serves as a complementary training tool for refrigeration and air-conditioning (RAC) sector servicing technicians to help them revise and retain the skills they have acquired during hands-on training. Additional videos will be added regularly.

Please share with your RAC associations, technicians and other interested stakeholders... **Over 11, 200 installations to date!**



Now available in the [Android Play Store](#) and Apple Store/iTunes.



(Just search for 'OzonAction' or scan this QR Code)



OzonApp eDocs+ launched in Android Play Store and Apple Store. This new application launched by OzonAction on February 12, includes publications, videos, fact sheets and other awareness materials to help National Ozone Units (NOUs) and other stakeholders to build their capacity to implement the Montreal Protocol in a sustainable manner and at the same time to derive climate benefits. Now available in the [Android Play Store](#) and Apple Store/iTunes.



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OzonAction Recent Publications:

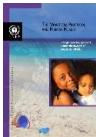


Lower-GWP Alternatives in Commercial and Transport Refrigeration: An expanded compilation of propane, CO₂, ammonia and HFO case studies - This booklet presents an expanded compilation of case studies on lower-GWP alternatives in commercial and transport refrigeration and provides an update to the first set of case studies which was published in 2014 by UNEP DTIE OzonAction/CCAC (Low GWP Alternatives in Commercial Refrigeration: Propane, CO₂ and HFO Case Studies).



NATIONAL CERTIFICATION SCHEMES FOR RAC SERVICING TECHNICIANS - This publication aims to provide introductory information for institutions in developing countries to better understand the issue of certification in the field of refrigeration and air conditioning, to assist in the creation of such certification

and training schemes and to demonstrate to service technicians and enterprises why it is in their interest to participate.



THE MONTREAL PROTOCOL AND HUMAN HEALTH - This booklet summarizes how the successful implementation of the Montreal Protocol has protected human health. It describes how ozone depletion would have led to increases in UV radiation and, based on current understanding of the mechanisms by which UV affects biological processes, how that would have led to a dramatic increase in skin cancers, cataracts and affected human health in other ways. It also covers recent progress in understanding the 'World Avoided' – that is the world we would have lived in without a successful Montreal Protocol.



FINANCING THE CLIMATE CO-BENEFITS OF THE HCFC PHASE-OUT - A guide for Low Volume Consuming Countries - Hydrochlorofluorocarbons (HCFCs) are being phased out worldwide under the Montreal Protocol on Substances that Deplete the Ozone Layer. The Parties to this treaty encouraged countries to promote the selection of alternatives to HCFCs that minimise environmental impacts, in particular impacts on climate. The Protocol's Multilateral Fund encourages developing countries to explore potential financial incentives and opportunities for additional resources to maximise the environmental benefits from HCFC Phase out Management Plans (HPMPs). This booklet explains how Ozone Officers in low volume consuming countries can explore such opportunities for climate co-benefits. [English](#) | [French](#) | [Spanish](#)



SAFE USE OF HCFC ALTERNATIVES IN REFRIGERATION AND AIR CONDITIONING - An Overview for Developing Countries - Many of the alternative refrigerants to hydrochlorofluorocarbons (HCFCs) have particular characteristics in terms of toxicity, flammability and high pressure which are different from those used previously. It is therefore important that the refrigeration and air-conditioning industry adapts to both the technical and safety issues concerning these refrigerants. This publication provides an overview of the alternatives, their general characteristics and their application in the context of the safety issues. It provides guidance for National Ozone Units (NOUs) and other interested parties in developing countries on how they can advise and assist their national stakeholders in the selection and implementation of alternative refrigerants.



PHASING-OUT HCFCS IN SMALL AND MEDIUM-SIZED ENTERPRISES - This booklet aims to assist foam enterprises, especially SMEs, to better understand policies on HCFC phase-out, access to assistance from the Multilateral Fund for the Implementation of the Montreal Protocol and access alternative technologies in different foam applications taking into account challenges in converting to alternative technology. It also discusses some tips on how to identify enterprises that may use HCFCs and verify the HCFCs consumption of enterprises.



INTERNATIONAL STANDARDS IN REFRIGERATION AND AIR-CONDITIONING - This guide provides an introduction and simple overview of the issues related to international standards in the refrigeration and air-conditioning sector and how they can be useful in the context of the phase-out of hydrochlorofluorocarbons (HCFCs) in developing countries as required by the Montreal Protocol on Substances that Deplete the Ozone Layer.

EVENTS

2018



[The HVAC & Refrigeration Show](#), 23 - 25 January 2018, London, United Kingdom



A/Ccess is the theme of the MACS 2018 Training Event and Trade Show to be held 14-18 February 2018, at the Caribe Royale Hotel and Convention Center, USA



AIRAH Refrigeration 2018, 26 – 27 March 2018, Sydney, Australia



12th Conference on Phase-change Materials & Slurries for Refrigeration & Air Conditioning, 21-23 May 2018, Quebec, Canada

13th IIR-Gustav Lorentzen Conference on Natural Refrigerants, 18-20 June 2018, Valencia, Spain

1st IIR International Conference on the Application of HFO Refrigerants. 2-5 September 2018, Austin Court Conference Centre, Birmingham, United Kingdom

See other IIR [upcoming events](#)

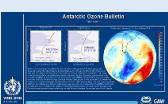
READING



[Twenty Questions and Answers About the Ozone Layer](#), presents complex science in a straightforward manner. It complements the [2014 Scientific Assessment Report of Ozone Depletion](#) by WMO and the U.N. Environment Programme.



[UNEP and USEPA: Promoting ozone and climate-friendly technologies in public procurement - a scoping study of Asia Pacific](#)



[WMO Antarctic Ozone 2016 Bulletins](#) - Containing information on the state of the ozone layer in the Antarctic at roughly two week intervals from August to November. The bulletins are based on data provided by WMO Members which operate ozone monitoring stations in the southern hemisphere and satellites to observe ozone globally.



The [EU F-Gas Regulation Handbook](#), Keeping Ahead of the Curve as Europe Phases Down HFCs - a free online resource for climate media and other concerned parties, published by the London-based Environmental Investigation Agency (EIA).



[Alternative Refrigerant Evaluation for High-Ambient-Temperature Environments: R-22 and R-410A Alternatives for Mini-Split Air Conditioners](#)



[AREA Guidance on minimum requirements for contractors' training & certification on low GWP Refrigerants](#) - AREA has updated its Guidance on minimum requirements for contractors' training & certification on low GWP Refrigerants.



[Free guide to F-gas changes](#) The European contractors association AREA has produced a timely guide to the F-gas regulations which clarifies the new rules, their impact and their practical application... [Read more](#)



Industrial Refrigeration Equipment Market (Refrigeration systems, Coil and Condensers, Thermal panels and Parts) - Latin America Industry Analysis, Size, Share, Growth, Trends and Forecast 2013 - 2019



The recent [Alternatives to HCFCs/HFCs in developing countries](#) with a focus on high ambient temperatures" study carried out by Öko-Recherche for the European Commission stresses that the refrigerant and blowing agent demand is expected to triple by 2030 in developing countries as a result of economic growth. A sector by sector analysis shows that a climate-friendly replacement for current and future of HCFCs and high GWP HFCs is possible in most applications ...

[Primer on Hydrofluorocarbons](#), Fast action under the Montreal Protocol can limit growth of HFCs, prevent up to 100 billion tonnes of CO₂-eq emissions by 2050, and avoid up to 0.5°C of warming by 2100. IGSD, January 2014, Lead authors: Durwood Zaelke, Nathan Borgford-Parnell, and Danielle Fest Grabiel. Contributing authors: Stephen O. Andersen, Xiaopu Sun, Dennis Clare, Yuzhe Peng Ling, and Alex Milgroom.

[Flammable Refrigerants Safety Guide](#), AIRAH - Many of the refrigerants traditionally used in refrigeration and air conditioning systems in Australia have been non-flammable, non-toxic, synthetic greenhouse gases (SGGs) that have a high global warming potential (GWP). These were typically synthetic refrigerants including CFCs, HCFCs and HFCs. Due to the growing national and international concern regarding the resulting atmospheric effects of SGGs, the use of alternative low GWP refrigerants is increasing.

[Recent Trends in Global Emissions of Hydrochlorofluorocarbons and Hydrofluorocarbons: Reflecting on the 2007 Adjustments to the Montreal Protocol](#).

S. A. Montzka *†, M. McFarland ‡, S. O. Andersen §, B. R. Miller †||, D. W. Fahey †, B. D. Hall †, L. Hu †||, C. Siso †||, and J. W. Elkins †† Earth System Research Laboratory, National Oceanic and Atmospheric Administration, Boulder, Colorado 80305, United States ‡ DuPont Chemicals & Fluoroproducts, Wilmington, Delaware 19805, United States § Institute for Governance & Sustainable Development, Washington, D.C. 20007, United States|| Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, United States.

[Geothermal Heating and Cooling: Design of Ground-Source Heat Pump Systems](#)- ASHRAE

A first edition, the IIR guide "[CO₂ as a Refrigerant](#)" highlights the application of carbon dioxide in supermarkets, industrial freezers, refrigerated transport, and cold stores as well as ice rinks, chillers, air conditioning systems, data centers and heat pumps. This guide is for design and development engineers needing instruction and inspiration as well as non-technical experts seeking background information on a specific topic. Publication, IIR Technical Guide, 2014.

FREE [HVAC Optimisation Guide released](#) by AIRAH and the NSW Office of Environment & Heritage outlines 20 HVAC optimisation strategies and how they can be applied to the vast majority of commercial systems, both in older and modern buildings...

[Latin America Industrial Refrigeration Equipment Market Benefits from Region Flourishing Food and Beverage Production and Processing Market – Trends and forecast 2013-2019.](#)

[Solvents & Bio Solvents Market Outlook - Global Trends, Forecast, and Opportunity Assessment \(2014-2022\)](#)

[Chlorofluorocarbon Market: Global Industry Analysis and Forecast 2015 to 2021](#)

[Getting The World Off the Chemical Treadmill: A per capita convergence framework for an ambitious phase-down of HFCs under the Montreal Protocol](#), By: Umang Jalan, Research Associate, Climate Change Programme, Centre for Science and Environment



[The Importance of Ambition in the 2016 HFC Phase-Down Agreement](#). Download the full report from EIA, [here](#)

[Update on the Illegal Trade in Ozone-Depleting Substances](#) – The Environmental Investigation Agency (EIA) briefing to the 38th meeting of the Open-Ended Working Group of Parties to the Montreal Protocol, in Vienna, Austria, from July 18-21, 2016.

[F-Gas Regulation shaking up the HVAC&R industry](#). Commissioned by the Greens in the European Parliament, the study provides qualitative and quantitative analysis of the early impacts of the EU F-Gas Regulation on the European industry and evaluates its influences on other countries and regions in designing their own policies to curb HFCs.

"[The Road to Competence in Future Green Technologies](#)", the International Special Issue 2016-2017 of Centro Studi Galileo. Read/Download [pdf version](#) | [E-book](#)

The [2016 editions of ASHRAE's major refrigerants-related standards](#) have been published as a package with 30 new refrigerants and refrigerant blends added.

[Quest for climate-friendly refrigerants finds complicated choices](#), National Institute of Standards and Technology (NIST), 17 February 2017, Summary: Researchers have just completed a multiyear study to identify the 'best' candidates for future use as air conditioning refrigerants that will have the lowest impact on the climate.

The second issue of [The Natural Voice magazine](#), entitled 'Mainstreaming Natural Refrigerants' showcases examples of installations using natural refrigerants around the world, including in the Gambia, Jordan, South Africa, China, Thailand, Tanzania and Saudi Arabia.

[Industria & Formazione, no. 2/17](#), Preview of the journal Industry & Training in refrigeration and air conditioning, technical refrigeration and air-conditioning, Centro Studi di Galileo # 406 Technological innovations in cooling and air conditioning with special focus on the F-Gas new regulations, new refrigerants, components and systems, food storage and cold sector. Vol. XLI - No. 2-2017.

Refrigeration: An increasingly strategic issue for data centres - [Cooling data centres: A major economic challenge](#) Today, data centres play a key role in many businesses as information technology is becoming an increasingly strategic factor. Cooling can present a major economic challenge for data centres. If cooling is implemented incorrectly or is inadequate, the amount of energy required to cool a data centre can equal or exceed that used to operate the equipment. Larger data centres can use a staggering amount of energy just to ensure the day-to-day running of electronic equipment. As a result, these data centres can produce a great deal of heat, which require large-scale cooling systems in order to maintain efficient and continual operation... Browse through a selection of [articles and papers](#), by [iifir](#)

[shecco](#) GUIDE to Natural Refrigerants Training in Europe shows that training is readily available. [Read on r744](#)

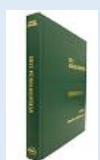
[40 Years of Global Environmental Assessments: A Retrospective Analysis](#), J. Jabbour and C. Flachsland. Environmental Science & Policy

FactSheet - [Hazards during the Repair and Maintenance of Refrigeration Systems on Vessels.](#)



[High-performance insulation materials market, June 2017](#)

[EIA Applauds Bipartisan Effort to Tackle Super Pollutants, Including HFCs. Environmental Investigation Agency, 8 June 2017](#)



The Environmental Investigation Agency (EIA), recently launched report: [Chilling Facts VII](#), Chilling Facts I-VI reports available [here](#)

ASHRAE Releases New Edition of [Principles of Heating, Ventilating and Air Conditioning](#).- Eighth edition of textbook updated based on the 2017 ASHRAE Handbook - The textbook is ASHRAE's recommended text for HVAC instruction and presents the fundamental concepts for HVAC systems and design.

[The Australian Institute of Refrigeration, Air Conditioning and Heating outlines the Future of HVAC in a Net-Zero World](#)



“[Absorption Chillers Market: Global Industry Analysis and Forecast, 2017-2025](#),”... The demand for thermally-driven chillers in multiple industrial verticals is poised to grow in the immediate future. Considering the rising demand for electrical chillers in commercial, residential as well as industrial settings, the adoption of absorption chillers will gain traction at considerable rate. By consuming lesser energy than conventional electrical chillers, absorption chillers will also garner surplus demand for not using ozone-depleting chlorofluorocarbons (CFC) for chilling purposes. Persistence Market Research’s latest report delivers key insights for the future of global [absorption chillers market](#), excerpts from which highlight that by the end of 2025, more than US\$ 2 Bn worth of absorption chillers will be sold throughout the globe...



[Thousands of scientists issue bleak ‘second notice’ to humanity](#), The Washington Post, Speaking of Science, 13 November 2017, By: Sarah Kaplan



Research: [Reducing HFCs can help sustainable development - Reducing these emissions can mitigate the worst of climate change and reduce hunger and poverty. read on r744](#)

MISCELLANEOUS



[UN knowledge platform launches live-tracking tools to review progress towards SDGs](#), UN Environment’s dynamic online platform designed for sharing contextualized data...



New *International Journal of Refrigeration* service for IIR members - As of January 2017, not only will IIR members continue to receive the hard copy of the journal but IIR membership will now also give members access to the complete archives of the *International Journal of Refrigeration (IJR)* online. Designed with IIR members in mind, this new and practical electronic subscription gives members substantial advantages:

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International Observers - New AREA membership category - Due to the significant worldwide interest in European legislative developments and the increase in competence of personnel who handle new refrigerants, AREA is pleased to introduce its brand new "International Observer" membership category. This provides a fantastic opportunity for non-European RACHP installer bodies the world, to benefit from the expertise and discussions within Europe through access to AREA. Contact: info@area-eur.be



The Mobile Air Conditioning Society (MACS) Worldwide has released the [MACS Mobile A/C Diagnostics app](#) powered by Shiftmobility® for use on all mobile devices. The MACS app includes comprehensive mobile A/C and engine cooling system specifications for cars and light duty trucks from 1960-present; A library of heavy duty vehicle specifications donated by MACS member companies; access to MACS training calendar and website, archived MACS *ACTION™* magazines and *Service Reports*, MACS mobile A/C diagnostic checklists and a MACS member supplier directory. The MACS app is available only to MACS members in good standing. Each membership will receive one free download; and additional member downloads are \$60 each annually. The MACS app can be downloaded from the Google play or iTunes store



The Montreal Protocol Who's who

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<http://www.montrealprotocolwhoswho.org>



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<http://www.youtube.com/ozonaction>

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