



# OzoNews

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

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## 1. Special End of Year Message Tina Birnpili, Executive Secretary, Ozone Secretariat



### “The Kigali Amendment: A New Year’s resolution we cannot break”

It's the time of the year when many people start planning New Year's resolutions: declarations that have to do with our own daily habits or deeper promises about our lives.

It will come as no surprise to learn that many of us may break these resolutions, sometimes only a few minutes after midnight. We are only human, after all.

However, there is one resolution we have all made for next year that we cannot afford to break. On the first day of 2019, the Kigali Amendment to the Montreal Protocol enters into force, which means the work on this crucial agreement begins in earnest.

We all know why the Kigali Amendment is so important. The Intergovernmental Panel on Climate Change has given us until 2030 to take the actions needed to hold the increase in average global temperature to 1.5°C.

Under the Amendment, nations are promising to reduce the use of hydrofluorocarbons, or HFCs, in refrigerators, air conditioners and related products by more than 80 percent over the next 30 years. Cutting the use of these powerful climate-warming gases could avoid up to 0.4°C of global warming by the end of the century, while continuing to protect the ozone layer.

And there's more. The move to planet-friendly alternatives opens a window to redesign cooling equipment to make them more energy efficient. Actions to phase down HFCs and enhance energy efficiency can increase the effects of actions taken in isolation.



We have a real chance to take a big bite out of climate change. With this in mind, everybody involved in the Montreal Protocol has been working hard throughout 2018 to ensure the Kigali Amendment hits the ground sprinting.

We have ratifications from 63 parties, with more expected in the coming weeks and months. The parties have put in place practical arrangements for the implementation of the Amendment. They have agreed on technologies for the destruction of HFCs and adopted new data reporting requirements and tools. Enabling activities are also already underway. With funding from the Multilateral Fund, parties are building their capacity, strengthening institutions and developing national strategies to ensure we tackle HFCs quickly and decisively.

This preparatory activity gives us hope that we can succeed, as does the Montreal Protocol's record at keeping its resolutions. The latest report from the Scientific Assessment Panel of the Montreal Protocol, released at the 30th Meeting of the Parties in November, shows that the ozone layer in parts of the stratosphere has recovered at a rate of 1-3% per decade since 2000. At projected rates, Northern Hemisphere and mid-latitude ozone will heal completely by the 2030s followed by the Southern Hemisphere in the 2050s and the Antarctic ozone hole to gradually close by 2060.

This healing is a direct result of the banning, under the Montreal Protocol, of chlorofluorocarbons (CFCs) and other substances that were tearing a hole in the ozone layer and letting harmful UV-B radiation damage human and ecosystem health.

But the events of 2018 also showed us that we must be careful to preserve this progress in the face of new threats. A scientific study revealed an unexpected and persistent increase in global emissions of trichlorofluoromethane (CFC-11) in recent years, despite the reported elimination of production.

These measured emissions can slow down the recovery of the ozone layer if they continue, which is why the Montreal Protocol parties have acted swiftly. At the Meeting of the Parties, they ordered a conclusive scientific investigation into the emissions and decided on a specific path forward in resolving the issue.

While these new emissions are worrying, the fact we detected them shows that the monitoring, networks and science in place to protect the ozone layer are working. Had scientists not been monitoring the atmosphere for this ozone-depleting substance, we would be none the wiser about these illegal emissions.

Dealing decisively with the unexpected emissions of CFC-11 will raise the bar of expectations of delivery by Montreal Protocol institutions even higher. In order to do that, we should take a pause, reflect on what worked well for 31 years and what can be strengthened and renewed. We are evolving together with a treaty that has been keeping us proud and successful for so long.

As 2018 draws to a close, we can be quietly satisfied with the work we have done and remember that much more effort lies ahead if we are to preserve and build on the gains we have made for human health, economies and the planet.

Let us give a collective promise that the resolution to protect the climate and ozone layer is the resolution that we cannot break.

**Author:** Tina Birnpilli, Executive Secretary, [Ozone Secretariat](#), United Nations Environment Programme

## Global

### 2. Buildings and construction sector – Huge untapped potential for emission reductions



[Katowice Climate Change Conference](#), 7 December 2018 - Dramatic action will be needed by governments, cities and business if the global buildings and construction sector is to cut its carbon footprint in line with international agreements, according to a new report released today by the Global Alliance for Buildings and Construction.

There is good news. [The 2018 Global Status Report - Towards a Zero-Emission, Efficient and Resilient Buildings and Construction Sector](#), highlights that emissions from buildings and construction may have peaked in the past few years, with energy efficiency gains in areas such as heating, lighting and cooking and with more offices and

homes being powered by cleaner forms of energy. The study was written by the International Energy Agency and UN Environment.

Efficiency gains are also being realised through shifts towards energy saving technologies like heat pumps, improved windows and insulation, the use of less energy-intensive materials, and buildings design. However, the report underlines that the buildings sector – a huge engine of the global economy – still accounts for a significant 39 percent of total energy-related CO<sub>2</sub> emissions and 36 percent of final energy use.

The number of new buildings is likely to grow rapidly in the coming years, especially in Africa and Asia. This rapid growth will challenge the target of a 30 percent energy intensity improvement in buildings by 2030, needed to put the sector on track to meet the goals of the Paris Climate Change Agreement. [...]

The report highlights:

### An Emerging Challenge—Cooling Buildings

The report flies a red flag over the sharply rising energy demand for cooling systems and air conditioners, linked with improving incomes in developing countries and higher temperatures – such as recent heat waves this year in many parts of the globe – as a result of climate change.

Energy use for 'space cooling' has already increased 25 per cent since 2010 and there are now more than 1.6 billion air conditioning units in buildings globally. Today, the largest markets are not in the hottest countries on the planet: only 8 per cent of the 2.8 billion people living in places with average daily temperatures above 25 degrees have an air conditioner.

There are many ways to deliver cooling in buildings, and the entry into force of the Kigali Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer could provide a boost to one of them, the global penetration of air conditioners that use climate-friendly gases. This needs to go hand in hand with efforts to achieve much higher levels of efficiency. [...]

**UN Environment Programme, 7 December 2018**

## 3. Ozone depletion increases Antarctic snowfall, partially mitigates ice sheet loss

Ozone layer depletion has increased snowfall over Antarctica in recent decades, partially mitigating the ongoing loss of the continent's ice sheet mass, new University of Colorado Boulder research finds.



Credit: CCC/ Public Domain

The findings, published today [10 December] in the journal Geophysical Research Letters, show a distinct signal linking stratospheric ozone loss above Antarctica with increased precipitation, even as those gains have been outpaced by an even greater ice loss rate due to warming oceans, contributing to sea level rise. The Antarctic Ice Sheet is the world's largest ice sheet and freshwater reservoir, containing the potential for hundreds of feet of sea level rise if all ice were to melt.

"Calving icebergs and melting ice shelves have gotten lots of attention because they're the most visible impact of ongoing climate change to Antarctica," said Jan Lenaerts, lead author of the research and an assistant professor in CU Boulder's Department of Atmospheric and Oceanic Sciences. "But the input side of the equation, which is precipitation falling in the form of snow, hasn't drawn the same level of study."

An ozone "hole," or a seasonal thinning of the ozone layer, forms above Antarctica in the austral summer, influencing atmospheric circulation and creating stronger circumpolar westerly winds.

While previous research has outlined some aspects of the relationship between ozone depletion and the climate of the southern hemisphere, the new study co-authored by Lenaerts, Jeremy Fyke of Los Alamos National Laboratory and Brooke Medley of NASA's Goddard Space Flight Center Cryospheric Sciences Laboratory has analyzed the effect on Antarctica specifically.

The results complement a separate NASA-led study, which was led by Medley and published today in the journal Nature Climate Change, which uses observations from ice cores to show that Antarctic snowfall has increased in the last 200 years and especially so in the past 30 years, suggesting that precipitation changes can be linked to man-made causes such as greenhouse gas emissions as well as the ozone hole.

In order to pinpoint the effect of ozone loss on Antarctic snowfall, Lenaerts and his colleagues compared two sets of eight climate modeling simulations, one set with observed ozone levels and one set with ozone values kept constant at levels before the ozone hole started, allowing the researchers to isolate the signal relative to natural climate variability.

The comprehensive analysis, which encompassed the years 1955-2005, revealed increased Antarctic precipitation during the austral summer that can be attributed to lower levels of stratospheric ozone, and which has in part buffered ice sheet mass loss.

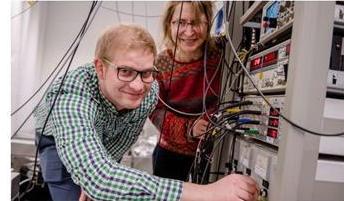
Paradoxically, while the results suggest that ozone depletion (previously the focus of global conservation efforts such as the 1987 Montreal Protocol) helps to partially mitigate sea level rise by increasing Antarctic precipitation, those mass gains have been more than offset by increasing iceberg calving and melting.

"The pace at which snowfall is increasing is not keeping up with the ocean-induced losses," Lenaerts said. "The Antarctic Ice Sheet is still losing mass."

**Phys.org; 10 December 2018**

## 4. How ice particles promote the formation of radicals

The production of chlorofluorocarbons, which damage the ozone layer, has been banned as far as possible. However, other substances can also tear holes in the ozone layer in combination with ice particles, such as those found in clouds. Researchers at Ruhr-Universität Bochum, the University of Duisburg-Essen and Friedrich-Alexander-Universität Erlangen-Nürnberg have discovered a possible mechanism for this. They describe it in the journal Physical Review Letters on 13 November 2018.



Karina Morgenstern and Cord Bertram with the experimental setup. Credit: RUB, Marjgaard

The work was part of a long-standing cooperation between the teams from Bochum, Duisburg-Essen, and Erlangen-Nuremberg led by Professor Karina Morgenstern, Dr. Cord Bertram, Professor Uwe Bovensiepen and Professor Michel Bockstedte, which is currently being continued within the framework of the cluster of excellence Ruhr Explores Solvation, or Resolv for short.

### Organic molecules are deposited on ice particles

Chemical processes can significantly influence the weather, the climate and the composition of the atmosphere. Cosmic rays or UV light provide the energy to split chemical compounds. In the case of bromine, chlorine or fluorine compounds, radicals, i.e. particularly reactive molecules, are formed. These attack the ozone molecules and can trigger chain reactions in the ozone layer. An earlier laboratory study had shown that ice particles with a silver core can promote such reactions. The team investigated the mechanism behind this effect in the current study.

In the laboratory, the scientists produced tiny ice particles and analysed how certain compounds containing chlorine or bromine interacted with them. They condensed the ice particles onto copper. In nature, mineral dust particles, among other things, form condensation nuclei for the ice particles.

Using microscopic and spectroscopic methods, they observed that the molecules preferentially attached themselves to defects in the ice structure. The surrounding water molecules of the ice structure then reoriented themselves and hydrogenated the molecules. This, in turn, made it easier to ionise the molecules in the experiment.

### UV radiation generates radicals

The researchers irradiated the ice crystals with the attached molecules using UV light, which excited electrons in the ice particles in the vicinity of the molecules. These excited electrons ionised the chlorine and bromobenzene molecules. Through ionisation, the molecules disintegrated into organic residues and highly reactive chlorine and bromine radicals.

"The mechanism could explain what happens when UV light hits mineral-contaminated ice," says Cord Bertram. "Our results could thus help to understand the fundamental processes behind phenomena such as ozone holes."

**PhysOrg, 7 December 2018**

## 5. Mini Screw: the development of a high-CFM compact compressor for LGWP A1 low pressure refrigerant

### Abstract

Addressing global warming concerns is one of the largest challenges facing the HVAC industry currently. Although A2L refrigerants are important options to consider for certain sizes of HVAC units, there remain many systems that require A1 category refrigerants.

Among the several available refrigerants, we looked at DR-12 as one of the attractive refrigerants. Along with it being in the A1 category, its very low GWP value (32) and high cycle performance make it an excellent long-term solution if successfully applied. A significant challenge to overcome with this refrigerant is its low density. DR-12 will require almost 7 times the volumetric flow for the same cooling capacity compared to R410A.

The current scroll or rotary technologies are not realistic to be applied in such a low density refrigerant system. The development of a new compact large CFM compressor is key to realize the scope of the project successfully.

The authors have explored various types of compression mechanisms and identified screw as one of the most suited technologies for this refrigerant. In order to obtain such large volume flow (19.8L/s, 42CFM), a unique screw rotor design and a high speed PM motor were employed.

Innovative bearing design and new compressor layout also enabled the compressor to be compact (145mm) and cost effective. A prototype compressor was built and tested.

This concept delivered 17.6kW (5 ton) capacity at 11,000rpm and 4.4kW (1.25 ton) at 2,500rpm, meeting its target requirements. This paper will introduce details of the compressor concept, along with the test results from a physical prototype. [...]

[Read/download the full report](#)

**Authors:** Masao Akei et al 2018 IOP Conf. Ser.: Mater. Sci. Eng. 425 012013

**IOP Conference Series: Materials Science and Engineering, November 2018**



## 6. "The Dawn of a New Refrigeration Era - The Kigali Amendment for a Brighter Future"

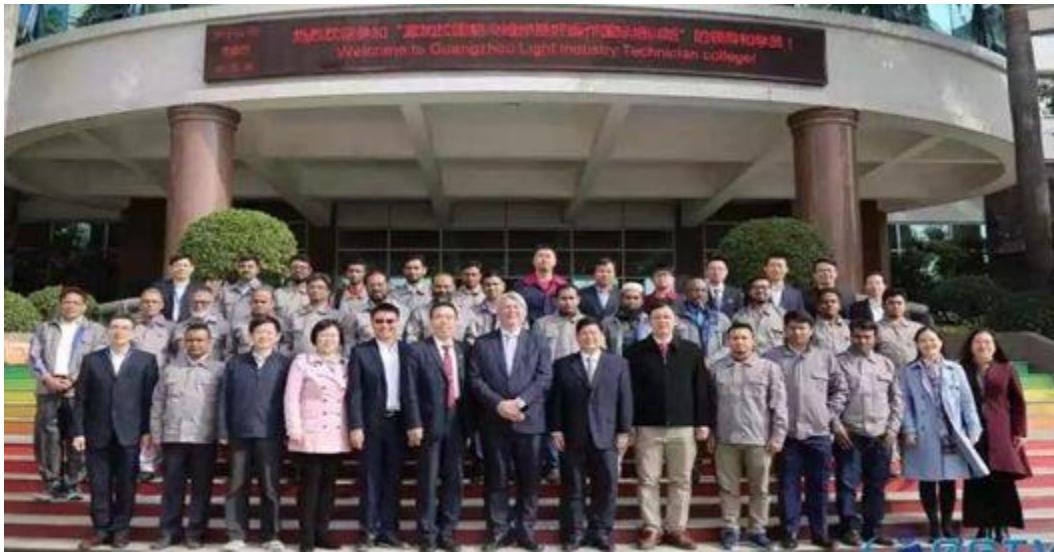
"The Dawn of a New Refrigeration Era - The Kigali Amendment for a Brighter Future" The New International Industria & Formazione Special Issue 2018-2019 recently launched on Tuesday 16 October in Chillventa.

The seventh edition of this renowned international publication, edited in cooperation among Centro Studi Galileo, United Nations Environment and the International Institute of Refrigeration after months of tight joint action, was also presented in a world premiere at the 30<sup>th</sup> Meeting of the Parties to the Montreal Protocol (MOP-30), 5-9 November 2018, Quito, Ecuador.

Request your free copy by filling out this [form](#)

[Centro Studi Galileo \(CSG\), December 2018](#)

Asia Pacific



## 7. OzonAction Brings Bangladesh Refrigeration and Air-Conditioning Professionals to China for Cool Training

GUANGZHOU, CHINA, 25 November 2018 – Twenty-five refrigeration and air-conditioning master technicians and industry experts from Bangladesh attended a training workshop in China on the campus of Guangzhou Light Industry Technician College from 22-24 November. This specialized training focused on good practices and safe use of flammable technology used in air conditioners and fridges. The additional know-how gained by the Bangladeshi trainees will enable them to work more efficiently with the latest technology and at the same time support of objectives of the Montreal Protocol on Substances that Deplete the Ozone Layer.

Representatives from Guangzhou Human Resources and Social Security (HRSS), Guangdong Province Vocational Skill Appraisal Centre, Guangzhou Vocation Skill Appraisal Centre, Mechanic Education Management Office and WorldSkills International inaugurated and welcomed the participants to the workshop. They also presented their capacity building activities undertaken at the provincial and national levels in China, particularly on good practices in operation and maintenance of refrigeration and air-conditioners.

It was highlighted that both China and Bangladesh are members of WorldSkills International, an international body that organizes national vocational skills competitions for its 79-member countries. Such south-south cooperation on skills development and knowledge exchange is crucial for economic development of both countries.

Technicians from major refrigeration and air-conditioning industries in Bangladesh such as Walton, Supreme, Elite Hi-Tech Industries Ltd., Cooling Point, AC Bazaar and Unitech participated in the training. Trainers from polytechnic institutes and technicians from major servicing workshops in Bangladesh also attended. Mr. Sheikh Obaidullah Al Mahmood from Bangladesh's National Ozone Unit at the Department of Environment highly appreciated the training workshop and said: "Bangladesh's refrigeration and air conditioning sector is moving towards low-GWP technologies in the near future, and the learnings from this training workshop would facilitate the development of competence needed for adoption of such technologies."

The three-day workshop included both theoretical and extensive practical sessions. Participants were introduced to alternative refrigerant technologies such as R-290, R-744, etc. that replace ozone depleting substances and were provided detailed training on good practices and safe use of such alternatives. Detailed sessions were held on refrigeration and air conditioning installation, maintenance, and safety parameters.



UN Environment OzonAction in cooperation with China Foreign Economic Cooperation Office (FECO) at the Ministry of Environment and Ecology of China facilitated the organization of the training workshop.

**Contact:**

**Shaofeng Hu**, Regional Montreal Protocol Coordinator  
Asia and the Pacific Office, OzonAction - UN Environment

**Liazzat Rabbiosi**, Montreal Protocol Officer, Asia and the Pacific Office, OzonAction – UN Environment

## 8. Centro Studi Galileo trains Chinese technicians on R290 A/C

Centro Studi Galileo (CSG), a leading Italian training institute in the sectors of refrigeration, air conditioning and renewable energies, held a course on Refrigeration and Air Conditioning Good Practices using Natural Alternative Refrigerants; in particular, split R290-based (propane) air-conditioning systems.

The course, addressed 24 Chinese trainers and engineers, took place at the Yantai Vocational College on 9-11 December 2018.



At the opening ceremony, Mr. Qu Lubin, Director of the Department of Automobile and Marine Engineering of the Chinese College, warmly welcomed and thanked the trainees and trainees, and introduced the development of refrigeration and air conditioning technology in YTVC.

Prof. Luca Rollino, expert trainer from CSG in Italy, taught the bases of environmental protection knowledge and showed the best practices in installation and servicing with R-290.

**Centro Studi Galileo (CSG), December 2018**

## 9. Japan to start helping Thailand collect greenhouse gas HCFCs next year

KATOWICE, Poland -- The Environment Ministry [Japan] will start supporting Thailand next year to collect greenhouse gases called hydrochlorofluorocarbons (HCFCs) used as coolants in air conditioners and refrigerators, according to ministry officials.

The project is part of the ministry's initiative to help other countries collect or neutralize the highly warming gas and thus win credit for greenhouse gas reductions through a joint crediting mechanism (JCM).

HCFCs were introduced in the 1980s to substitute chlorofluorocarbons (CFCs) that were seen as destroying the Earth's ozone layer blocking ultraviolet rays from the sun and increasing the risk of skin cancer. But some HCFCs have an extremely high capacity to trap heat in the Earth's atmosphere, reaching 10,000 times that of carbon dioxide.

This has prompted the international community to revise the Montreal Protocol for ozone layer protection and regulate HCFCs' production, and incorporate its reduction as one of the important goals of the Paris Agreement to fight global warming.

CFC substitutes are collected in Japan from electric appliances that use them, but the gases are released into the environment in developing countries.

Under the Environment Ministry's plan, a Japanese company with HCFC collection and neutralization capabilities will collect the gases from car air conditioners around the Thai capital of Bangkok, and burn them at local facilities to render them harmless.

This operation is estimated to neutralize as much as 12 metric tons of HCFCs annually. A ministry official said the government wants to make the project a symbolic case of international cooperation. "We want to actively



UN Secretary-General Antonio Guterres appears via screen when delivering a speech during the opening of the COP24 UN Climate Change Conference 2018 in Katowice, Poland, Monday, Dec. 3, 2018. (AP Photo/Czarek Sokolowski)

contribute to countries overseas by using Japanese technology," the official said. The ministry is also in consultations with Vietnamese officials about the possibility of similar cooperation.

The HCFC collection initiative will be announced by Environment Minister Yoshiaki Harada at the 24<sup>th</sup> Conference of the Parties to the United Nations Framework Convention on Climate Change (COP24).

*Japanese language version*

**Mainichi, 7 December 2018, By: Kazuhiro Igarashi, Environment & Science News Department**

## North America

### 10. Transforming the US market to phase down potent HFCs

*COP24, Katowice, Poland, Side event, 10 December 2018, hosted by: US Climate Alliance*



Hydrofluorocarbons (HFCs) are the fastest growing source of greenhouse gas emissions and can be several thousand times more potent than carbon dioxide.

Because they are short-lived, rapidly phasing-down HFCs is one of the best opportunities to slow the pace of climate change in the near-term.

Under the Kigali Amendment to the Montreal Protocol, the world agreed to phase down their use and transition to climate friendly alternatives.

The U.S. has yet to ratify the Kigali Amendment, and federal rules restricting the use of HFCs have been partly vacated by the D.C. Court of Appeals.

U.S. Climate Alliance states are stepping up to fill this void and protect American companies and jobs, and are considering adopting their own regulations to transition away from HFCs.

#### Panelists:

- Mary Nichols, Chair of California Air Resource Board, California
- Jim Wolf, President of Global Policy Associates and consultant to Ingersoll Rand
- Jake Schmidt, Managing Director, International Program, Natural Resources Defense Council
- Moderated by Ben Garside, Carbon Pulse

*Click [here](#) to watch the event's video.*

**CCAC Secretariat, December 2018**

### 11. Washington governor proposes HFC-reduction program

Governor Inslee earmarks \$959,000 to phase out HFCs as part of climate-action plan.

Jay Inslee, governor of Washington state, this week unveiled a \$273 million climate action plan – including \$959,000 to phase out HFCs – that would reduce greenhouse gas emissions to 25% below 1990 levels by 2035.

The proposal, which would need to be enacted by the Washington legislature, includes a transition to 100% clean energy and ultra-efficient buildings, as well as the elimination of HFC "superpollutants."

Phasing out HFCs alone would enable Washington to cut 2 million metric tons of CO<sub>2</sub>e greenhouse gas emissions by 2035, "a significant step toward meeting the state's reduction targets," said Inslee in a policy brief. In total the plan targets an emissions reduction of 16 million metric tons.



"[The] international community and business leaders have recognized HFC pollution as a serious threat and the transition to climate-safe alternatives as an economic opportunity," he said in the policy brief.

Inslee co-founded the U.S. Climate Alliance, a bipartisan coalition of governors from 16 states and Puerto Rico committed to reducing short-lived climate pollutants (SLCPs), including HFCs. (Last month, the newly elected governors of Michigan, Illinois and Wisconsin pledged to join the alliance.)

If Inslee's HFC-reduction program is enacted, Washington would join U.S. Climate Alliance members California, New York, Maryland and Connecticut as states that have launched HFC-reduction programs.

Washington was also one of 15 U.S. states and the District of Columbia that send a letter last month to the U.S. Environmental Protection Agency (EPA) "strongly opposing" its proposed revisions to updated leak repair and maintenance regulations that were extended to HFCs.

In June 2018, Washington joined nine other states and Washington, D.C., in a lawsuit to protect the EPA's SNAP (Significant New Alternatives Policy) rule regulating HFC emissions.

**Hydrocarbons21, 13 December 2018, By Michael Garry**

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## West Asia

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### 12. Centro Studi Galileo Certifies the first woman of the Middle East in RAC

Centro Studi Galileo since years is commissioned by several international Bodies, e.g. United Nations Agencies, to train and certify technicians from developing Countries from the point of view of industrial technology and environmental protection regulations.

This mission, which involved 50 nations on 4 continents so far, has become even more pressing due to the forthcoming entry into force of the Kigali Amendment, which imposes the HFC's phase-down to all the signatory nations of the Montreal Protocol.

From 15 to 17 October 2018, CSG's expert trainer Mr Gianfranco Cattabriga, trained 20 Kuwaiti engineers and trainers, whom were additionally assessed and certified.

Herein, a record global achievement was reached: the first woman in the Middle East ever certified under F-gas regulation! This incredible news carries the name of Asmaa Alenezi, pictured here with the trainer.

Many are the female trainers and engineers who've been already certified by Centro Studi Galileo across the world; few examples are only in Tunisia, China and Balkan States.

[Watch the trainers in action!](#)

Centro Studi Galileo, December 2018

## Europe & Central Asia

### 13. Turkmenistan greatly reduces use of ozone depleting substances

As much as 99 percent of ozone depleting substances (ODS) have been withdrawn from use in Turkmenistan, *Trend reports citing the Neutral Turkmenistan newspaper*.

"For now, the only ODS in Turkmenistan is R22 freon, the limited use of which is regulated," the report said.



Ashgabat has recently hosted a seminar by the Ozone Center under the State Committee for Environmental Protection and Land Resources of Turkmenistan dedicated to modern methods of refrigeration equipment maintenance and the introduction of alternative refrigerants.

Aspects of Turkmenistan's commitments arising from the Montreal Protocol on Substances that Deplete the Ozone Layer and the Vienna Convention for the Protection of the Ozone Layer aimed at withdrawing hydrochlorofluorocarbons from use with complete cessation by 2040, were highlighted at the event.

Most ODS are gases that actively contribute to global warming. Experts note that decreasing ODS emissions has led to significant reduction in greenhouse gas emissions and, as a result, curbing climate change processes.

[AzerNews, 10 December 2018](#)

## Featured



OZONE SECRETARIAT

- 61<sup>st</sup> Meeting of the Implementation Committee under the Non-Compliance Procedure of the Montreal Protocol, Quito (Centro de Convenciones QUORUM, Cumbaya), Ecuador | 3<sup>rd</sup> Nov 2018
- Bureau Meeting of the Twenty-Ninth Meeting of the Parties to the Montreal Protocol, Quito (Centro de Convenciones QUORUM, Cumbaya), Ecuador | 4<sup>th</sup> Nov 2018
- 30<sup>th</sup> Meeting of the Parties to the Montreal Protocol, Quito (Centro de Convenciones QUORUM, Cumbaya), Ecuador | 5 - 9 Nov 2018

Kigali Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, 15 October 2016 to [date](#)

- 40<sup>th</sup> Meeting of the Open-ended Working Group of the Parties to the Montreal Protocol, 11-14 July 2018, Vienna, Austria

The documents for the forthcoming 40<sup>th</sup> meeting of the Open-ended Working Group of the Parties to the Montreal Protocol (11 to 14 July 2018, Vienna), and the associated workshop on energy efficiency opportunities while phasing-down hydrofluorocarbons (9 and 10 July 2018) are available on the meeting portal and mobile app.

Read/download OEWG40 [Summary](#)  
[OEWG-40 Daily coverage by IISD](#)

- Click [here](#) for Montreal Protocol upcoming Meetings Dates and Venues

## The UN Environment Assessment Panels

The Assessment Panels have been vital components of ozone protection since the Montreal Protocol was first established. They support parties with scientific, technological and financial information in order to reach decisions about ozone layer protection and they play a critical role in ensuring the Protocol achieves its mandate.

The Assessment Panels were first agreed in 1988 to assess various direct and indirect impacts on the ozone layer. The original three panels are:

[The Technology and Economic Assessment Panel](#)

[The Scientific Assessment Panel](#)

## The Environmental Effects Assessment Panel

In the past there were 4 main panels. The Panels for Technology and Economic Assessments were merged in 1990 into one Panel, now called the Technology and Economic Assessment Panel.

Why are the three current panels important to ozone layer protection? Each carries out assessment in its respective field. Every four years, the key findings of all panels are consolidated in a synthesis report.



## THE MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL

- 82<sup>nd</sup> meeting of the Executive Committee, 3-7 December 2018, Montreal, Canada
- Adjusted Prorated 2018-2020 business plan of the Multilateral Fund (16 August 2018)
- 81<sup>st</sup> meeting of the Executive Committee, Montreal, Canada, 18 to 22 June 2018
- Reports of projects demonstrating alternatives to HCFC technologies (updated 81<sup>st</sup> meeting)
- 2018 Executive Committee Primer

[Learn more](#)



## OZONACTION



### **NEW OzonAction smartphone application: Good Servicing: Flammable Refrigerants Quick Guide**

#### **An interactive Quick Guide on Good Practices for Flammable Refrigerants.**

This is the electronic and interactive version of the UN Environment OzonAction Quick Guide on Good Servicing Practices for Flammable Refrigerants.

It offers easy reference to the key safety classification and technical properties of flammable refrigerants that are available in the market. It also provides important safety guidance for the installation and servicing of room air-conditioners designed to use flammable refrigerants.

This interactive guide allows you to scroll and browse the text, jump to specific chapters or use the comprehensive dynamic index to locate specific keywords,



figures and tables. The application also includes a refrigerant charge size calculator and a room size calculator for flammable refrigerants.

Available for free on the Google play store (Apple version coming soon) - Search for "UNEP Quick guide" or use the QR code.



### **NEW OzonAction smartphone application: Refrigerant Identifier Video Series**

#### **Guidance on how to identify refrigerants using a refrigerant identifier.**

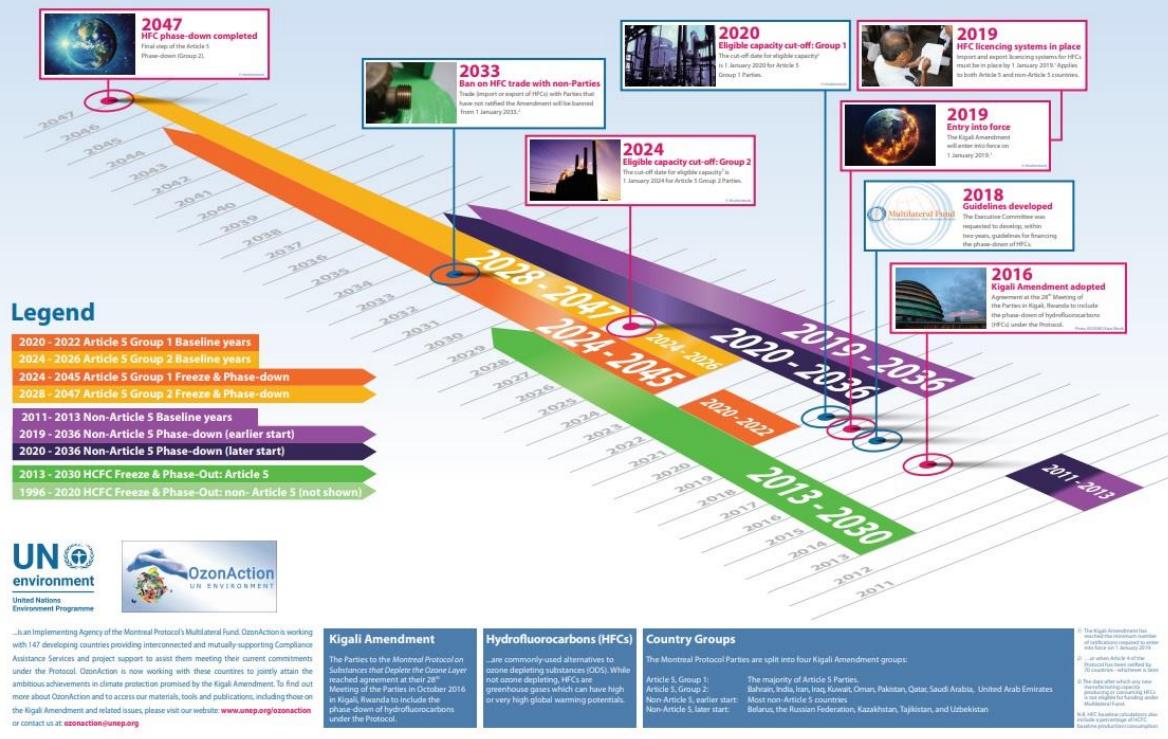
This new OzonAction video series consists of short instructional videos showing how to use and maintain a refrigerant identifier.

The videos provide useful guidance on safety and best practice, understanding the difference between different identifier units, testing procedures and identification of results.

It is intended for use by Montreal Protocol National Ozone Officers, Customs and Enforcement Officers as well as technicians involved in the servicing and maintenance of refrigeration and air-conditioning systems.

Available for free on the Google play store (Apple version coming soon)  
Search for "UNEP Refrigerant ID" or use the QR code.

## The Path from Kigali: HFC Phase-Down Timeline



## The Path from Kigali: HFC Phase-Down Timeline

This timeline, produced by OzonAction, highlights key hydrofluorocarbons (HFCs) phase-down dates.

Click [here](#) to download the timeline

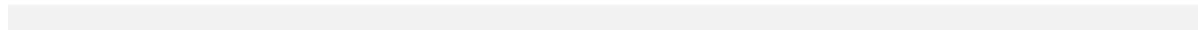


## New videos available on the OzonAction RAC video application

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!**

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



### GWP-ODP Calculator Smartphone Application

The application allow you to easily convert ODP, CO<sub>2</sub>-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 CO<sub>2</sub>-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, CO<sub>2</sub>-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!**



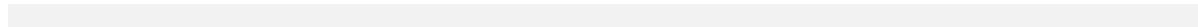
### OzonAction Smartphone Application WhatGas? Quickly search for the information you need

- 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 28<sup>th</sup> 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

A grid of nine factsheets from OzonAction, each with a different title and visual content:

- The Kigali Amendment to the Montreal Protocol - Opportunities and Next Steps**: A factsheet about the 2016 Kigali amendment to phase down HFCs, featuring a large photo of a conference.
- Ozone Depleters of Particular Concern Under the Montreal Protocol**: A factsheet on substances like HCFCs and HFCs.
- Montreal Protocol and Kigali Amendment**: A factsheet comparing the two agreements.
- The Kigali Amendment to the Montreal Protocol - Opportunities and Next Steps**: Another version of the first factsheet.
- Phase-down of Hydrofluorocarbons (HFCs)**: A factsheet on the phase-down of HFCs.
- Phase-down of Hydrofluorocarbons (HFCs) - Tools and Resources**: A factsheet on tools and resources for the phase-down.
- Monteiro Report**: A factsheet on the report by Monteiro et al. on the health impacts of HFCs.
- Tools Commonly Used by Refrigeration and Air-Conditioning Technicians**: A factsheet with a photograph of various HVAC tools.
- Update on New Refrigerants - Designations and Safety Classifications**: A factsheet on new refrigerants.

**NEW >> UN Environment-ASHRAE Factsheet** Update on New Refrigerants Designations and Safety Classifications

OzonAction Series of 19 Fact Sheets related to the Kigali Amendment.

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 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).

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 - Over 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

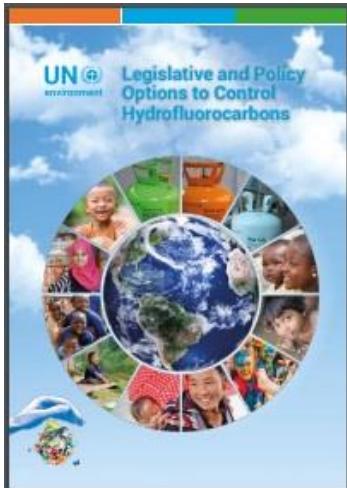
Available in the [Android Play Store](#) and [Apple Store/iTunes](#).  
(Just search for "OzonAction", or scan this QR code)

## Publications



"The Dawn of a New Refrigeration Era - The Kigali Amendment for a Brighter Future" The New International Industria&Formazione Special Issue 2018-2019 was launched on Tuesday 16 October in Chillventa. The seventh edition of this renowned international publication, edited in cooperation among Centro Studi Galileo, United Nations Environment and the International Institute of Refrigeration after months of tight joint action, will be also presented in a world premiere at the 30<sup>th</sup> Meeting of the Parties to the Montreal Protocol (MOP-30), 5-9 November 2018, Quito, Ecuador.

[Request your free copy by filling out this form](#)



#### [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

### 2019

- **Natural Refrigerant Seminar & Live CO<sub>2</sub> Demo**, 10 January 2019, Register for this free seminar for an overview of natural refrigerant applications in supermarkets, and why they are considered a "future-proof" alternative to HFC refrigerants...

**Call for abstracts - 15<sup>th</sup> Cryogenics 2019 Conference**, 7-11 April 2019, Prague, Czech Republic

- 8<sup>th</sup> Conference on Ammonia and CO<sub>2</sub> Refrigeration Technologies, 11-13 April 2019, Ohrid, Macedonia (FYROM)
- 25<sup>th</sup> IIR International Congress of Refrigeration - 24-30 August 2019, Montreal, Canada

Click [here](#) for more information / International Institute of Refrigeration

## 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 CO<sub>2</sub>-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.

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

**Optimization, monitoring, and maintenance of cooling technology**

**KIGALI**  
COOLING EFFICIENCY PROGRAM

This Knowledge Brief from the Kigali Cooling Efficiency Program, outlines the need for maintaining and servicing of cooling technology. It estimates that better optimization, monitoring, and maintenance of cooling equipment the potential to save 30Gt of CO<sub>2</sub> emissions by 2050.

**THE NEED FOR COOLING EFFICIENCY**  
Cooling is essential to health, property, and the environment, underpinning many of the Sustainable Development Goals. Yet cooling is also a major source of greenhouse gas emissions. Demand for cooling is increasing, yet there is an urgent need to develop more efficient cooling technologies to ensure future cooling needs are met sustainably.

**COOLING ACCOUNTS FOR 7% GREENHOUSE GAS EMISSIONS**  
Use of cooling technologies causes substantial global GHG emissions of between 3.7 ° and 4 ° Gt CO<sub>2</sub> eq. by 2050, which is a 17% global increase from 2015 levels. This projection is based on the assumption that cooling consumption will grow 17.2% of global electricity demand by 2050. Cooling technologies account for 10% of global greenhouse gas emissions. Global greenhouse gas emissions from electricity to power cooling technologies causes 1.5 Gt CO<sub>2</sub> eq. by 2050. The projected growth in cooling equipment is projected to grow between now and 2050 as developing nations gain access to energy and cooling technologies. The projected growth in the use of cooling equipment between now and 2050 can avoid the emission of approximately 800 Gt CO<sub>2</sub> eq.

**OPTIMIZATION, MONITORING & MAINTENANCE CAN REDUCE COOLING EQUIPMENT'S GREENHOUSE GAS EMISSIONS**  
Reducing the optimization, monitoring, and maintenance of cooling equipment through increased efficiency, improved performance, and service equipment life. Effective optimization,

The global stock of cooling air conditioners is expected to grow from 500 million in 2015 to 2.5 billion units in 2050. China is the largest producer of cooling equipment.

CARTON TRUST  
International Institute of Refrigeration  
ASHRAE

**"Optimization, monitoring, and maintenance of cooling technology"** outlines the need for maintaining and servicing of cooling technology. It estimates that better optimization, monitoring, and maintenance of cooling equipment the potential to save 30Gt of CO<sub>2</sub> emissions by 2050.

**Cooling as a Service (CaaS)**

**KIGALI**  
GLOBAL COOLING FUND

This brief presents a new approach to cooling – Cooling as a Service. This approach can benefit companies, governments and society at large and is based on the servitization concept which is rapidly penetrating other marketplaces.

**WHAT IS CaaS?**  
 The standard business model of delivering cooling typically involves the manufacturer or supplier of cooling equipment selling a product to a customer. Higher production volumes generally support more sales and lower unit costs. The manufacturer's focus is on maximizing the revenue to volume ratio by minimizing the energy and resource use of cooling products. Alternative business models, such as CaaS, have emerged to address the need for more efficient technologies.

**CaaS** is a service model and customers pay for the cooling they receive, rather than the physical product or equipment. There are two main types of CaaS models. CaaS model include direct cooling, where customers do not pay the cooling equipment, and pay per service (PPS) models, where the customer pays for the cooling equipment, maintenance, and services costs through periodic payments. In both cases, the payment is based on the actual usage for the cooling service delivered (the example: dollars per tonnes of cooling capacity per hour). The payment is not dependent on the cooling equipment installed, but on the actual usage of the equipment. This makes it easier and more transparent for the client. In a broader sense, customers may also view some ECO-cooling technologies as a form of CaaS, as they are providing a low-cost cooling solution.

**WHY CaaS IS BENEFICIAL?**  
 At the global scale, the anticipated reduction of demand for cooling equipment, because more energy efficient and/or refrigeration and planetary warming increase, will lead to significant cost savings for the industry and consumers. The EIA projects that global annual energy use from space cooling will grow from 1.6% in 2010 to 2.8% in 2030 under a business-as-usual (BAU) scenario (IEA, 2010). There is an urgent need to reduce the energy intensity and end pollution from cooling equipment. Cooling systems are affordable to all those who need them.



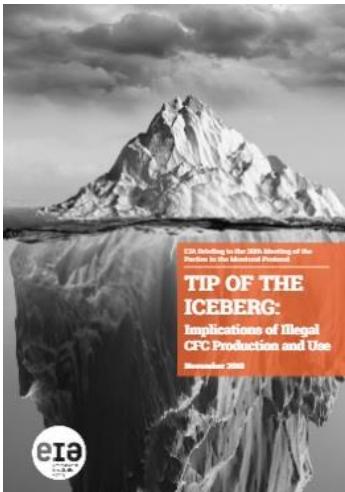


**"Cooling as a Service (CaaS)"** presents a new service approach to cooling, which can benefit companies, governments and society at large and is based on the servitization concept which is rapidly penetrating other marketplaces.

**IMPACT OF STANDARDS ON HYDROCARBON REFRIGERANTS IN EUROPE**

Market research report

**life front**



**Impact of Standards on Hydrocarbon Refrigerants in Europe – Market research report.** The market research report was realised for the EU-funded **LIFE FRONT** project. Amongst the main result of the market research:

- Current charge limits set in standards both restrict and obstruct the development of hydrocarbon technology
- Over 50% survey respondents already work with hydrocarbons to some extent
- Most of those planning to start working with hydrocarbons in the future will do that in 2019-2020 timeframe - revision of standards could have a major impact on the scale of this shift
- Large proportion of respondents indicated they manufacture equipment using multiple refrigeration circuits - allowing higher hydrocarbon charge limits per single refrigeration circuit would have a profound impact on cost and availability of larger units.

**Tip of the Iceberg: Implications of Illegal CFC Production and Use.** The Environmental Investigation Agency (EIA) recently released report urges Parties to the Montreal Protocol to address a number of remaining unanswered questions, in particular the absence of comprehensive data regarding the size of current banks of CFC-11 in PU foam and other products or equipment.



**Cold Hard Facts 3 - Review of the Refrigeration and Air Conditioning Industry in Australia** - The refrigeration and air conditioning industry is the largest user of synthetic greenhouse gases and ozone depleting substances in Australia. Cold Hard Facts 3 provides an economic and technological assessment of the refrigeration and air conditioning industry in Australia in 2016. The report includes an analysis of the size and economic value of the industry, the equipment and refrigerant gas bank, trends in gas imports and equipment, and direct and indirect emissions in this sector. [...] This study provides a broad view of the composition, size and value of the industry, and projections for its future. This will assist industry and policy makers with management of ozone depleting substances as they are phased out, and synthetic greenhouse gases, including hydrofluorocarbons (HFCs) which are being phased down from January 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".

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 women and men who made an important contribution to the Montreal Protocol success and ozone layer protection.**

- View the «Montreal Protocol Who's Who» [introductory video](#)
- Contact : [Samira Korban-de Gobert](#), UN Environment, OzonAction

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



#### New International Journal of Refrigeration service for IIR members -

Access 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](mailto:info@area-eur.be)

The screenshot shows a news article from the International Institute of Refrigeration (IIR) website. The headline reads: "Refrigeration now has its own day of the year". The article discusses the annual World Refrigeration Day, established on 26 June 2019, to raise awareness among the wider public about the importance of refrigeration technologies in everyday life. It highlights the role of refrigeration in maintaining food safety, preserving the environment, and improving health and well-being. The article also mentions the historical significance of Lord Kelvin's birthday on 26 June 1824, which is the origin of the international unit of temperature. The IIR joins associations and companies worldwide to support the initiative of an official World Refrigeration Day.

#### The International Institute of Refrigeration supports World Refrigeration Day

**Day** - As the only independent intergovernmental organisation in the field of refrigeration, the International Institute of Refrigeration (IIR) joins associations and companies worldwide to support the initiative of an official World Refrigeration Day.

Refrigeration Day on 26 June every year. The annual World Refrigeration Day, to be launched on 26 June 2019, aims to raise awareness among the wider public about the importance of refrigeration technologies in everyday life.

Refrigeration is essentially a question of temperature and, as such, it only seems natural to celebrate the field on the birthday of the pioneer at the origin of the international unit of temperature, Lord Kelvin (Sir William Thomson) – born 26 June 1824.

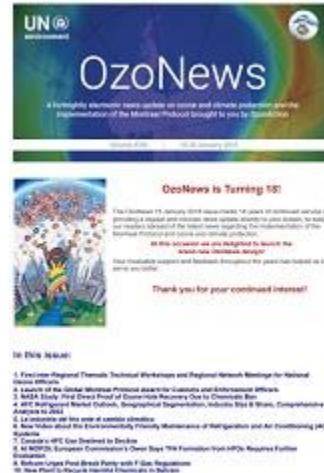
With increasing global stakes at hand, over the past years refrigeration has come to take a leading role at the heart of international affairs.

The inauguration of a World Refrigeration Day would not only be an ideal way to recognise the many historical achievements of the industry, but also a means to anticipate and overcome together the challenges we face. ... Click [here](#) for more information.



### Global Cooling Prize - Cooling for all, without warming the planet.

An innovation competition to develop a climate-friendly residential cooling solution that can provide access to cooling to people around the world without warming the planet



Current and previous OzoNews Issues, are available from OzonAction website

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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.

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