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Global



1. OzonAction launches initiative to highlight 'Women in the refrigeration and air-conditioning sector'

OzonAction, in cooperation with UN Women, is seeking to collect experiences and short 'stories' from women working in the refrigeration and air-conditioning (RAC) sector.

From female service technicians to installers, from designers to trainers, from manufactures to RAC associations, UN Environment OzonAction are looking to highlight your experience.

Being aware of the experiences of women working in the RAC sector and the opportunities available can encourage and inspire other women to consider careers in the sector and support girls to seek to follow a career path in this fast growing and important sector.

OzonAction, therefore is launching a global initiative to raise awareness of the opportunities available to women and to highlight the particular experiences and examples of women working in the sector, explaining their motivations, training and education, the challenges they may have faced, their experience and day to day details of their working lives and to recognise their successes.

Background

Refrigeration and air-conditioning is crucial for our health, nutrition, comfort and well-being. From prevention of food wastage to preservation of vaccines, from air-conditioning in hospitals to our homes we increasingly rely on the advances that refrigeration has brought us.

Appropriate implementation of refrigeration and air-conditioning technologies can assist countries in contributing to achieving the 2015 United Nations Sustainable Development Goals. In particular, this can contribute to achieving food security and improved nutrition (Goal 2), in ensuring healthy lives and promoting well-being (Goal 3), and promoting sustained, inclusive and sustainable economic growth (Goal 8). The transition away from ozone depleting substances and chemicals with high global warming potentials has already made a significant impact on combatting climate change (Goal 13). By encouraging and facilitating women to pursue careers in the refrigeration and air-conditioning sector can also contribute to achieving gender equality and empowering women and girls (Goal 5).

The refrigeration and air-conditioning (RAC) sector is crucial to all countries in the successful phase-out of hydrochlorofluorocarbons (HCFCs) and forthcoming phase-down of hydrofluorocarbons (HFCs) under the Montreal Protocol on Substances that Deplete the Ozone Layer. The fast-growing RAC sector can offer a wide variety of interesting and fulfilling careers for women as well as men. However, all around the world the sector has always been a largely male-dominated work environment.

Seeing the RAC sector from a different gender perspective and becoming aware of women's experiences and the opportunities available can encourage and inspire other women to consider careers in the sector and support girls to aspire to follow a career path in this fast growing and important sector.

OzonAction is requesting you to share your experiences and impressions of working in the RAC sector to raise awareness of the opportunities available to inspire women and girls to follow in your footsteps

How to apply

If you are a woman working in any part of the RAC sector, we encourage you to submit an entry. Please use the standard template provided. We very much welcome that you provide pictures showing you at work to accompany the submission.

["Women in the RAC Sector" flyer](#)

[Submission Form](#)

Nominations will be reviewed, verified and edited, as required, by an expert panel established by UN Environment. All the accepted submissions will be compiled into an official UN Environment publication, which will be outreached to a broad range of stakeholders in the Montreal Protocol and RAC community.

The authors of the two most relevant and interesting submissions (as decided by the expert panel) will be invited to attend an award ceremony and side event organised by UN Environment OzonAction at an international Montreal Protocol meeting.

Completed submissions, sent by email, based on the standard template (with photos) should be received by the UN Environment regional focal points (see flyer for details) as soon as possible but at the latest by 31st July 2018.

Nominations should preferably be submitted in English but other UN languages will be accepted (Arabic, Chinese, French, Russian, Spanish).

[UN Environment, OzonAction, March 2018](#)

2. New videos available on the OzonAction RAC video application

A series of new videos has just been released on the Refrigeration and Air-conditioning Technician Video Series application, with a focus on working with flammable refrigerants

50,000 downloads and counting...



The Refrigeration and Air-conditioning Technician Video Series is a mobile application consisting of a series of short instructional videos on techniques, safety and best practice for refrigeration and air conditioning (RAC) technicians. This serves as a complementary training tool for technicians to help them revise and retain the skills they have acquired during hands-on training. The app is part of OzonAction's portfolio of activities and tools to help enhance the knowledge and skills of technicians in the servicing and maintenance of RAC systems. The videos were produced in collaboration with Bundesfachschule Kälte Klima Technik. Additional videos will be released soon.

The videos cover the following topics:

New:

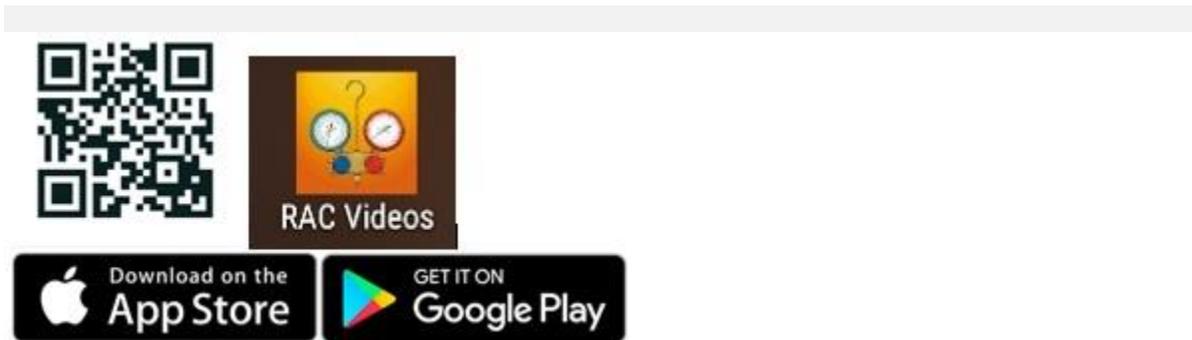
- Flammable Refrigerant Safety
- Specialist Equipment and Tools
- Handling, Transport, and Storage
- Safety features of hydrocarbon refrigeration system
- Preparation for working with flammable refrigerants
- Flammable Refrigerant recovery
- Preparing for repair and charging
- Preventing accidents

Original Videos:

- Basic Tools
- Copper Tube Handling
- Bending
- Copper-Copper Connections
- Copper-Brass Connections
- Flaring
- Press-Fit Connections
- Leak Detection (soap solution)
- Evacuation
- Refrigerant Charging
- Connecting RAC Unit to Manifold
- Electronic Leak Detection
- Refrigerant Recovery
- Thermal Insulation
- Preparing the Cables

Available in: English, Chinese, French, Russian, Spanish, German & Armenian (Arabic coming soon).

To install, search for "RAC Video" in the Google Playstore or Apple IOS store, or scan the following QR code:



3. Twinning of national ozone officers and energy policymakers

OzonAction: South Asia, South-East Asia and West Asia Joint Twinning Workshop – April 11-12, Beijing, China



UN Environment OzonAction is implementing the two-year "twinning" project to jointly build the capacity of National Ozone Officers (NOOs) and national energy policymakers (NEPs) for linking energy efficiency with Montreal Protocol objectives in support of the Kigali Amendment.

The first workshop, "**Twinning Workshop on Energy-Efficient and Climate-Friendly Refrigeration and Air Conditioning,**" will be held in Beijing from 11-12 April 2018 for South Asia, South-East Asia, and West Asia countries.

UN Environment's OzonAction and United for Efficiency initiatives are organizing this capacity building event, which will be hosted by China's Ministry of Environmental Protection.

ASHRAE will assist UN Environment with conducting the workshop and several organizations with specific expertise will participate as resource persons/trainers.

The interaction in this workshop is intended to catalyze enhanced cooperation at the national level between these two stakeholder groups, and enable the governments to integrate energy efficiency considerations more rapidly into the ongoing Montreal Protocol process.

The workshop will feature plenary and separate parallel sessions, as well as practical exercises and one-on-one exchanges between NOOs and NEPs from the same country.

Under the Kigali Cooling Efficiency Program (K-CEP), UN Environment is implementing a two-year “twinning” project to build the capacity of National Ozone Officers and national energy policymakers for linking energy efficiency with Montreal Protocol objectives in support of the Kigali Amendment.

CONTEXT

The Kigali Amendment to the Montreal Protocol, which enters into force on 1 January 2019, will help protect the climate by phasing down high global warming potential (GWP) hydrofluorocarbons (HFCs), which are commonly used as refrigerants. Promoting energy efficiency of cooling technology can significantly increase those climate co-benefits. The capacity of National Ozone Officers (NOOs) in Article 5 countries needs to be strengthened so they can adjust their national Montreal Protocol compliance programmes to respond to the Kigali Amendment and incorporate energy efficiency considerations into their countries’ work with the refrigeration and air conditioning sector.

Since this cannot happen in isolation, a variety of national stakeholders need to come together to develop or revise policies and programmes for integrated, holistic refrigerant management approaches to this next refrigerant transition.

The daily work of the NOOs now takes place in this new Kigali context. Their countries face critical technology and policy choices as they continue work to meet and sustain the Protocol’s HCFC phase-out compliance targets, while simultaneously preparing for the HFC phase down. They need support to assess, monitor and sustain the sound management of refrigerants with due consideration for energy-efficient technology choices and sustaining the critical refrigeration and air conditioning sector workforce.

The Kigali Cooling Efficiency Program (K-CEP) is supporting countries, companies and communities to achieve energy efficiency objectives related to the Kigali Amendment. Launched in 2017, K-CEP is deploying US\$ 52 million of philanthropic funds to strengthen institutions, support adoption of model policies, scale-up technology deployment, leverage finance and help make cooling more affordable and sustainable. UN Environment is one of K-CEP’s implementing partners.

THE TWINNING PROJECT

UN Environment’s OzonAction’s Compliance Assistance Programme (CAP) manages ten Regional Networks of Ozone Officers covering 147 developing countries, with financial support from the Montreal Protocol’s Multilateral Fund. These highly successful networks are a core mechanism of the Multilateral Fund family of institutions and are a cost-effective and appropriate platform to provide capacity building services. This well-established infrastructure will be used to deliver the “twinning” services under K-CEP.

Under this 2-year project (2018-2019), one national energy policymaker (NEP) per country will be identified and twinned with the NOO from the same country to exchange experiences, develop skills, and share knowledge and ideas on the energy efficient refrigerant transition in support of the Kigali Amendment. UN Environment and its partners will provide these officials with specialized training, capacity building tools, country assessments, and national pilot project opportunities. This interaction will catalyze enhanced cooperation at the national level between these two stakeholder groups, and enable individual governments to integrate energy efficiency more rapidly into the ongoing Montreal Protocol process.

Participation in the project is voluntary and offered as a service to NOOs and NEPs.

[Twinning of national ozone officers and energy policymakers, OzonAction](#)



4. UNDP is supporting the technology changes that will deliver the HFC phasedown targets as one of the implementing agencies of the Kigali Amendment

To help countries phase down HCFCs, UNDP (United Nations Development Programme), one of United Nations’ investment implementing agencies

works towards facilitating technology changes in recipient companies. “For the moment, we engage with companies to commit to reducing the use of mostly HCFCs – and tomorrow HFCs,” says UNDP’s Etienne Gonin, programme analyst (Europe/CIS, Arab states and Africa), Montreal Protocol and Chemicals Unit.

UNDP advocates for energy efficient solutions that fight global warming. Which is where natural refrigerants come in, although as a UN agency, UNDP must remain technology neutral. “Everything is an option for developing countries that is allowed by the Montreal Protocol. Obviously natural refrigerants are part of the solution, but we’re not ruling out other acceptable low-GWP alternatives,” says Gonin.

“When companies want to implement technology changes, the way to access [the] funds available through the UN is through national governments, specifically through National Ozone Units, generally under the Ministry of Environment of the countries,” says Selimcan Azizoglu, a project manager at the UNDP who works for regional projects in Europe, Central Asia and Africa related to the HCFC phaseout. He coordinates project implementation at regional level, providing support to developing countries in the areas of policy, technology conversion, capacity building and regional cooperation.

One example of a preparatory UNDP project to phase down HFCs is in Zimbabwe, where a company called Capri, a manufacturer of refrigerators and chest freezers, is considering converting its domestic refrigerator line from R134a to natural refrigerant R600a (isobutane). Another is for Bangladesh, to convert compressor production lines from R134a to R600a at Walton Hi-Tech Industries. Other examples of UNDP-backed projects include the ammonia air-conditioning chillers in Tashkent’s biggest hospital (from R22) and a transcritical CO₂ supermarket in Chile.

“If you’re a company in this field, you have opportunities for changing your technologies. However, there are some limitations for supply – particularly in Africa,” Gonin remarks.

UNDP funded a demonstration project in Nigeria on how to produce high-grade hydrocarbon refrigerants. “Now we need to scale it up to actually make hydrocarbons available in the market, particularly in African markets,” says Gonin. As it is still a relatively new technology, it is difficult to find hydrocarbon-based air conditioning units in Africa. “There is a strong demand and interest from African countries for this technology,” Gonin says.

“Demand is there, political support is there. It’s mostly difficult to make it happen logistically, practically,” says Gonin. “It’s all about setting up the supply chain to some African countries.”

Another important role that UNDP plays in the HVAC&R sector is to reach out to refrigeration associations and hold training, particularly, to achieve technician certification and promote recycling. “We aim to strengthen refrigeration associations through bilateral exchanges but this is not developed enough in some countries,” notes Azizoglu. Training is a major subject for UNDP worldwide.

“We use training institutes for all key natural refrigerants. We had two trainings last year in Germany, with the participation of technicians from Belarus, Tajikistan, Uzbekistan and Ukraine (countries for the project he is managing),” says Azizoglu. “It was good for these countries to see a great example for themselves.”

See the booklet [‘Past Successes and Future Opportunities: Case Studies from the UNDP Portfolio and Innovative Approaches to Cooling without Warming’](#) outlining the UNDP’s work in protecting the ozone layer, advancing sustainable cooling solutions and tackling climate change.

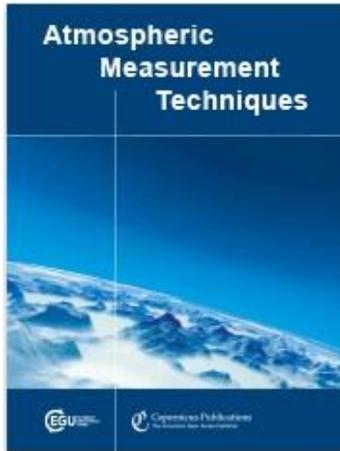
r744, 19 March 2018, By: Eda Isaksson

5. How sudden stratospheric warming affects the whole atmosphere

High above Earth’s surface, air temperatures occasionally increase suddenly, producing widespread effects on weather, air chemistry, and telecommunications.

Weather events 10–50 kilometers above Earth’s surface, in the atmospheric layer called the stratosphere, affect weather on the ground as well as weather hundreds of kilometers above. Experiments demonstrate that resolving stratospheric dynamics enables forecasters to predict surface weather farther into the future, particularly during winter in the Northern Hemisphere [Tripathi et al., 2015]. Thus, meteorologists looking to improve their short- and long-term weather forecasts are seeking accurate models representing the way stratospheric disturbances propagate downward into the troposphere, the atmospheric layer closest to Earth’s surface.

Chief among these disturbances are common events called sudden stratospheric warmings (SSWs). During SSWs, stratospheric temperatures can fluctuate by more than 50°C over a matter of days. [...]



6. A new photometric ozone reference in the Huggins bands: the absolute ozone absorption cross section at the 325 nm HeCd laser wavelength

Abstract. The room temperature (294.09 K) absorption cross section of ozone at the 325 nm HeCd wavelength has been determined under careful consideration of possible biases. At the vacuum wavelength of 325.126 nm, thus in a region used by a variety of ozone remote sensing techniques, an absorption cross-section value of $\sigma = 16.470 \times 10^{-21} \text{ cm}^2$ was measured. The measurement provides the currently most accurate direct photometric absorption value of ozone in the UV with an expanded (coverage factor $k = 2$) standard uncertainty $u(\sigma) = 31 \times 10^{-24} \text{ cm}^2$, corresponding to a relative level of 2‰. The measurements are most compatible with a relative temperature coefficient $c_T = \sigma^{-1} \partial \sigma / \partial T = 0.0031 \text{ K}^{-1}$ at 294 K. The cross section and its

uncertainty value were obtained using generalised linear regression with correlated uncertainties. It will serve as a reference for ozone absorption spectra required for the long-term remote sensing of atmospheric ozone in the Huggins bands. The comparison with commonly used absorption cross-section data sets for remote sensing reveals a possible bias of about 2%. This could partly explain a 4% discrepancy between UV and IR remote sensing data and indicates that further studies will be required to reach the accuracy goal of 1% in atmospheric reference spectra.

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[Atmospheric Measurement Techniques \(AMT\), 27 March 2018](#)

7. Cooling critical to achieving Sustainable Development Goals, says report

Birmingham University's Energy institute sheds light on the key role climate-friendly solutions for cooling plays to achieve the global Sustainable Development Goals.



The research paper highlights cooling is facing booming demand from fast growing economies and urban populations. Providing climate-friendly and energy efficient solutions – such as natural refrigerants-based equipment - will be key to protect the environment and the world population's vital needs.

On September 2015, United Nations countries adopted a set of goals to end poverty, protect the planet and ensure prosperity for all over the next 15 years. Birmingham Energy Institute's report shows how cooling will play a vital role in achieving – either directly or indirectly - almost all the Sustainable Development Goals (SDGs).

Cooling is a fundamental component of daily survival – from cold chains for fresh food, to safe storage of life-saving vaccines and medicines, to cooler, safer workplaces and schools that can elevate productivity.

On the other hand, the world's population is projected to reach 9 billion by mid-century, and food demand to increase by 60%. The world is seeing the rapid emergence of new middle classes in countries such as China, India, Indonesia and Brazil. "There is no question that we will need far more cooling," outlines Professor Toby Peters from the Birmingham Energy Institute.

Air conditioning is a case in point: Researchers at Lawrence Berkeley National Laboratory estimate the global stock of room air conditioners will rise by an additional 700 million by 2030, and 1.6 billion by 2059.

But cooling is also polluting the planet. The study points out that cooling is responsible for 7% of total CO₂ emissions, and will almost double to 13% by 2030. The recent global agreement to phase down HFCs will help restraining emissions growth, but does nothing to tackle the 75% of cooling emissions that come from energy consumption.

The natural refrigerants industry can play a role in addressing this challenge, by providing sustainable and energy efficient technology to mitigate the growing cooling needs of a warming planet.

Africa



8. United for Efficiency Initiates Collaboration with Rwanda

On 20 March 2018, United for Efficiency launched work with Rwandan government, aiming to accelerate the transformation of the country's cooling market. This will allow for energy-efficient and climate-friendly air conditioners and refrigerators to enter Rwandan markets, saving Rwandan customers \$40M in their energy bills.

The Rwanda Cooling Initiative, initiated in Kigali at the outset of the Africa Cooling Efficiency Conference, includes five action areas, most notably an energy efficiency market assessment, development of a national cooling strategy and energy performance standards, and training of government officials to adopt and implement the recommended policies.

"As governments, we have a responsibility to put in place regulations that promote energy-efficient equipment, both at home and for industry. We also know that the best time to invest in improved energy efficiency is when one is making the decision of which equipment to buy. That's why we need to move quickly to set the standard, and explain the benefits to consumers in a language they understand," said Rwanda's Minister of Environment Vincent Biruta at the Africa Cooling Efficiency Conference.

Cooling equipment stock in Rwanda is expected to increase stridently.

According to United for Efficiency estimations, the refrigerator stock is expected to increase from 100,000 units in 2015 to 1 million units, and room air conditioner stock from 12,000 to 180,000 units, by 2030.

This is increasing electricity demand and boosting greenhouse gas emissions.

As the country's electricity grid currently serves only 27 per cent of the population, efforts from many sectors are required to drive the country in a pathway that allows to improve the well-being and energy access of the population whilst it uptakes the rampant growth.

The Rwanda Cooling Initiative brings Rwanda significant savings. It will allow Rwandan customers to save \$40M in energy bills, and the country to save 164 gigawatts of electricity and to increase electricity energy availability on the grid to connect around 70,000 homes.

With the nation's capital as the namesake of the Kigali Amendment to the Montreal Protocol on the phase down of the production and usage of hydrofluorocarbons (HFCs), it is fitting that Rwanda is interested in pursuing exemplary action.

The Rwanda Cooling Initiative is funded by the philanthropic organisation Kigali Cooling Efficiency Program, and will be carried out in collaboration with the Rwanda Environment Management Authority, the Ministry of Infrastructure and the Rwanda Standards Board.

[United for Efficiency, 22 March 2018](#)



9. Workshop on refrigerant gases (Eritrea)

The Ministry of Land, Water and Environment organized a workshop on refrigerant gasses management [...] At the one day workshop in which representatives from Government and private institutions took part, Mr. Marvin Loga, the UN Industrial Development Representative and other experts gave extensive briefings on the ozone depleting gasses and their

development.

Indicating that refrigerant gasses have a variety of application and contribute a wide range of benefits, Mr. Mogos Woldeyohannes, D. G. of Environment at the Ministry of Land, Water and Environment, said that their effect has been causing the depletion of the ozone layer and global warming.

The head of Exploration and Research at the Ministry, Mr. Kibrom Asmerom said that refrigerant gasses have become global concern. Mr. Kibrom reiterated since the refrigeration apparatus that are commonly used are changing from time to time and that the objective of the workshop is to create common understanding.

Eng. Robel Kibrom also gave briefing on the effect of ozone depletion on living things and the causes for its depletion.

The Ministry of Land, Water and Environment in collaboration with stakeholders has established refrigeration and air-conditioning training center and has already started providing training from 20 to 23 February.

[Eritrea Ministry of Information, February 2018](#)

Latin America and Caribbean



10. New customs officers received training in ozone depleting substances (Grenada)

Sixteen customs and trade officers received training in Monitoring, Control and Reporting of Trade in Ozone Depleting Substances (ODS) on Monday March 19th – Tuesday March 20th, 2018. The training which was organised by the National Ozone Unit (NOU) in conjunction with the Customs and Excise Division of the Ministry of Finance and Energy is part of the training and initiation exercise for new customs officers. It is also an integral component of Grenada's hydrochlorofluorocarbons (HCFC) Phase-out Management Plan (HPMP) to regulate the importation of ODS prevent any attempts of illegal trade in these substances. Customs officers in Grenada have been receiving this training since the year 2005 and has assisted the NOU tremendously in performing this agency function.

The training was facilitated by Mr. Rene Parkes of the Customs Division and the National Ozone Officer, Mr. Leslie Smith. The officers were exposed to both theoretical and practical sessions. The Customs and Excise division was among beneficiaries in 2017 that received state of the art multi-refrigerant identifiers to assist in the identification of refrigerants in cylinders and refrigeration and air-conditioning.

Among the many topics included in the training were:

- the Science of the Ozone layer
- the international response to Ozone Layer depletion
- Licensing and quota system for ODS
- ODS HS Classification
- ODS Smuggling
- Health and Safety
- ODS identification

On completion of the training, the officers were presented with Certificates of Participation. The certificates were presented to them by the Comptroller of Customs, Mr. Donan Victor during a brief closing ceremony. Addressing the ceremony, Mr. Victor complemented the trainees for their co-operation and active participation and implored upon them to put the equipment to full use in performing their roles as agents for the protection of the environment.

Funding for the training was provided by the Multilateral Fund for the implementation of the Montreal Protocol and Implemented by UN Environment in collaboration with the national Ozone Unit in the Ministry of Finance and Energy

[The National Ozone Unit Grenada, 26 March 2018](#)

11. Grenada request for expressions of interest for R-290 AC demonstration

The National Ozone Unit (NOU) in the Energy Division of the Ministry of Finance and Energy in conjunction with the global programme "Cool Contributions fighting Climate Change" (C4) request for suitable demonstration sites for evaluating the energy performance of R-290 (hydrocarbon) split air-conditioning units



The project Cool Contribution Fighting Climate Change (C4) is making available to the private sector in Grenada, a total of six (6) climate friendly split air conditioners for demonstration purposes. The objective of this initiative is to evaluate the energy efficiency of these R-290 Split AC units (12,000 BTU and 18,000 BTU cooling capacity) and to promote the use of natural refrigerant technologies in Grenada.

This project is being implemented by the National Ozone Unit (NOU) in the Energy Division of the Ministry of Finance and Energy, in conjunction with the Deutsche Gesellschaft fuer Internationale Zusammenarbeit (GIZ) GmbH, as part of the global programme "Cool Contribution fighting Climate Change", funded by the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) as part of the International Climate Initiative (IKI).

The general objective of this is to promote the use of energy-efficient and climate friendly air conditioning appliances while increasing the availability of natural refrigerants such as, R-600a and R-290.

The project now invites eligible private sector entities to submit Expressions of Interest (EOI) giving consideration to the following criteria.

Click [here](#) to learn more

The National Ozone Unit of Grenada, 9 March 2018

12. Report of a large depletion in the ozone layer over southern Brazil and Uruguay by using multi-instrumental data

Abstract. Ozone is one of the chemical compounds that form part of the atmosphere. It plays a key role in the stratosphere where the ozone layer is located and absorbs large amounts of ultraviolet radiation. However, during austral spring (August–November), there is a massive destruction of the ozone layer, which is known as the Antarctic ozone hole.

This phenomenon decreases ozone concentration in that region, which may affect other regions in addition to the polar one. This anomaly may also reach mid-latitudes; hence, it is called the secondary effect of the Antarctic ozone hole. Therefore, this study aims to identify the passage of an ozone secondary effect (OSE) event in the region of the city of Santa Maria – RS (29.68° S, 53.80° W) by means of a multi-instrumental analysis using the satellites TIMED/SABER, AURA/MLS, and OMI-ERS. Measurements were made in São Martinho da Serra/RS – Brazil (29.53° S, 53.85° W) using a sounding balloon and a Brewer Spectrophotometer.

In addition, the present study aims to describe and analyse the influence that this stratospheric ozone reduction has on temperatures presented by these instruments, including data collected through the radio occultation technique. The event was first identified by the AURA/MLS satellite on 19 October 2016 over Uruguay. This reduction in ozone concentration was found by comparing the climatology for the years 1996–1998 for the state of Rio Grande do Sul, which is close to Uruguay. This event was already observed in Santa Maria/RS-Brazil on 20 October 2016 as presented by the OMI-ERS satellite and the Brewer Spectrophotometer. Moreover, a significant decrease was reported by the TIMED/SABER satellite in Uruguay.

On 21 October, the poor ozone air mass was still over the region of interest, according to the OMI-ERS satellite, data from the sounding balloon launched in Santa Maria/RS-Brazil, and measurements made by the AURA/MLS satellite.

Furthermore, the influence of ozone on the stratosphere temperature was observed during this period. Despite a continuous decrease detected in height, the temperature should have followed an increasing pattern in the stratospheric layer.

Finally, the TIMED/SABER and OMI-ERS satellites showed that on 23 October, the air mass with low ozone concentration was moving away, and its layer, as well as the temperature, in the stratosphere was re-established.

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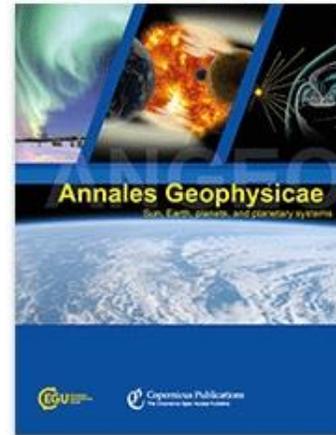
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⁵Federal University of Western Pará, Santarém – PA, Brazil

[Annales Geophysicae \(ANGEO\), Volume 36, issue 2, 16 March 2018](#)





13. Improving kids awareness on being sun safe and protecting the ozone layer!

Sun safety is a critical factor in health and science education. **Slip, Slap, Slop!** an awareness activity book, makes the topic fun, practical, and easy.

The National Ozone Unit - Lebanon launched this workbook for children aged 8-10, designed for flexible use in both homes and schools.

The objective of this new awareness activity book, in English and Arabic - is to help educate children about the Ozone Layer and the health risks due to the overexposure to the sun.

The activity book five interactive chapters provide the following:

Chapter 1: An engaging graphical introduction explains the science of the UV index, the ozone layer, and sun safety.

Chapter 2: A coloring quest helps children engage with the science concepts that they have learned from chapter one.

Chapter 3: Literature brings the UV index to life through a fun story about Lebanese UV superheroes.

Chapter 4: Games and activities, supplemented by stickers, allow for individual or group play.

Chapter 5: Through a hands-on project, children apply the lessons of the workbook and create enduring understandings.

Read/download [English](#) | [Arabic](#)

Contact: [Mazen Hussein](#) and/or [Joumana Samaha Atiyeh](#), National Ozone Unit, Ministry of Environment



14. Workshop with the ODS importers in Lebanon

On Monday March 5, 2018, the National Ozone Unit (NOU) Lebanon organized a workshop with the importers in Lebanon, where they discussed in brief the amended ODS Decree 3277/2016.

The main reason for the workshop was to remind the importers of the importance of submitting the requested forms and reports on time to ensure a smooth process. In addition, importers were informed about the energy efficiency in cooling technologies and the effect of some gases on the global warming.

The workshop aimed for a better monitoring and controlling system of imports of ODSs in accordance with the guidelines of the Montreal Protocol and its amendments.

The cooperation, continuous communication, and partnership between the NOU and the importers is crucial for better implementation of the Montreal Protocol guidelines towards the national strategy of HCFCs phase out in the country.

Contact: [Mazen Hussein](#), National Ozone Unit, Ministry of Environment

Asia Pacific



15. China Navigation provides Pacific islands with waste management solution

The China Navigation Company (CNCo) and the Secretariat of the Pacific Regional Environment (SPREP) have signed a memorandum of understanding (MOU) to address critical waste management issues in the Pacific islands.

Known as the Moana Taka Partnership, this MOU allows for CNCo vessels to carry containers of recyclable waste from eligible Pacific island ports, pro bono, to be sustainably treated and recycled in suitable ports in Asia Pacific. [...]

Under this agreement 21 Pacific island countries who have insufficient or inappropriate landfill space to store waste, have inadequate waste treatment facilities, and the financial inability to ship recyclable waste are eligible for this opportunity. Ozone Depleting Substances are among the types of materials that are considered. [...]

"Better waste management is absolutely critical for Pacific island nations. Landfills should be the last option and throwing it all in the ocean is not an option. Only when we work together can we overcome one of the biggest environmental challenges of our time," said Erik Solheim, executive director UN Environment.

[Splash247, 20 March 2018](#)

Europe & Central Asia

16. 'Keep calm and phase down HFCs' at European Parliament



The new EU F-Gas Regulation, which entered into force in 2015, is progressively banning the use of certain HFCs in different types of new equipment. Key European industry players are already adopting natural refrigerants instead, heard participants in an event organised by shecco (publisher of this website) and 3M at the European Parliament.

"In 2018, we will see the largest reduction steps in the phase-down mechanism. And that also presses the point that it is time to take fast action now," Yvon Slingenbergh, director of the department responsible for the EU F-Gas Regulation at the European Commission, told participants in the event, held in Brussels on 7 March 2018.

"We know that in the market, there are some players who are taking this in a very proactive manner. It is good and encouraging seeing there is really great potential to reduce the use of HFCs in a quick manner," Slingenbergh said.

Fast action includes "installing new equipment with climate-friendly new alternatives" such as natural refrigerants, explained Slingenbergh.

Fast market development of natural refrigerants, powered by the EU F-Gas Regulation

shecco presented the latest market development of natural refrigerant-based equipment, the main alternatives to HFCs. Klára Skačanová, shecco's market development manager, highlighted the growing investments in natural refrigerants across Europe.

"With economies of scale and the multiplication of players on this market, the cost of natural refrigerants-based equipment is going down," Skačanová said. "European companies' ongoing efforts to improve energy efficiency on one hand, and the increasing adoption of these types of technology on the other, is having a positive impact both on the upfront cost and the lifecycle cost for the end user," she added.

End-user perspective on NatRefs future

Delhaize Belgium, part of retail giant Ahold Delhaize, outlined its natural refrigerant strategy during the event.

Commercial refrigeration is one area in which the EU F-Gas Regulation is already beginning to bite. In 2022, bans on using certain HFCs with GWPs above 150 in new centralised and plug-in commercial refrigeration equipment will come into effect.

"13% of the group's sites already have natural refrigerant-based installations," said David Schalenbourg, director of department – building projects, format & maintenance at Delhaize Belgium (part of Ahold Delhaize Group).

Emergency call for revising hydrocarbons standards

Joachim Maul, from German manufacturer AIT, showed how the company's propane-based heat pumps can be a solution to upgrade obsolete boilers in existing constructions. R290 systems, according to Maul, can be taken to mass production in a straightforward manner, and are capable of reaching high temperatures efficiently even at low ambient temperatures.

However, the technology faces legislative barriers under current technical standards, which restrict the charge limit for propane to very low levels.

"Existing standards, such as EN 378 and EN 60335-2-40, do not allow or make it difficult to use A3 (e.g. 'flammable') refrigerants indoors," Maul said. "Existing standards do not sufficiently reflect new refrigerants, and that is why AIT is a partner for the European Union LIFE FRONT project" he added.

LIFE FRONT is a EU-funded project run by a consortium of six partners led by shecco, working to remove barriers to wider uptake of flammable refrigerants in RACHP applications.

'Keep calm and phase down HFCs'

Clare Perry from the Environmental Investigation Agency (EIA) outlined the other remaining barriers to successful implementation of the F-Gas Regulation.

Certification programmes under the EU F-Gas Regulation must include mandatory training on natural refrigerants. Awareness raising and communication to end users, particularly SMEs, is vital too, Perry said.

She urged policymakers to provide financial incentives to move early to low-GWP natural refrigerant technologies, and consider additional market restrictions (e.g. bans) to guide subsectors to move at the right time.

"Keep calm and phase-down HFCs," concluded Perry, arguing that, "a successful pathway to [the EU F-Gas Regulation's] implementation will pave the way for low-GWP sustainable technologies to reach developing

countries, allowing the EU to leverage its early action to address hydrofluorocarbons (HFCs) globally while also providing new market opportunities for European companies”.

[Ammonia21, 9 March 2018, By: Marie Battesti](#)

See also: [Will new EU legislation boost NatRef adoption?](#), article in [Accelerate Europe #10 Spring 2018](#)



17. No ‘one size fits all’ solution to decarbonise heating and cooling

Heating and cooling our homes, businesses and industrial processes makes up half of the EU’s energy demand. Yet, decarbonising the sector is proving a daunting task for which multiple solutions will be needed, industry experts say.

Contrary to popular belief, there is more than one solution to Europe’s heating and cooling conundrum, said Brian Vad Mathiesen, a Danish engineer who coordinates an EU-funded project aimed at drawing up decarbonisation roadmaps for the sector.

“It isn’t about 100% electrification, it isn’t about 100% greening gas. There are a multitude of solutions,” Mathiesen told policymakers, local representatives and industry delegates in Amsterdam last Friday (16 March).

The Amsterdam gathering aimed at taking stock of progress made with ‘Heat Roadmap Europe 4 (HRE4)’, the EU-funded project Mathiesen coordinates.

And the consensus that emerged from the talks is the absence of a silver bullet solution to decarbonise the heating sector.

Stefano Lambertucci, from industry association Solar Heat Europe, hammered the point home, insisting that “simplistic” solutions focused on one dominant energy source “are not credible anymore”. Efficiency, renewable options and even green gas will go hand-in-hand “where it makes sense,” he argued.

Funded under Horizon 2020, HRE4 aims to draft national heating and cooling strategies based on data related to the actual energy needs of individual EU countries, taking into account costs and available technologies. It started work in 2016 and will run until the end of next year.

The previous three iterations of the roadmap yielded results that show energy efficiency is all-important to decarbonising heating and cooling, as estimates show that more heat is wasted during power generation than is needed to heat all the buildings in Europe.

[EURACTIV, 20 March 2018, By: Sam Morgan](#)

18. Phase down sparks rise in illegal sales

With the F-gas regulations beginning to bite and higher GWP refrigerants becoming expensive and scarce, evidence of illegal imports and sales is increasing.

Despite a recent EC-sponsored report finding no evidence of large-scale illegal HFC imports, reports received by the Cooling Post and a general search of online auction sites suggests the problem is more widespread than some would admit. A search of country-specific auction sites reveals evidence of refrigerant being offered for sale without ensuring the buyer is F-gas registered and sales of refrigerant in illegal disposable cylinders.

While there are many reputable suppliers selling refrigerant over the internet, who follow the F-gas regulations and ensure all purchasers have the appropriate F-gas certification, there are many who don’t. The Cooling Post has uncovered instances of sellers ignoring the regulation completely or merely paying lip-service to the licence requirement.



An Italian seller, for instance, offering R404A drew customers' attention to the F-gas regulations but merely stated: "By purchasing a refrigerant, you confirm that you are knowledgeable in the sense of the above-mentioned regulations and thereby the use of the refrigerant by a knowledgeable person."

The CNA, Italy's national confederation of SMEs, has expressed concern at the ease with which refrigerants can be ordered on the internet. This was exposed by the Canale 5 TV programme Striscia la Notizia earlier this month when the presenter successfully bought an 800g bottle of R410A from a seller on Amazon. While the website advert suggested an F-gas licence was required, the presenter Jimmy Ghione was assured by the seller over the phone that this wasn't needed.

In a joint statement, CNA president Giuseppe Napolitano and regional head Vittorio Schininà said: "The satirical transmission has shown, in fact, as on Amazon anyone can, easily, buy a container of F-gas, when the same can be sold only and exclusively to persons and companies that have a specific license."

The situation is by no means restricted to Italy. The problem seems to extend across all the European member states, including its largest members the UK, France, Germany and Spain. Not surprisingly, the majority of activity centres on the refrigerants most affected by the price increases – R404A, R410A and R134a.

While some of the refrigerant may have been legally imported under a legitimate F-gas quota, the large amount being offered in disposable cylinders suggests that much of it is illegal. Non-refillable, disposable have been banned in Europe since 2007.

In Ireland, two of the countries largest refrigeration wholesalers, RSL and FSW, have both recently warned customers to beware of refrigerant being offered for sale in disposable cylinders and questioned the purity of the contents.

The overt nature of the internet should make it very easy for the authorities to police but this is clearly not being effective. More worryingly, illegal internet sales may be the thin end of the wedge – there is evidence that offenders are avoiding the internet altogether by contacting contractors directly.

[Cooling Post, 21 March 2018](#)



19. Environmentally safe refrigeration technologies for the Arctic zone of the Russian Federation

On 10 April 2018, Murmansk will see conference "Environmentally safe refrigeration technologies for the Arctic zone of the Russian Federation". The conference is organized by the International Centre for Scientific and Technical Information. The partners of the conference are the Ministry of Natural Resources and Environment of Russian Federation, Nordic Environment Finance Corporation, Ministry of Natural Resources and Environment of the Murmansk Oblast, Russian Union of the Refrigeration Industry Enterprises. The Ministry of Fishery and Agriculture of the Murmansk Oblast supports the conference.

The list of the conference speakers includes representatives of federal and regional government bodies, international experts of the Arctic council project and UN, heads of trade associations and unions. Heads and top managers of major producers of refrigeration equipment and engineering companies, such as Danfoss, Ostrov, GEA Refrigeration Rus, BarentsCool, Khimkholodservis and others, will speak about modern environmentally sound technical solutions suitable for the Russian Arctic zone. The conference talks will also touch on current and future legal restrictions and reporting requirements relating to use of refrigerants containing ozone-depleting substances and fluorinated greenhouse gases, problems of the fishing industry, servicing and vocational training.

The attendees will be informed how they can take part in the Arctic council project and receive grant technical assistance for conversion to ozone-safe technologies and addressing the related servicing of equipment. Most of companies using refrigeration equipment will face such mandatory conversion because Russia's obligations under the Montreal protocol oblige the country's economic entities to reduce use of ozone-depleting substances by 99,5% by 2020, and phase out of fluorinated greenhouse gases, including refrigerants on the base of hydrofluorocarbons (HFC), will begin soon.

Contact: [Ekaterina Sarycheva](#), manager of the Arctic council project, to apply for participation via + 7 (926) 074-35-54 or

Our Murmansk coordinator: [Igor Schipin](#), +7(911)339-75-37

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](#)
- [TEAP](#)

SYNTHESIS REPORTS

- [2014 assessments](#)
- [2010 assessments](#)
- [2006 assessments](#)

[Assessment Panels List of Meetings](#)



THE MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL

- [Report and other Documents](#) for the 80th meeting of the Executive Committee
- [Agenda](#) for the 80th meeting of the Executive Committee
- [Report](#) of the 79th meeting of the Executive Committee

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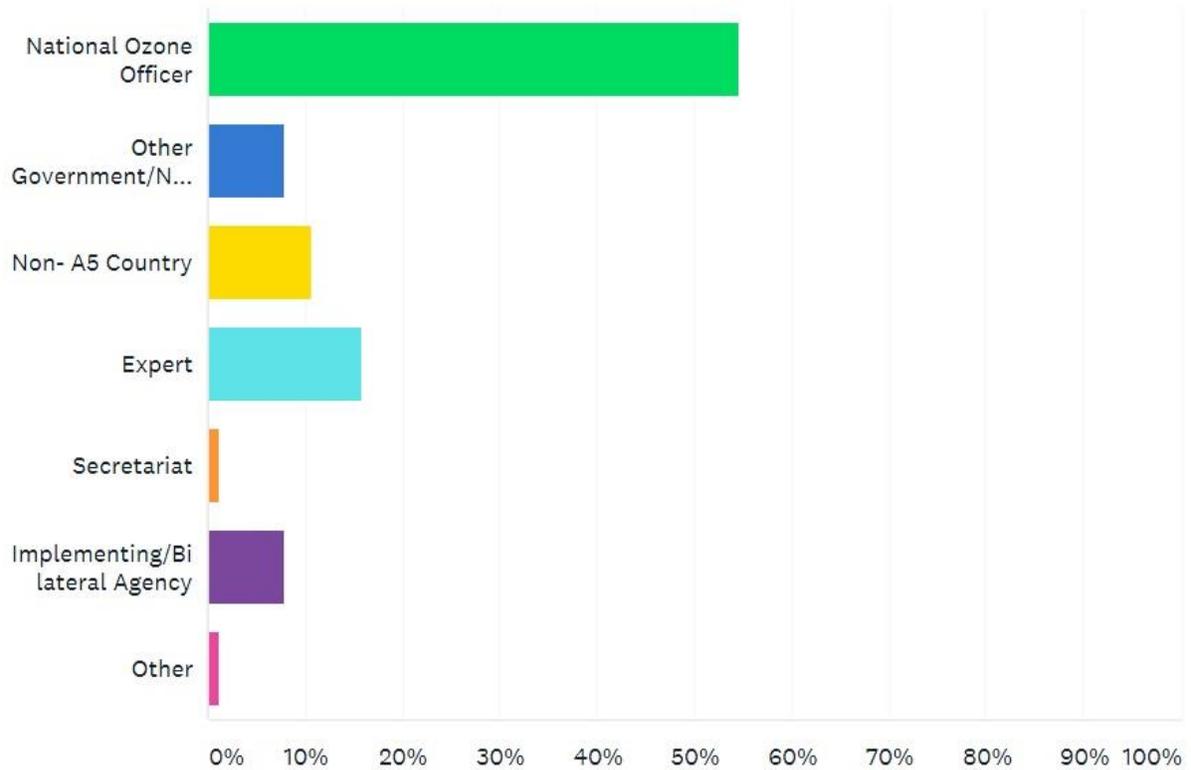
OZONACTION

Feedback Survey Results: First Inter-Regional Thematic Technical Workshops and Regional Network Meetings for National Ozone Officers

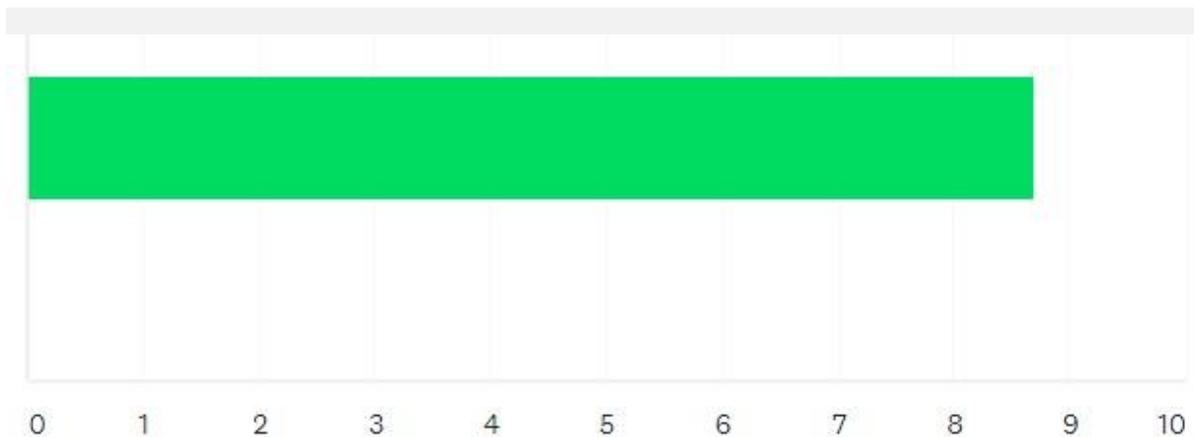


UN Environment OzonAction organised the first Inter-Regional Thematic Technical Workshops and Regional Network Meetings for National Ozone Officers, 15-19 January 2018 in Paris, France. Following the event OzonAction carried out a quick online survey to seek some guidance, feedback and understanding of the level of satisfaction of the participants in this type of meeting.

[In what capacity did you participate in the workshops?](#)



**What was your overall opinion of the workshops?
(0 = poor 10 = excellent)**



The feedback in general was very positive with participants scoring the meeting with an overall score of 8.6 (out of a total score of 10). OzonAction also received some very useful comments and suggestions. Full details can be seen in the analysis and brief report, which can be found [here](#)

Thank you very much to all that completed the survey.




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**

FEATURES

- **Pre-session** distribution of concept notes, logistics information, agendas & meeting documents
- **In-session** sharing of presentations delivered during the meeting & updated documents
- **Post-session** circulation of meeting reports & recommendations
- **Secure** operations with password protection before & during meetings



24/7 ACCESS from PC, tablet, & mobile phone

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Visit the [OzonAction Meetings Portal](http://www.ozonactionmeetings.org) and learn more about our current, upcoming, and future events



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



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!

Download it Now!



OzonAction Smartphone Application WhatGas? 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

OzonAction Smartphone Application WhatGas?
Available for **free** in the Google Play and Apple IOS Store
Scan the QR code or search for “UNEP”, “OzonAction” or “WhatGas?”



[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](#)

OzonAction Factsheets



Click [here](#) to access **OzonAction Series of Fact Sheets** relevant to the **Kigali Amendment**.

UNEP
HS Nomenclature (HS Codes) for HCFCs and Certain Other Ozone Depleting Substances
Post-Kigali Update

INTRODUCTION

In recent years, trade patterns in ozone depleting substances (ODS) have changed with the complete phase-out of chlorofluorocarbons (CFCs) as of 1 January 2010 (except for a few exempt uses), the hydrochlorofluorocarbon (HCFC) phase-out in progress and the increased trade hydrofluorocarbons (HFC) and other alternatives as replacement alternatives.

To better facilitate monitoring of trade in ODS, the Parties to the Montreal Protocol requested the World Customs Organization (WCO) to revise the Harmonized Commodity Description and Coding System (HS) in the Harmonized System (HS) codes for HCFCs. This resulted in providing binding notes for HCFCs under the Harmonized System (HS) of Chapter 29 with the objective of assigning specific eight digit HS codes to the most commonly used HCFCs, and at the same time labelling individual HCFC codes previously assigned to CFCs. This amendment entered into force on 1 January 2012. With the 2016 Kigali Amendment to the Montreal Protocol phase-down HCFCs it is expected that a future amendment of the HS will assign separate HS codes for the most commonly used HFCs and hydrocarbons containing HFCs.

HS Classification for ODS (2012)

Under the HS 2012 HCFCs and certain other ODS are to be classified in the HS as follows:

Chapter 29. Organic chemicals

29.03 Halogenated derivatives of hydrocarbons.

29.03.1 - Halogenated derivatives of acyclic hydrocarbons containing two or more different halogens

2903.11 - Chlorofluoromethane (=HCFC-22)

2903.12 - Dichlorodifluoromethane (=HCFC-123, covers two isomers)

2903.13 - Chlorotrifluoromethane (=HCFC-113, covers two isomers)

2903.14 - Dichlorodifluoroethanes (=HCFC-142, covers 3 isomers, including the most popular HCFC-142b)

2903.15 - Dichlorotrifluoroethanes (=HCFC-225, covers 3 isomers, including the most popular HCFC-225a and HCFC-225a2)

2903.16 - Bromochlorofluoromethane, bromochlorodifluoromethane and dibromochlorofluoromethane

2903.17 - Other (= all remaining HCFCs and a number of other halogenated derivatives of acyclic hydrocarbons containing two or more different halogens, including other than the following ozone depleting substances controlled by the Montreal Protocol: hydrochlorofluorocarbon (HCFC) and bromochlorofluoromethane (BCFM))

Download & present a comparison table showing the previous HS classification of ODS until 31 December 2011 (HS 2007) and the revised classification, which were applicable from 1 January 2012 (HS 2012). Information is also provided on the current HS codes for ODS-containing mixtures (see back page).

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

UNEP
The Kigali Amendment to the Montreal Protocol: HFC Phase-down

28th Meeting of the Parties to the Montreal Protocol

INTRODUCTION

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 hydrofluoro-carbons (HFCs).

HFCs are commonly used alternatives to ozone depleting substances (ODS). While not ozone depleting substances themselves, HFCs are greenhouse gases which can have high or very high global warming potentials (GWPs), ranging from about 12 to 14,800.

The phase-down of HFCs under the Montreal Protocol has been under negotiation by the Parties since 2009 and the successful agreement on the Kigali Amendment (Decision XXXVI) and accompanying Decision XXXVII continues the historic legacy of the Montreal Protocol.

This fact sheet summarizes and highlights the main elements of the Amendment of particular interest to countries operating under Article 5 of the Protocol (Article 5 Parties).

OVERVIEW OF AMENDMENT

The Kigali Amendment adds to the Montreal Protocol the phase-down of the production and consumption of HFCs. The main features of the amendment are the following:

- The Kigali Amendment will enter into force on 1 January 2019, provided that it is ratified by at least 20 Parties to the Montreal Protocol (90 per cent ratification) by the COP Party.
- There are four groups of Article 5 Parties with different cessation dates and phase-down schedules (see chart and graph on page 2).
- Some non-Article 5 Parties have already submitted calculations and different initial phase-down rates from the main group (non-Article 5 Parties) (see chart and graph on page 3).
- A new Annex F has been added to the Protocol. This lists the HFCs separated into two groups:
 - Annex F, Group 1: all HFCs (except HFC-125 and HFC-134a)
 - Annex F, Group 2: HFC-23.
- Global warming potential values have been added to the Protocol for HFCs and selected HCFCs and CFCs (see page 6).
- Production, consumption, import, export and emissions as well as consumption balances of HFCs and its equivalent in carbon dioxide (CO₂) equivalents.
- Businesses are to be calculated from both HFC and HCFC production/consumption.
- There is an exemption for high ambient temperature countries (see page 5).
- Trade and export licensing systems for HFCs must be in place by 1 January 2019.
- Trade and Parties that have not ratified the Amendment ("non-Parties") will be banned from 1 January 2023.
- The Executive Committee is required to develop, within two years, guidelines for licensing of the phase-down of HFCs.
- A timeline of the HFC phase-down is provided on page 4.

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 hydrofluoro-carbons (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).

UNEP
Refrigerant Blends: Calculating Global Warming Potentials
Post-Kigali Update

INTRODUCTION

The number of single component refrigerants with different thermodynamic properties suitable for different types of equipment is limited. Growing demand for refrigerant and accompanying with diversified applications has led to a continued search for suitable refrigerant blends. A number of such blends have been developed by mixing two or more single component refrigerants in different proportions. The resulting blends have entirely different properties from that of its components.

While it is common to use the term "blends" in the context of the Montreal Protocol, it is important to note that the term "mixtures" is also used to describe refrigerants which are composed of more than one component. The terminology "mixture" is specifically used in the World Customs Organization (WCO) Harmonized Commodity Description and Coding System, also known as the Harmonized System (HS) codes.

TYPES OF REFRIGERANT BLENDS

A refrigerant blend or mixture of refrigerants is made up of two or more single component refrigerants. These blends can be of two types: "Azeotropic and Zeotropic blends".

Azeotropic blends
 These blends behave like a single component refrigerant, in that they boil and condense at a constant temperature or at a constant pressure. In the azeotropic refrigerant mixture, there is no change in composition during the phase change. These blends are assigned numbers for ASHRAE codes in the 500 series, e.g. R502A.

Zeotropic blends
 These blends boil and condense through a range of temperatures at a given pressure. This range of temperatures is called the "temperature glide". Zeotropic blends are assigned ASHRAE codes in the 400 series, e.g. R404A, R407C, etc.

Global warming potential (GWP)
 Global warming potential (GWP) is a measure which enables comparison of the global warming effects of different gases. It compares the amount of heat trapped by a certain mass of a gas to the amount of heat trapped by a similar mass of carbon dioxide over a specific period of time. Carbon dioxide was chosen by the Intergovernmental Panel on Climate Change (IPCC) as the reference gas and its GWP is taken as 1.

Following the 2016 Kigali Amendment, the Montreal Protocol has adopted flexible licensing system for ODS in HFCs. All the remaining HCFCs and CFCs which have been incorporated into the text of the Protocol in Annexes A, C and F.

GWP values for some common refrigerants

Substance	GWP value
CFC-12	10,900
HCFC-22	1810
HCFC-124	800
HCFC-142b	2100
HFC-134a	1430
HFC-152a	124
HFC-23	14,800
HFC-32	675
HFC-125	3000
HFC-134a	1430
HFC-124a	1430
HFC-124a	-1
HFC-124a	-1
R-290 (Propane)	3

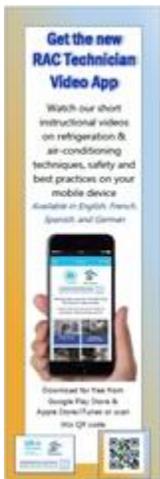
Refrigerant Blends: Calculating Global Warming Potentials (post-Kigali update)



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



Tools Commonly used by Refrigeration and Air-Conditioning Technicians



OzonAction Multimedia Video Application: Refrigeration and Air-conditioning Technician Video Series - 50,000 download to date - 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.

New videos on flammable refrigerants just added!

Please share with your RAC associations, technicians and other interested stakeholders...

OzonAction Multimedia Video Application: Refrigeration and Air-conditioning Technician Video Series

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.

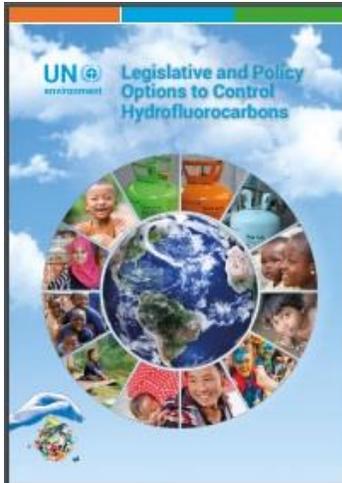
OzonApp eDocs+ available in the [Android Play Store](#) and [Apple Store/iTunes](#).
(Just search for "OzonAction", or scan this QR code)



Publications



Twinning of National Ozone Officers and Energy Policymakers - Under the Kigali Cooling Efficiency Program (K-CEP), UN Environment is implementing a two-year "twinning" project to build the capacity of National Ozone Officers and national energy policymakers for linking energy efficiency and Montreal Protocol objectives in support of the Kigali Amendment.



Legislative and Policy Options to Control Hydrofluorocarbons

In order to follow and facilitate the HFC phase-down schedules contained in the Kigali Amendment, the Parties, including both developed and developing countries, will have to implement certain measures.

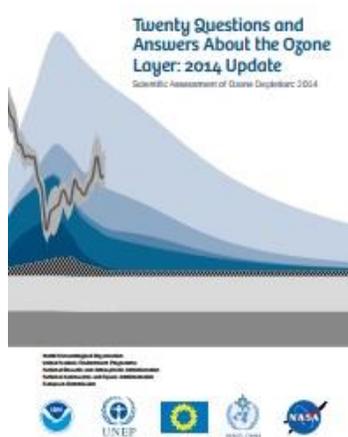
This booklet contains a recommended set of legislative and policy options which the developing (Article 5) countries may wish to consider for implementation. It is intended to be a guide/tool for countries.

Events

2018

- [A Cool World: 1st International Congress on Clean Cooling](#), 18 -19 April 2018, University of Birmingham, United Kingdom
 - [12th Conference on Phase-change Materials & Slurries for Refrigeration & Air Conditioning](#), 21-23 May 2018, Orford, Quebec, Canada
 - [13th IIR-Gustav Lorentzen Conference on Natural Refrigerants](#), 18-20 June 2018, Valencia, Spain
 - [Solar Heating and Cooling Forum](#), 9 August 2018, Brisbane, Qld, Australia
 - [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](#)
- [The Future of HVAC Conference 2018](#), 12–13 September, Melbourne, Australia.

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.

Lead Author:
 Michaela I. Hegglin
 Coauthors:
 David W. Fahey, Mack McFarland, Stephen A. Montzka, Eric R. Nash



[Primer on Hydrofluorocarbons \(HFCs\)](#) - IGSD -11 January 2018

Summary:
 Fast action under the Montreal Protocol can limit growth of hydrofluorocarbons (HFCs), prevent 100 to 200 billion tonnes of CO₂-eq by 2050, and avoid up to 0.5°C of warming by 2100.

Lead authors:
 Durwood Zaelke, Nathan Borgford-Parnell, and Stephen O. Andersen.
 Contributing authors:
 Kristin Campbell, Xiaopu Sun, Dennis Clare, Claire Phillips, Stela Herschmann, Yuzhe Peng Ling, Alex Milgroom, and Nancy J. Sherman.



The [IIR International Dictionary of Refrigeration Available in 11 languages](#), the complete version of the International Institute of Refrigeration (IIR) International Dictionary of Refrigeration is now freely accessible online.

The IIR International Dictionary of Refrigeration offers researchers, industrialist or administrations the practical resources required to produce content related to refrigeration technologies in multiple languages. This online tool allows you to find definitions, in English and French, of scientific and technical terms, as well as identify terms in the language of your

choice and find corresponding translations in the 10 other languages. The dictionary provides term searches in Arabic, Chinese, Dutch, English, French, German, Italian, Japanese, Norwegian, Russian and Spanish.

- The dictionary in numbers:
- more than 4,300 terms in English and French, including 800 synonyms,
 - around 3,500 definitions in English and French,
 - approximately 7,800 terms, synonyms and definitions
 - content in 11 languages.

This international tool is the result of the work of nearly 200 experts, members of the IIR network, from around 30 countries throughout the world.

- The dictionary's content covers all areas of refrigeration such as:
- basic principles (thermodynamics, transfer of heat and mass ...)
 - production of refrigeration (refrigerated systems, refrigerants...)

- refrigerated installations
- methods of chilling, refrigeration and freezing
- storage, transport and distribution
- refrigeration applications for perishable products and the agro-food industry
- air conditioning
- heat pumps
- cryogenics
- environment

Access the International Dictionary of Refrigeration on the IIR [website](#)



Letter to the Editor

Refrigerants: There is still no vision for sustainable solutions

Risto Ciconkov

Refrigerants: There is still no vision for sustainable solutions

by Risto Ciconkov

Letter to the Editor, International Journal of Refrigeration

[Abstract and highlights](#)



University of Birmingham. "[Draining peatlands gives global rise to greenhouse laughing-gas emissions.](#)" ScienceDaily, 28 March 2018.

Miscellaneous



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

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



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:

- Immediate and permanent access to the latest research and to IJR archive
- Access the latest articles as soon as they become available online.
- Browse, search and read each one of the nearly 4,500 papers since Volume 1, Issue 1.
- Unlimited access to seminal contributions to the field of refrigeration dating

back to 1978.

- Keep up-to-date with subscriptions to customized e-alerts on New Volumes, Topics and saved Searches.

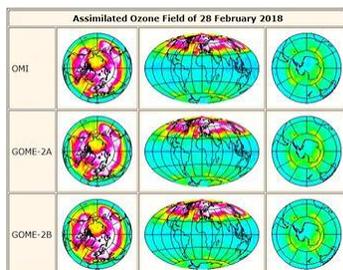
Enhanced content and functions

- Easily export references, citations and abstracts.
- Print, download or share articles with colleagues or peers.
- See which papers, published in Elsevier or elsewhere, have cited any selected article.
- Consult the research highlights overview of articles in volumes from 2012 onwards.

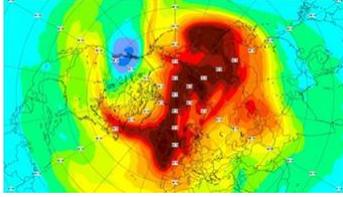
To access this new service, click "[activate my e-IJR subscription now](#)" and follow the instructions.



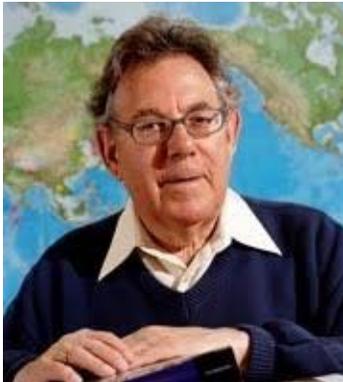
International Observers - New AREA membership category - Due to the significant worldwide interest in European legislative developments and the increase in competence of personnel who handle new refrigerants, AREA is pleased to introduce its brand new "International Observer" membership category. This 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



TEMIS -- Near-real time global ozone field. The in near-real time delivered total ozone columns, derived from satellite observations, are input to a data assimilation program which provides global ozone fields for today and a forecast for the coming days.



Copernicus Atmosphere Monitoring Service. Since 7 February, CAMS has predicted the appearance of an ozone mini-hole over western Canada around 12-13 February. The 5-day forecast from the ECMWF Copernicus Atmosphere Monitoring Service (CAMS) showed the location of this ozone mini-hole and predicted its shape and size. This prediction was broadly consistent with other leading global atmospheric composition forecasting centres. Satellite observations acquired on 12 and 13 February data assimilation actually confirmed these predictions. "It is a nice way for us to show that our models really work and can accurately predict these kinds of events," says Mark Parrington, senior scientist for CAMS...



Call for nominations for the "Paul Crutzen 2018 Award for Young Scientists of the International Commissions on Atmospheric Chemistry and Global Pollution" by iCACGP of IAMAS.

The purpose of the award is to promote scientific innovation in atmospheric sciences for the protection of the environment.

The person nominated for the Award should be the first author of at least one cited paper with significant innovation and impact. An early career scientist is defined for this award as a researcher within 7 years of completing a Ph.D. or equivalent degree. If parental leave falls into this period, up to one year may be added per child where appropriate. The nominee should meet the above

criteria by the first of June of the year when the award is competed.

Nomination Procedure

A complete nomination packages must be e-mailed in one e-mail to the two following e-mail addresses: mariak@uoc.gr; christian.george@ircelyon.univ-lyon1.fr under the subject heading: 'Nomination for the iCACGP Paul Crutzen Award 2018'



Survey: "Hydrocarbons availability & impact of standards"

You are invited to participate in this survey as part of the work conducted within the EU-funded project "LIFE FRONT" (<http://lifefront.eu>).

The project aims to remove barriers posed by standards for flammable refrigerants in refrigeration, air conditioning and heat pump (RACHP) applications.

The aim of the survey is to map the available technology and product groups using hydrocarbon (HC) refrigerants, their expected future availability, and the impact of standards on such market development. The findings will contribute to the market research investigating the impact of current (restrictive) standards on the European HVAC&R industry, and their end users.

The results of the survey will be available for free to the public as one of the outcomes of the project. The expected publication date is early September.

The respondents can help advance the objectives of the project that seeks to eliminate the existing barriers for hydrocarbons.

Who should answer?

Interested participants to the survey could be:

- system manufacturers
- end-users
- trade bodies

- the research community
- national authorities
- NPOs

The questionnaire takes around 15 minutes to complete, depending on the level of detail you provide.

All results will remain anonymous and only aggregated data will be used to outline the current and future situation for this market segment.

Deadline for contributions: 02 April 2018

For any questions, do not hesitate to contact us at info@lifefront.eu.

Take the survey

[These Climate Pollutants Don't Last Long, But They're Wreaking Havoc on the Arctic.](#) If we can cut back on methane, black carbon and other short-lived climate pollutants, it could buy time to solve the trickier problem of CO₂. By Sabrina Shankman

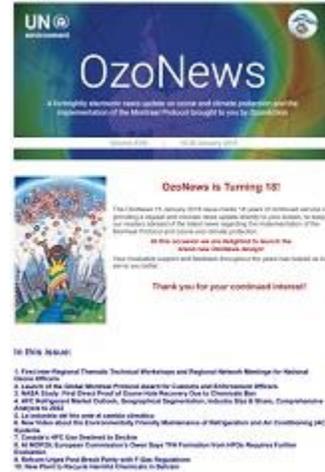


The 2018 Climate & Clean Air Awards are now open for nominations! For the 2nd consecutive year, we are calling on the SLCP community to recognise the projects and policies making an impact on climate change and air pollution.



AIRAH Awards 2018 nominations now open! The AIRAH Awards recognise the individuals, companies, research projects and products across the diverse specialist fields that make up the HVAC&R industry. Open to individuals, companies, corporate bodies, institutions and government authorities, the 2018 Awards will recognise work carried out during 2016/2017.

Current and previous OzoNews Issues, are available from
OzonAction website



Disclaimer:

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

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

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

Prepared by: Samira Korban-de Gobert, OzonAction

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