OzonAction

OzoNews

UN environment

30 August 2017

Vol. XVII

In this issue

UN environment

Multilateral Fund for the Implementation of the Montreal Protocol

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

GLOBAL

1. Message from Shamila Nair-Bedouelle, Head of OzonAction, to the National Ozone Officers – Few Steps Ahead for the 2017 Ozone Day Celebrations!

Dear National Ozone Officers,

This year's International Day for the Preservation of the Ozone Layer on 16 September marks the 30th Anniversary of the Montreal Protocol on Substances that Deplete the Ozone Layer. And the theme **"Caring for life under the sun."** is quite appropriate as ALL of us in the Montreal Protocol family and the general public at large should commit and collaborate with one another to ensure that the Montreal Protocol's timetable and objectives are achieved in order for continued life under the sun, now, and in the future.

National Ozone Units (NOUs) such as yours, and cooperation with other countries through the Regional Networks of Ozone Officers, have both played a crucial role towards the success achieved in the 30 years of the Montreal Protocol. Your consistency at Network Meetings over the years to discuss the challenges and the way forward in *caring for life under the sun* has truly been fruitful. Knowledge sharing and awareness raising at the country and regional levels is important for transmitting the news of the success to targeted stakeholders and this we must continue to do. We highly commend you, and your teams for your unwavering commitment and tremendous efforts in this regard.

Many of you, I am certain, are now busy organizing activities for the 30th Anniversary; OzonAction Compliance Assistance Programme (CAP) has dedicated a webpage with products that you may use for your events http://www.unep.org/ozonaction/international-day-preservation-ozone-layer-2017. Some of our recent products include the following:

1. **Video: The Kigali Amendment – Opportunities and Next Steps:** The Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer reached an agreement at the 28th Meeting of the Parties on 15 October 2016 in Kigali, Rwanda to phase down hydrofluorocarbons (HFCs). OzonAction has developed a video to find out from renowned international scientific, health, technical, financial and national experts the background and significance of the Kigali amendment.

2. **Refrigerants Literacy eLearning Course:** This is a free web-based course developed by UN Environment and ASHRAE. It provides instruction covering the basics of refrigerants used in air-conditioning and refrigeration applications.

3. **Good Servicing Practices for Flammable Refrigerants: A Quick Guide**: The aim of this practical guide book is to provide refrigeration and air-conditioning servicing technicians with a quick reference to the key safety classifications and technical properties of commercially available flammable refrigerants.

4. **OzonAction Series of Fact Sheets Relevant to the Kigali Amendment (quick links):** Following the adoption of the Kigali Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, UN Environment's OzonAction prepared a series of fact sheets describing the immediate and future challenges to be addressed by the different Parties between now and until the amendment comes into force.

Please visit the OzonAction Ozone Day website for other interesting products. Also, in the right-hand column of this webpage you will find links to last year's Ozone Day webpage and other previous years; please feel free to browse through them for useful information and ideas.

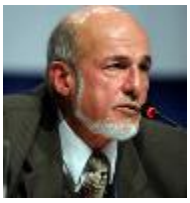
We would also appreciate receiving your Ozone Day planned activities/reports for posting on the OzonAction website. You may send this information through your respective regional OzonAction CAP office or to Ms Jo Chona.

If you require assistance or any specific awareness material for your celebrations, please do not hesitate to contact me or your nearest regional OzonAction CAP office.

I wish to take this opportunity to wish you all the best for the celebration of the 30th Anniversary in your country and look forward to receiving feedback from you.

Yours sincerely,

Shamila Nair-Bedouelle, Head of OzonAction, UN Environment



2. Reflections on the Montreal Protocol - the International Community's Covenant with the Future

In the early 1970's, the world community was made aware of the potential future damage that would occur to the stratospheric ozone layer if we continued to use and emit ozone depleting substances. This early period was characterised by heated scientific debate as to the validity of these claims. However, it soon became evident to all that this was an environmental risk management problem, the downside of which would be immoral to bequeath to future generations. Furthermore, this was clearly a global problem that could only be remedied by a global response; and, a global response could only be achieved if there was a political will, and such a will on a global scale would require collective and co-operative actions by governments, industries, and all other interested parties.

Global efforts to protect the ozone layer began in earnest in late 1981. The Vienna Convention for the Protection of the Ozone Layer that was signed in March 1985, was the important first step. Whereas the Convention provides a framework for co-operative activities, including the exchange of data on matters related to the ozone layer, no agreement could be reached, at that time, on specific control measures. Negotiations between March 1985 when the Vienna Convention was signed and when the Montreal Protocol was finally signed in September 1987 can be most charitably described as "difficult". Nonetheless, the fact that we were able to sign a Protocol heralded the start of a chain of remarkable achievements.

The Montreal Protocol put in place an international process for controlling all ozone layer depleting substances. It did this by:

- providing both a short and long term plan for addressing all of the ozone layer depleting substances;

- providing a mandated phasedown which stimulated product development for environmentally acceptable substitutes or alternatives (the phasedown also affected market behaviour through placing constraints on supply and demand);

- it signaled to all producers and users of these controlled substances that society's tolerance of these chemicals would be short lived and future investment decisions should be made accordingly;

- it put in place a dynamic, science and technology driven process whereby the stringency and scope of the controls can be adjusted in response to the current understanding of the science, the environmental affects, the technological capabilities, and the economic considerations;

- it provided, within its own framework, an incentive for developing countries to join the Protocol early without fear of additional economic hardship for having done so;

- it provided for trade sanctions as a way of denying those that chose to remain non-parties access to the worlds most lucrative markets.

In September 1987, when we were all basking in the afterglow of the successful conclusion of the Montreal Protocol negotiations, many of you will remember, especially those of you from industry, that there was a sense that much time would be needed to see real progress on the ground. But the signing of the Montreal Protocol was seen by all as a beginning and not an end. It was simply not acceptable to the international community to assume that the early consensus-based (not science-based) reductions agreement could, or should, survive for other than the very short term. The onus was on, the developers or supporters of the technical solutions to demonstrate the feasibility of accelerating the schedule. The international community's message was simple … we must move further, faster. Future generations were counting on us to secure their future.

Ten years later, upon reflection, you the atmospheric environmental stewards have performed admirably. You've gone further and faster than anyone dreamed possible and for this you deserve both credit and global recognition. Through the various supportive panels of experts you created, you demonstrated that sufficient information or data was available to make key decisions to secure a reasonable lifestyle for all inhabitants without further degrading the atmospheric environment.

The panel work paved the way forward. The data displayed was widely accepted by the international community and they agreed that we had to press ahead in making continuous improvements, if only in small steps.

The Montreal Protocol not only represents a political understanding and commitment between governments, on the direction of both policy and action required to protect the atmospheric heritage of mankind. It also recognises within its contextual setting that to succeed, all sectors of society must be actively engaged in policy formulation, action planning and implementation. Decisions that so intimately affect our personal well-being can no longer be seen as the sole prerogative of Governments. What the Protocol managed to achieve was a web of interconnected relationships and commitments involving all sectors of our society.

So many people take a well-deserved special pride in the Montreal Protocol accomplishment; a Treaty, the likes of which the world had not seen before and without extreme vigilance and courage at the highest political levels, is unlikely to see again.

Industry has long realised the importance of international controls. With ever expanding markets, industry for some years has looked to the international intergovernmental community to create agreed behavioural norms and thus avoid economic/trade disruption brought about by differing domestic standards. But under the auspices of the Protocol, industry went much further than this. It decided itself to enter into an unprecedented level of co-operation to find environmentally appropriate solutions in the shortest time frame possible. I believe industry revisited its corporate value system, and in many instances, redefined its corporate ethics: moving from a policy position of doing the minimum the law requires to doing the right thing even if that meant far exceeding the letter and even the spirit of the law. The profit criterion was, in many instances, held in abeyance, for the timely achievement of the greater good.

Another sector that deserves special mention is the contribution of NGOs. During the ozone layer negotiations, the NGOs gave us constant reminders that space ship earth carries no passengers, just crew members and each bears responsibility for keeping us on course. Their greatest contributions were through their active presence and contributions to the debate and their role in making ozone layer protection a political issue in many countries. They constantly reminded us that the property of all will remain the responsibility of none unless each of us can find the strength of personal conviction to crawl out from under the weight of self-interest. NGOs were the restrained voice of conscience during the verbal wars to protect the ozone layer. The ozone Treaty negotiations, often traumatic and sometimes paralysed by unrelenting self-interests, were often re-energized by NGO reminders of what, in the ultimate analysis, really mattered. NGO active and constructive participation proved that there is a better alternative to confrontation.

This takes me to the second major milestone of this great success story which occurred when the Protocol was amended in London in 1990. At that time, the Protocol made its most dramatic achievement...not in the augmentation in stringency and scope of its technical revisions, although these were important, but rather through the introduction to the world of its ethical revisions.

An Indian scientist, Anil Agarwal, during the Earth Summit process, noted, "global environmental concern is all about caring and sharing and learning to live within the limits of the earth's environment." The international community in 1990 was supportive of a new paradigm of relations with developing countries… one characterised by equality, dialogue, trust and partnership predicated on the concept of mutual need. For the first time in history, the international community was able to strike a global bargain on an environmental issue in which the most affluent 20-25% of the world's population, the developed countries agreed to provide the 75-80% of the world's financially poorer peoples, the developing countries, with financial and technical assistance so they could proceed with addressing the Treaty obligations at no net costs to their often already cash-starved economies. The inclusion of the multilateral funding mechanism transformed the amended Montreal Protocol into perhaps the world's first environmental Treaty that was predicated on, and took formal recognition of, the concept of mutual need.

The Montreal Protocol multilateral fund, in my mind, is all about caring, sharing and the pursuit of mutual need. The Montreal Protocol's consultative framework provides a forum where developed and developing countries engage equitably in a dialogue to address common concerns and where we can collectively move from the idea of donors and recipients to one of successful partnership to solve global problems predicated on the concept of mutual need.

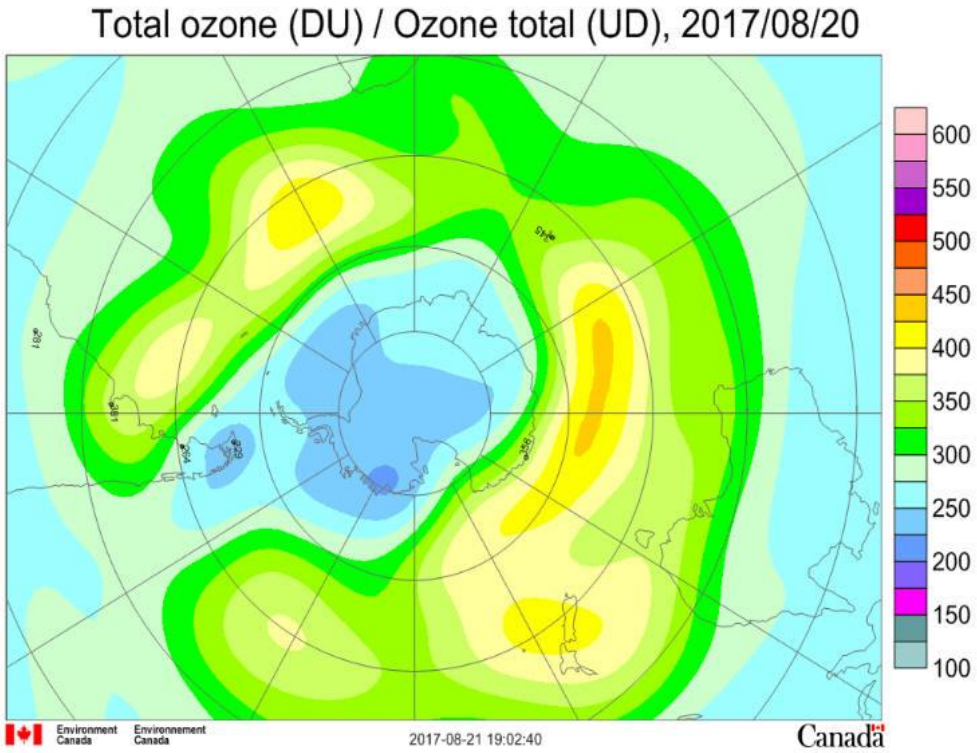
The Montreal Protocol experience has dramatically altered the way in which we value and view multi-sectoral participation and consultation.

Let me close by saying that we can all take great pride in our collective Montreal Protocol accomplishments. I salute all those who have contributed to the creation of the Montreal Protocol and its continuous improvement and evolution. I especially salute the many unsung contributors to this success story from industry, the inner sanctums of Government, and volunteers from the NGO community. But lest we forge ... the work is not yet finished. An opportunity and obligation still remains within each sector to undertake a holistic audit or update of its goals, its

aspirations, its responsibilities to enunciate the remedial measures it will pursue to protect the atmospheric heritage of mankind. With these actions we will update our social contract, the workplan for our covenant with the future.

- G. Victor Buxton, former Canadian Chief Negotiator for the Montreal Protocol

3. The Ozone Hole 2017 - British Antarctic Survey Ozone Bulletin



Antarctic Situation at 2017 August 21 British Antarctic Survey Ozone Bulletin

Antarctic ozone today: The atmospheric circulation remains in its winter mode, with the polar vortex near its largest. Ozone amounts are growing around Antarctica, whilst they are lower within the vortex. The growing ozone hole is centered over the Weddell Sea. Ozone values over the bulk of the continent are between 220 and 340 DU, whilst over the southern ocean they rise to over 400 DU in places, particularly south of Australia. There are noticeable differences between the various satellite ozone measurements over Antarctica. Temperatures in the ozone layer are near their winter minimum and it is cold enough (below -78°C) for Polar Stratospheric Clouds (PSC) to have formed over much of the continent. Temperatures are highest around the outside of the polar vortex and decline towards the pole and towards the equator. They are generally a little above the normal. In the upper parts of the ozone layer they are beginning to rise. Ozone depletion will increase further over the coming weeks.

The 2017 ozone hole: The polar vortex formed over the winter, isolating the ozone layer over Antarctica. Stratospheric temperatures fell below -78°C through much of the ozone layer, leading to the formation of polar stratospheric clouds. Overall, meteorological conditions in the ozone layer were stable until early August, allowing colder than normal temperatures to persist. A short-lived minor warming took place around August 8, and overall temperatures are now a little warmer than the average of the last few decades. Ozone depletion is taking place in sunlit parts of the vortex and the ozone hole formed in early August over the base of the Antarctic Peninsula, in part assisted by dynamic forcing. Rothera station saw ozone hole values for the first time on July 15, and for a longer period in early August.

- The British Antarctic Survey Ozone Bulletin, 21 August 2017

4. How Future Volcanic Eruptions will Impact Earth's Ozone Layer

The next major volcanic eruption could kick-start chemical reactions that would seriously damage the planet's already besieged ozone layer.

Researchers have long known that when concentrations of chlorine from human-produced CFCs are high, ozone depletion will result following a volcanic eruption. When levels of chlorine from CFCs are low, volcanic eruptions can actually increase the thickness of the ozone layer.

The extent of damage to the ozone layer that results from a large, explosive eruption depends on complex atmospheric chemistry, including the levels of human-made emissions in the atmosphere. Using sophisticated chemical modeling, researchers from Harvard University and the University of Maryland explored what would happen to the ozone layer in response to large-scale volcanic eruptions over the remainder of this century and in several different greenhouse gas emission scenarios. The research was published recently in Geophysical Research Letters.

The Earth's stratosphere is still recovering from the historic release of chlorofluorocarbons (CFCs) and other ozone-depleting chemicals. Even though CFCs were phased out by the Montreal Protocol 30 years ago, levels of chlorine-containing molecules in the atmosphere are still elevated.

Explosive volcanic eruptions that inject large quantities of sulfur dioxide into the stratosphere facilitate the chemical conversion of chlorine into more reactive forms that destroy ozone.

Researchers have long known that when concentrations of chlorine from human-produced CFCs are high, ozone depletion will result following a volcanic eruption. When levels of chlorine from CFCs are low, volcanic eruptions can actually increase the thickness of the ozone layer.

But exactly when this transition happens - from eruptions that deplete ozone to eruptions that increase ozone layer thickness - has long been uncertain. Previous research has put the window of the transition anywhere between 2015 to 2040.

The Harvard researchers found that volcanic eruptions could result in ozone depletion until 2070 or beyond, despite declining concentrations of human-made CFCs.

"Our model results show that the vulnerability of the ozone column to large volcanic eruptions will likely continue late in to the 21st century, significantly later than previous estimates," said David Wilmouth, who directed the research and is a project scientist at the Harvard John A. Paulson School of Engineering and Applied Sciences and the Department of Chemistry and Chemical Biology.

So, why is this shift happening so much later than previously thought?

"Previous estimates did not take into account certain natural sources of halogen gases, such as very-short lived bromocarbons originating from marine plankton and microalgae," said Eric Klobas, lead author and Harvard chemical physics PhD candidate.

Accounting for these emissions fine-tunes the timing of the shift from eruptions that cause ozone depletion to eruptions that increase the thickness of the ozone layer. These natural sources of bromine become especially important in the lower stratosphere after concentrations of human-emitted CFCs have declined.

"We found that the concentration of bromine from natural, very short-lived organic compounds is critically important," said Klobas. "Even small, part-per-trillion changes in the amount of bromine from these sources can mean the difference between a late 21st century volcanic eruption resulting in ozone column depletion or ozone column enhancement."

The researchers then explored how a volcanic event the size of the Mount Pinatubo eruption, which shot about 20 million metric tons of sulfur dioxide into the stratosphere in 1991, would impact the ozone layer in 2100. The team modeled four different greenhouse gas emission scenarios, ranging from very optimistic to what is commonly considered the worst-case scenario.

The team found that the most optimistic projection of future greenhouse gas concentrations resulted in the most ozone depletion from a volcanic eruption. Conversely, in the pessimistic scenario in which greenhouse gas emissions continue to increase rapidly throughout the 21st century, a Mount Pinatubo-size eruption would actually

lead to a slight increase in ozone. The researchers found that the colder stratospheric temperatures and higher methane levels in this scenario would curb important ozone-depleting chemical reactions.

But, here's the kicker: all of the above scenarios assumed that the volcanic eruption would only inject sulfur into the stratosphere, like the 1991 eruption of Mount Pinatubo in the Philippines. If the eruption were to also inject halogen-containing chemicals such as hydrogen chloride (HCl) into the stratosphere, the results could be dire.

"If volcanic halogens, which are commonly present in large quantities in volcanic eruptions, were to partition substantially into the stratosphere - in any greenhouse gas emission scenario, at any point in the future - it would potentially cause severe losses of stratospheric ozone," said Klobas.

In such a case, the United States could see a prolonged and significant decrease in ozone layer thickness - upwards of 15 to 25 percent in the highest halogen scenario modeled. Even small reductions in the thickness of the ozone layer, which shields the surface of the Earth from DNA-destroying ultraviolet radiation, can adversely impact human health and other life on this planet.

"These eruptions are highly unusual events but the possibility does exist, as evidenced in the historical record," said Wilmouth.

SpaceDaily , 21 August 2017

ASIA PACIFIC

5. Afghanistan Tackling HCFC Use

This month national stakeholders, industry, civil society, government officials and international environment experts gathered in Kabul to raise awareness of and implement a national phase-out plan for HCFCs.

Photo: Hindukush, Afghanistan

This month in Kabul, Afghanistan, national stakeholders, industry, civil society, government officials and international environment experts gathered to tackle the country's use of ozone-depleting substances (ODPs) by raising awareness and implementing a national phase-out plan. The Central Asian country is also looking into alternatives to HCFCs like natural refrigerants.

In addition to a three-day training course for customs officers who monitor the use of hydrocholoflurocarbons (HCFCs) – an ODP substance that harms the ozone layer – in Afghanistan, in August a series of intensive discussions were held with key national actors on issues like certifying technicians, and setting policy such as banning imports of HCFC-based equipment.

The Afghan government is planning to ban imports of HCFC-based equipment from 2018, after having held further consultations, to allow the country to meet the objectives of its 2030 Phase-Out Plan under the Montreal Protocol. It is also aware that under the Kigali Amendment to the Montreal Protocol it will have to phase-down its use of hydroflurocarbons (HFCs) – high-GWP substances that contribute to emissions but do not impact the ozone layer – by 85% by 2047.

The country, which has long been racked by conflict, currently consumes only 425 metric tonnes of HCFCs – a significantly smaller amount then neighboring Iran, which consumes 5,000 metric tonnes – and Afghanistan is quickly reducing this small amount. It only signed up to the Montreal Protocol in 2004 but had managed to reduce its consumption of HCFCs by 10% by 2015.

“Under the Protocol the obligations are the same for Iran, Pakistan and Afghanistan, so that means if Iran ratified in 1995, by 2015 they had to reduce their consumption by 10%. Afghanistan has been able to achieve in the first six to eight months what would have taken some countries two to three years,” said Andrew Scanlon, Country Head of the UN Environment Programme (UNEP) office in Kabul and who was at the phase-out meetings in Kabul.

“Part of the reason for that is the fact the government is new, whereas in other established countries, ministries have been in competition with one another. Here because it is new it has been easier to have cooperation between ministries,” said Mostafa Zaher, director-general of the National Environmental Protection Agency.

NatRefs wanted, training needed

Some stakeholders also looking at leapfrogging HCFCs to natural refrigerants. “I have imported five large chiller systems from USA based [on] natural refrigerants this year,” said Aman Osman, a leading importer of RAC appliances in Afghanistan. “I care about my environment and I learnt that natural refrigerants will help us in maintaining [a] cleaner environment”.

Aman notes he needs training to make this possible. “But I need engineers who can design better and efficient [air-conditioning] systems for large buildings where these chillers will be installed. I need trained and licensed technicians to handle these new gases,” he said.

The Montreal Protocol’s Multilateral Fund for phasing out ODPs, implemented by UNEP and the United Nations Industrial Development Organization (UNIDO), has provided approximately US $1 million to help Afghanistan meet its phase-out targets.

A 10-month training program on refrigeration practices began last year, with help from UNEP. Once these technicians have been trained, Afghanistan will be able to replace or retrofit existing units, safely remove hazardous gases, and store the HCFCs.

The Afghan-Korea Vocational Institute in Kabul will train technicians under the UNEP project.

Within the next 12 months, the Institute will also receive UNIDO-approved equipment – allowing them to deal with flammable refrigerants. “The equipment will strengthen the Institute’s capability to train local technicians in good practices for handling new technologies that are already entering the Afghan market,” said Mohammadi Alireza, UNIDO’s international consultant in Afghanistan.

- r744, 16 August 2017, By Charlotte McLaughlin

6. Workshop on India’s HCFC Phase Out Plan

Two days workshop for supervisory officers of Customs and enforcement officials was inaugurated today by chief secretary of Manipur, Sh. RR Rashmi.

A release said, the workshop will focus on implementing the policy and enforcement component of India’s HCFC phase out management plan. During the function, the chief secretary highlighted the role of India in phasing out of HCFCs (hydrochlorofluorocarbons) and HFCs [hydrofluorocarbons] substances under the Montreal Protocol. He also emphasised about the role of enforcement officials in checking the illegal trade of the items taking place in different parts of the country. Additional chief secretary of Manipur, Shambhu Singh also gave awareness to the participants about the need to save the ozone cell for the welfare of mankind.

Chief commissioner of Customs and GST, NE region, Wilson Hangsing stressed about the role of customs in protection of ozone cell by checking illegal smuggling of Ozone Depleting Substances (ODS). While senior programme representative of UNEP, Atul Bagai explained the role and responsivities of customs in implementing HCFC phase out plan of the country and also told the participants to make maximum use of the workshop.

The workshop was organised by National Academy of Customs, Indirect Tax and Narcotics, Faridabad in collaboration with Ministry of Environment and Forest under the aegis of United Nations Environment Programme (UNEP). The workshop was attended by more than 25 officers of customs, GST and Directorate of Revenue Intelligence.

- IMPHAL, 25 August 2017

7. GMR Hyderabad Airport Migrates to Ozone Safe Air Conditioning

GMR Hyderabad International Airport Ltd (GHIAL) has migrated from conventional AC units to ozone safe units across its offices in the airport.

This is in line with India's ratification of the Montreal Protocol on substances that deplete the Ozone Layer in 1992 and its commitment to phase out ozone-depleting hydrochlorofluorocarbons (HCFCs).

SGK Kishore, CEO, GHIAL said, "Migration to inverter-based AC units has been a strategic decision taken in line with India's mission to phase out ozone-depleting HCFCs. The airport has a 5MW solar power plant, which meets 15 per cent of the airport's electricity demand. The airport is also striving towards 100 per cent LED lights."

With over 300 AC units across office spaces within the terminal and ancillary buildings, the airport is moving from conventional AC units that use R22 gas [GWP =1810], harmful for the ozone layer, to ozone safe R410 [GWP = 2088] gas compliant AC units.

It has converted more than 240 split air-conditioners to inverter technology, known for energy efficiency and reduction of greenhouse gases.

The new ACs are intelligent and intuitive and adjust airflow based on occupancy direction.

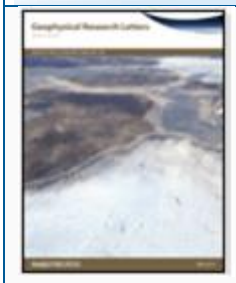
The airport receives more than 40,000 passengers daily. More than half of the electricity consumption goes towards maintaining air conditioning across the terminal, which includes both passenger and non-passenger areas.

With the implementation of new inverter-based AC units at Hyderabad airport, there has been a reduction of about 31 per cent in daily energy consumption. This has played a role in getting RGIA Level 3+ Neutrality status.

The 1.17 lakh sqmt area has central air conditioning backed by seven chiller plants and more than 5 km of chilled pipeline network.

- The Hindu BusinessLine, 23 August 2017, By: V Rishi Kumar

NORTH AMERICA



8. Considerable Contribution of the Montreal Protocol to Declining Greenhouse Gas Emissions from the United States

Ozone depleting substances (ODSs) controlled by the Montreal Protocol are potent greenhouse gases (GHGs), as are their substitutes, the hydrofluorocarbons (HFCs). Here we provide for the first time a comprehensive estimate of U.S. emissions of ODSs and HFCs based on precise measurements in discrete air samples from across North America and in the remote atmosphere. Derived emissions show spatial and seasonal variations qualitatively consistent with known uses and largely confirm U.S. Environmental Protection Agency (EPA) national emissions inventories for most gases.

The measurement-based results further indicate a substantial decline of ODS emissions from 2008 to 2014, equivalent to ~50% of the CO_2-equivalent decline in combined emissions of CO_2 and all other long-lived GHGs inventoried by the EPA for the same period. Total estimated CO_2-equivalent emissions of HFCs were comparable to the sum of ODS emissions in 2014, but can be expected to decline in the future in response to recent policy measures.

[…]

Our results suggest that total CO_2-equivalent emissions of CFCs decreased by two thirds from 2008 to 2014 (from 0.15 (0.12–0.19) $GtCO_2e\ yr^{-1}$ to 0.05 (0.04–0.06) $GtCO_2e\ yr^{-1}$), while the total emissions of HCFCs decreased by about one half over the same period (from 0.15 (0.12–0.17) $GtCO_2e\ yr^{-1}$ to 0.08 (0.07–0.09) $GtCO_2e\ yr^{-1}$) (Figure 3). For HFCs used as substitutes for both CFCs and HCFCs, aggregate emissions changed negligibly (i.e., within estimated year-to-year errors) from 2008 to 2014 (Figure 3). The large declining trends of CFC and HCFC emissions and increasing trends of emissions of many HFCs over the U.S. are indicative of the progress made in the U.S. in

replacing ODSs with HFCs and other ozone-friendly chemicals. Furthermore, the atmosphere-derived aggregate CO_2-equivalent emissions of HFCs from the U.S. are consistent with EPA-reported emissions within estimated uncertainties, suggesting that the increasing divergence between global HFC emissions derived from atmospheric observations and emissions reported to the UNFCCC by the EPA does not stem from inaccuracies in U.S. reporting

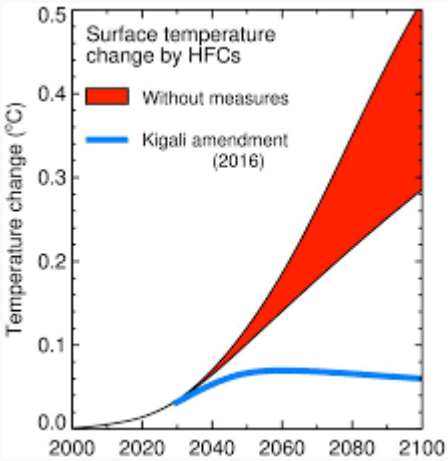
[…]

The overall climate impact of the Montreal Protocol in the future will also be determined by emissions of HFCs. Past U.S. HFC emission increases estimated here for some HFCs are not expected to continue. In fact, the U.S. EPA's Significant New Alternatives Policy (SNAP) program and the 2016 Kigali amendment of the Montreal Protocol controlling the use and production of HFCs may result in reductions of HFC emissions of 0.07–0.09 $GtCO_2e\ yr^{-1}$ [*Greenblatt and Wei*, 2016; *U.S. Department of State*, 2016]. Hence, the overall influence of the Montreal Protocol on U.S. GHG emissions decline from 2005 to 2025 can now be expected to be as large as ~0.5 $GtCO_2e\ yr^{-1}$. This is equivalent to ~25–30% of the GHG emission reduction target previously identified in the U.S. Intended Nationally Determined Contributions (INDCs) to the 2015 UNFCCC 21st Conference of Parties (COP-21) in Paris (1.64–2.07 $GtCO_2e\ yr^{-1}$ or a 26–28% reduction compared to 2005 values [*Greenblatt and Wei*, 2016; *U.S. Environmental Protection Agency*, 2016]). Only gases of the Kyoto Protocol, namely CO_2, CH_4, N_2O, HFCs, perfluocarbons, NF_3, and SF_6 were considered in the U.S. INDCs. Our results underscore the presence of significant GHG emission reductions related to the Montreal Protocol in addition to those achieved from gases included in the Kyoto Protocol and the historic COP-21 agreement.

- Geophysical Research Letters, 14 August 2017, Authors: Lei Hu, Stephen A. Montzka, Scott J. Lehman, David S. Godwin, Benjamin R. Miller, Arlyn E. Andrews, Kirk Thoning, John B. Miller, Colm Sweeney, Caroline Siso, James W. Elkins, Bradley D. Hall, Debra J. Mondeel, David Nance, Thomas Nehrkorn, Marikate Mountain, Marc L. Fischer, Sébastien C. Biraud, Huilin Chen, Pieter P. Tans

9. Why Supermarkets Should Care about the Kigali Amendment

In the wake of the recent decision by the US Federal Appeals Court that questions the EPA's power to regulate non-ozone depleting refrigerants, supermarket retailers are questioning how to move forward. Will the SNAP program have the power to approve refrigerants? Should they continue to plan to replace refrigerants with high global warming potential (GWP)? To answer these questions, supermarkets should look to the Kigali Amendment to the Montreal Protocol.



Almost 30 years since it's signing, the Montreal Protocol is considered one of the most successful international treaties of all time. It has effectively eliminated the production of harmful ozone depleting chlorofluorocarbons (CFCs) and is in the process of eliminating the production of hydrochlorofluorocarbon (HCFCs) refrigerants. However, this phase-out has effectively traded one environmental disaster for another, as the replacement refrigerants, hydrofluorocarbons (HFCs), cause global warming.

In 2016, the Kigali Amendment updated the Montreal Protocol to gain global commitment to the phasedown of HFCs. Developed countries, like the United States, will be required to begin reducing HFC production and import of HFCs in 2019. This reduction is expected to correlate to increased HFC prices, especially those with high GWP.

"We continue to believe that now, as always, the strongest case for natural refrigerants is the business case," said Danielle Wright, Executive Director of NASRC." It would be an unsound business decision to invest in HFCs for new equipment or retrofits when there are so many low GWP or zero GWP options available."

The Kigali Amendment also sets limits on the carbon dioxide equivalent emissions for several major corporations, including chemical manufacturers. These limits are expected to drive an increase in their manufacture of low-GWP refrigerants and a respective decrease in their manufactured volume of high-GWP refrigerants. Europe has already experienced a price increase of high-GWP refrigerants due to the accelerated phasedown of HFCs by the EU's F-gas regulations.

Furthermore, it should be noted that the US Appeals Court decision was not supported by the two largest US refrigerant manufacturers, Chemours and Honeywell. These companies are currently considering pursuing an appeal to have the entire DC Appeals Court hear their case. These companies' support of low-GWP refrigerants is another strong indicator of the inevitable phasedown of high GWP refrigerants.

While the Appeal Court decision may temporarily slow the phasedown of high GWP refrigerants, the Kigali Amendment will provide the economic drivers that will ultimately move the market towards low and zero GWP refrigerants. Supermarkets should act now to get ahead of what will surely be an expensive transition.

- North American Sustainable Refrigeration Council, 22 August 2017, By: Danielle Wright

EUROPE & CENTRAL ASIA

10. EC Rules Out Changes to Multipack Ban

EUROPE: The F-gas ban on refrigerants with a GWP of 150 or more in multipack centralised refrigeration systems from 2022 will not need to be amended, the European Commission has decided.

The implementation of the F-gas regulation included a promise to review the provision affecting multipack centralised refrigeration systems of the type normally used in larger supermarkets and hypermarkets.

The provision – point 13 of Annex III – bans the use of fluorinated greenhouse gases with GWPs greater than 150 in systems with a rated capacity of 40kW or more from 2022. The exception is in the primary refrigerant circuit of cascade systems where refrigerants with a GWP of less than 1500 are permitted.

The latest F-gas regulation (517/2014), which entered into force in 2015 included a promise to review the prohibition by considering the availability of cost-effective, technically feasible, energy-efficient and reliable alternatives.

The technical assessment report published this month has concluded that many alternatives are available and are already, or will be, cost competitive by 2022. "The Commission therefore sees no need to amend the provision pursuant to point 13 of Annex III of Regulation (EU) No 517/2014," the report says.

"From a technical assessment it is apparent that there are multiple technological alternatives available today, which are already used in the commercial refrigeration sector across the EU and would not be affected by the 2022 requirement."

It mentions transcritical CO_2 centralised systems, indirect centralised systems and stand-alone systems as being "feasible, reliable and energy-efficient alternatives".

The ban applies only to newly installed equipment after 1 January 2022, not to equipment that was installed before that date.

- The report document can be viewed and downloaded here and its relevant annexes here.
- CoolingPost, 20 August 2017, By: Neil Everitt

11. German Agency Seeks Ban on R1233zd

The German Federal Environment Agency (UBA) is pushing for a ban on the new low GWP refrigerant R1233zd under a review of the European ODS Regulation.

Last month, the European Commission initiated an evaluation of the European ODS regulation (1005/2009) to establish whether it is still fit for purpose. The regulation was introduced in 2010 to implement the Montreal Protocol, which has been in force since 1989.

In its feedback submission, the German Environment Agency calls for a consistent strict ban of ozone depleting substances and points out that R1233zd, which is being used in new low pressure centrifugal chillers as an alternative to R123, has an ozone depletion potential of 0.00034.

“We recommend a consistent strict ban of ozone depleting substances,” the German Environment Agency says in its feedback. Referring to R1233zd, it says “Despite the ODP >0 the substance will be produced and promoted for several new applications in the field of refrigeration”.

An A1, non-toxic, non-flammable refrigerant with a GWP of 4.5 (under AR4), R1233zd has already been adopted by many leading chiller manufacturers as an energy efficient alternative for applications currently using R123. R1233zd is also being used as a foam blowing agent.

R123 was first introduced in the early 1990s as an alternative to the CFC R11. Although highly efficient with a low GWP (77), R123 is an HCFC and currently being phased out worldwide under the Montreal Protocol.

Its new alternative, R1233zd, is normally described as zero-ODP due to its very low ODP, and, measured at 0.00034, its ODP is nearly 200 times less than R123.

- CoolingPost, 15 August 2017, By: Neil Everitt

12. Centro Studi Galileo Holds Specialist Training for Chinese Officials to Aid with Shift from HFCs Post Kigali Agreement

Training body Centro Studi Galileo (CSG) has expanded the global reach of a specialised assessment process designed to aid nations with the safe handling of alternative and eco-friendly refrigerants as part of wider attempts to move away from HFC use.

A delegation of Chinese officials representing government and academic institutions last week underwent training at the CSG headquarters in Casale Monferrato to take up customised training focused on challenges from adopting different gasses for air-conditioning and refrigeration purposes.

The training, which is supported by the EU-funded Real Alternatives for Life project, is the latest in a series of collaborations between CSG and Chinese officials reflecting an international push to curb reliance on Global Warming Potential (GWP) refrigerants.

It was devised with the assistance of air conditioning and refrigeration stakeholders such as private sector senior technicians, and culminated in an assessment session being held to provide the Chinese delegation with a globally recognised Italian Licence for Refrigeration Technicians.

Interest in phasing out of HFCs follows the signing last year of the Kigali Agreement that introduced revisions to the longstanding Montreal Protocol.

“The Kigali Amendment, which was signed by all of the parties, requires all involved nations to gradually switch from using Hydrofluorocarbons (HFCs), which can be powerful greenhouse gases with a high global-warming potential rate, in favour of natural gases or the brand new synthetic 4th Generation Hydrofluoroolefin (HFOs),” said

CSG in a statement. “Although these greener alternatives have a lower polluting potential, they also have some features, such as high flammability which mean that specific training is required for their safe handling.”

Considering these specific needs, a particular focus of last week’s training was to consider safety issues in industrial systems working with ammonia, hydrocarbon plants and cascade refrigeration systems with carbon dioxide.

The training programme builds on wider work between CSG and a number of nations including the US, Sri Lanka, Thailand, Saudi Arabia, India, and the UAE.

“CSG is not new to organising training in collaboration with foreign countries, and their involvement in doing so has even been requested by the United Nations through the agencies UN Environment and UNIDO,” said the training body.

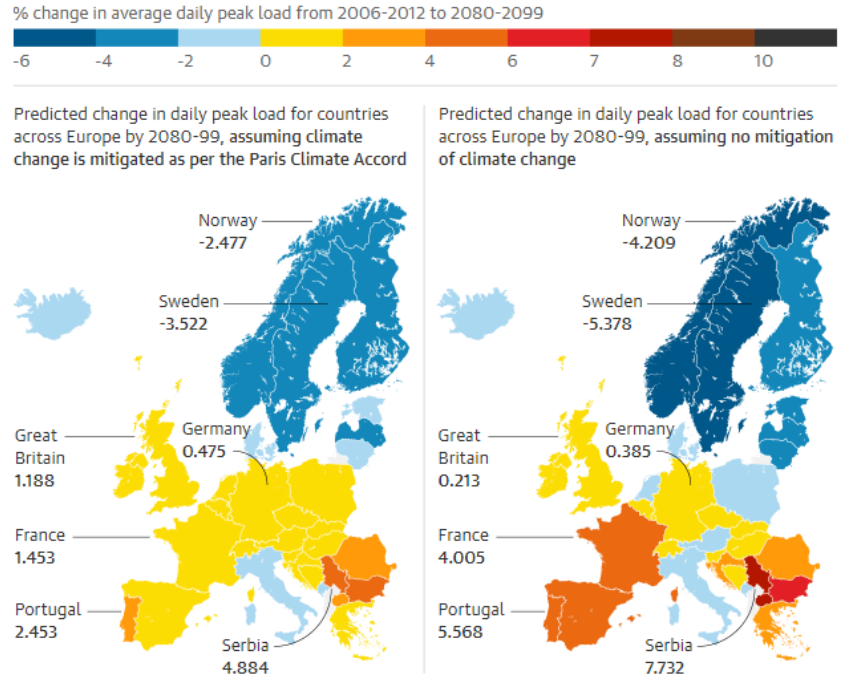
- RACplus, 2 August 2017, By Neil Merrett

13. Electricity Demand in Southern Europe to Soar with Air con – Scientists

Demand for electricity is set to soar in southern Europe as climate change takes hold, research has revealed, with the effect likely to be down to a boom in the use of air conditioning.

By contrast, electricity demand is expected to drop in northern countries, leading to an increasingly polarised pattern across the continent – a situation, the researchers say, that bolsters the case for greater integration of electricity supplies across Europe, particularly given the shift to renewable energies.

“Renewable energies are more time and space variable and you can dampen this [impact] by increasing the grid,” said Anders Levermann, professor of dynamics of the climate system at the Potsdam Institute for Climate Impact Research and co-author of the research.



Writing in the journal Proceedings of the National Academy of Sciences, Levermann and colleagues from Potsdam University and the University of California, Berkeley, describe how they first looked at data from 2006-2012 for 35 European countries including the UK, taking into factors including population size, effects due to the day of the week, and seasonal variables to extract electricity consumption data relating to temperature alone.

The results reveal that countries across Europe show a similar trend, with electricity consumption increasing either side of about 22C.

The team then used the trend to model electricity demand between 2013 and 2099 under conditions where no efforts are made to mitigate climate change, some efforts are made and finally, if climate change is mitigated as per the Paris climate agreement.

The results reveal that overall, the total demand for electricity in Europe overall is expected to remain almost constant. But within Europe, daily peak demand is expected to become polarised, with countries in the north

predicted to show a drop and those in the south a boom – a trend bucked by Italy alone, for reasons the researchers say is unclear.

The authors warn the polarisation would be strongest at the end of the century in a scenario where nothing is done to tackle global warming. In this case, the authors say the average maximum daily electrical power demand of Spain and Portugal could rise by up to 5-7% by the end of the century.

Average daily electricity demand showed a similar pattern of polarisation for all but the most ambitious climate change mitigation, while the annual peak demand is shifted from winter to summer.

While Levermann said the rise in electricity consumption in the south would probably be down to an increase in air conditioning, he added it was unclear what was behind the drop in the north, pointing out that many countries do not commonly use electricity for heating.

However the model makes a number of assumptions, not least that there would be no change in technologies or population size, and that populations in the north will indeed respond to warmer temperatures in the future in the manner of those in the south.

Detlef van Vuuren, professor in integrated assessment of global environmental change at Utrecht University, said that the research chimed with findings from his own research looking at the worldwide impact of climate change.

But, he added, the study did not take into account factors such as a shift to electric cars, or increasing wealth – which could also lead to a rise in air-conditioning. "Climate change is not the most important thing for electricity demands in the future," he said. What's more, he added that solar-powered photovoltaic systems, are expected to play an increasing role in southern Europe, a development that could help mitigate problems and costs around meeting increased peak demand. A greater need for electricity for cooling systems is likely to coincide with conditions that favour electricity production: sunny days.

But Lucas Davis, from the University of California, Berkeley, who was not involved in the study, said the research could prove valuable in planning infrastructure for future energy needs.

It also highlighted a significant problem, he said.

"What [the authors] are finding is large increases in electricity consumption on hot days – but if this happened tomorrow, the [electricity] system would not be ready," he said, adding that the impact on the use of air conditioning was "one of the big untold stories about climate change", and that more energy-efficient air conditioners and better insulated homes were needed.

"Air conditioning is wonderful – I would not want to live in Houston or Miami or Phoenix without air conditioning – but it puts enormous stress on our electricity systems and results in billions of tonnes of carbon dioxide emission annually," he said.

- The Guardian, 28 August 2017

FEATURED

OZONE SECRETARIAT

- Vienna Convention and Montreal Protocol Meetings: A Primer - Read/Download
- - Twenty-Eighth Meeting of the Parties
- 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.

«Caring for All Life under the Sun" Theme and Logo for 30th Anniversary of the Montreal Protocol and International Ozone Day 2017

The 30th anniversary of the Montreal Protocol, which we are commemorating this year, and the International Day for the Preservation of the Ozone Layer to be marked on 16 September, will be celebrated under the theme:

Caring for All Life Under the Sun

The theme is complemented by a logo that illustrates the Montreal Protocol's focused and singular goal to protect all life on Earth.

The logo and theme celebrate the Montreal Protocol's critical role in caring for life on the planet over the past 30 years by preventing massive damage to human health and the environment from excessive ultraviolet radiation from the sun by phasing out nearly 99 per cent of close to 100 substances that deplete the ozone layer.

As a result of the unwavering commitment of the parties to the Montreal Protocol during the past three decades, the ozone layer is on track to recovery by mid-century. In addition, up to 2 million cases of skin cancer may be prevented each year by 2030.

The Montreal Protocol is also one of the prime contributors to the fight against climate change, as it averted more than 135 billion tonnes of carbon dioxide equivalent emissions from 1990 to 2010.

The Kigali Amendment to the Montreal Protocol, which was adopted in 2016, is expected to avoid up to 0.5° Celsius warming by the end of the century, while continuing to protect the ozone layer.

The logo and theme in all the six official UN languages are posted on the Ozone Secretariat website for wider dissemination, together with brand guidelines on their usage. Parties are also encouraged to download and use the email signature image of the logo and theme.

In the coming months, the Ozone Secretariat will conduct a communication campaign to celebrate the 30th anniversary and will provide the parties with more information about the campaign and related products to support commemorative activities. We would also be pleased to receive any information products for your planned commemorative activities for wide dissemination through our website.

As in previous years, we expect that the United Nations Secretary-General's message for International Ozone Day to be shared prior to the day for further dissemination.

Once again, the Ozone Secretariat will provide limited financial assistance to four developing countries to contribute towards organizing their national commemorative activities. The Secretariat invites the parties to submit their plans of celebration activities and requests for assistance by 31 May 2017. Kindly send them to the Secretariat at dan.tengo@unep.org and ozone.info@unep.org

- 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

Assessment Panels List of Meetings

SYNTHESIS REPORTS

- 2014 assessments
- 2010 assessments
- 2006 assessments

THE MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL

Multilateral Fund for the Implementation of the Montreal Protocol

79th meeting of the Executive Committee, Bangkok, 3-7 July 2017

Report of the 78th meeting of the Executive Committee

Adjusted business plan of the Multilateral Fund for 2017-2019 after the 77th meeting of the Executive Committee

Learn more

OZONACTION

UN Environment, OzonAction highlights

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

Now available for free in the Google Play and Apple Store

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

Download on the App Store GET IT ON Google Play

OzonAction is pleased to share with you some awareness raising products that you can download and use for your activities to celebrate the

30th Anniversary of the Montreal Protocol on Substances that Deplete the Ozone Layer, and the International Ozone Protection Day, on 16 September.

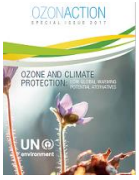
Please visit OzonAction' 2017 Ozone Day website >>>

The Kigali Amendment to the Montreal Protocol - Opportunities and Next Steps - OzonAction Video

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

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

OzonAction YouTube | See also: United Nations Treaty Collection



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

OzonAction Factsheets:

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

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

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

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

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

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

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

Now available in the Android Play Store and Apple Store/iTunes.

Available on the App Store | ANDROID APP ON Google play

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

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

Available on the App Store | ANDROID APP ON Google play

(*Just search for "OzonAction", or scan this QR code*)

OzonAction News Drops - UNEP OzonAction is presenting a series of short video "**News Drops**" which focus on ozone layer protection, climate change and the importance of continuing ozone observations.

Regional News Drops

The Regional Networks of National Ozone Units (NOUs) under the Multilateral Fund are a path-breaking mechanism for North-South and South-South cooperation. Networking provides a platform for NOUs from Article 5 countries to exchange experiences, develop their skills and tap the expertise of their peers in both developing and developed countries. Conducted at the regional level, the Networking activity builds the Ozone Officers' skills for implementing and managing their national ODS phase-out activities. During 2016 these videos were filmed at the regional network meetings around the world.

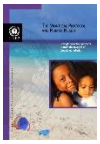
The NOUs were asked about their success stories, alternative refrigerants selected and their personal messages for national ozone celebrations…

Click here to access the News Drops

OzonAction Recent Publications:

Lower-GWP Alternatives in Commercial and Transport Refrigeration: An expanded compilation of propane, CO_2, ammonia and HFO case studies - This booklet presents an expanded compilation of case studies on lower-GWP alternatives in commercial and transport refrigeration and provides an update to the first set of case studies which was published in 2014 by UNEP DTIE OzonAction/CCAC (Low GWP Alternatives in Commercial Refrigeration: Propane, CO_2 and HFO Case Studies.

NATIONAL CERTIFICATION SCHEMES FOR RAC SERVICING TECHNICIANS - This publication aims to provide introductory information for institutions in developing countries to better understand the issue of certification in the field of refrigeration and air conditioning, to assist in the creation of such certification and training schemes and to demonstrate to service technicians and enterprises why it is in their interest to participate.



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

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

SAFE USE OF HCFC ALTERNATIVES IN REFRIGERATION AND AIR CONDITIONING - An Overview for Developing Countries - Many of the alternative refrigerants to hydrochlorofluorocarbons (HCFCs) have particular characteristics in terms of toxicity, flammability and high pressure which are different from those used previously. It is therefore important that the refrigeration and air-conditioning industry adapts to both the technical and safety issues concerning these refrigerants. This publication provides an overview of the alternatives, their general characteristics and their application in the context of the safety issues. It

provides guidance for National Ozone Units (NOUs) and other interested parties in developing countries on how they can advise and assist their national stakeholders in the selection and implementation of alternative refrigerants.

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

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

EVENTS

2017

9th International Conference on Compressors and Coolants, 6-8 September 2017, Bratislava, Slovakia

ATMOsphere Asia 2017 taking place a day before the **Bangkok RHVAC trade show**, 7-9 September, which ranks among the world's best HVAC&R exhibitions and is the second largest in the Asia Pacific region.

FEBRAVA 2017 - 20th International Refrigeration, Airconditioning ,Ventilation, Heating and Air Treatment Fair , 12 - 15 September 2017, Sao Paulo, Brazil

Future of HVAC 2017 – 13–14 September 2017, Sydney, NSW, Australia

EUREKA Italy, the first stop of the EUREKA roadshow, on 15 September 2017 in Mestre (Venice), Italy. EPEE and EVIA, the organisers of the annual EUREKA conference, are launching the "EUREKA roadshow", a series of national events to discuss the challenges the HVAC-R industry faces across EU Member States. Register here!

Symposium for the celebration of the Montreal Protocol 30th Anniversary - From the safeguard of the ozone layer to the protection of the earth climate, 19 - 20 September 2017, Paris, France

Le salon SIFA (salon interprofessionnel du froid et ses applications), organisé par La Rpf et le groupe LSA / Usine Nouvelle, aura lieu du 3 au 5 octobre 2017 au Dock Pullman de Paris, France. Le SIFA est un salon-congrès portant sur les enjeux réglementaires, économiques, techniques et environnementaux relatifs au FROID dans les domaines du tertiaire, de la grande distribution, l'agroalimentaire et de l'industrie.

EUREKA 2017: Heating, Cooling & Ventilation: Sustainable technologies for a better life, 11-12 December 2017, Berlin, Germany

2018

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

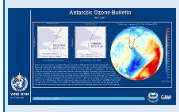
The HVAC & Refrigeration Show, 23 - 25 January 2018, London, United Kingdom

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

UNEP and USEPA: Promoting ozone and climate-friendly technologies in public procurement - a scoping study of Asia Pacific



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

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

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

AREA Guidance on minimum requirements for contractors' training & certification on low GWP Refrigerants - AREA has updated its Guidance on minimum requirements for contractors' training & certification on low GWP Refrigerants.

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

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

Primer on Hydrofluorocarbons, Fast action under the Montreal Protocol can limit growth of HFCs, prevent up to 100 billion tonnes of CO_2-eq emissions by 2050, and avoid up to 0.5°C of warming by 2100. IGSD, January 2014, Lead authors: Durwood Zaelke, Nathan Borgford-Parnell, and Danielle Fest Grabiel. Contributing authors: Stephen O. Andersen, Xiaopu Sun, Dennis Clare, Yuzhe Peng Ling, and Alex Milgroom.

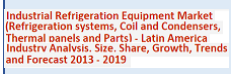
Flammable Refrigerants Safety Guide, AIRAH - Many of the refrigerants traditionally used in refrigeration and air conditioning systems in Australia have been non-flammable, non-toxic, synthetic greenhouse gases (SGGs) that have a high global warming potential (GWP). These were typically synthetic refrigerants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

Recent Trends in Global Emissions of Hydrochlorofluorocarbons and Hydrofluorocarbons: Reflecting on the 2007 Adjustments to the Montreal Protocol. S. A. Montzka *†, M. McFarland ‡, S. O. Andersen §, B. R. Miller †‖, D. W. Fahey †, B. D. Hall †, L. Hu †‖, C. Siso †‖, and J. W. Elkins †† Earth System Research Laboratory, National Oceanic and Atmospheric Administration, Boulder, Colorado 80305, United States ‡ DuPont Chemicals & Fluoroproducts, Wilmington, Delaware 19805, United States § Institute for Governance & Sustainable Development, Washington, D.C. 20007, United States‖ Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, United States.

Geothermal Heating and Cooling: Design of Ground-Source Heat Pump Systems- ASHRAE

A first edition, the IIR guide "CO_2 as a Refrigerant" highlights the application of carbon dioxide in supermarkets, industrial freezers, refrigerated transport, and cold stores as well as ice rinks, chillers, air conditioning systems, data centers and heat pumps. This guide is for design and development engineers needing instruction and inspiration as well as non-technical experts seeking background information on a specific topic. Publication, IIR Technical Guide, 2014.

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



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

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

Chlorofluorocarbon Market: Global Industry Analysis and Forecast 2015 to 2021

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

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

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

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

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

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

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

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

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

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

shecco GUIDE to Natural Refrigerants Training in Europe shows that training is readily available. Read on r744

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

FactSheet - Hazards during the Repair and Maintenance of Refrigeration Systems on Vessels.

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

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

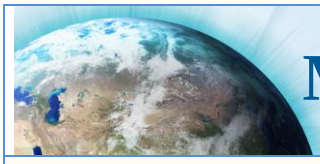
[The Environmental Investigation Agency (EIA)](), recently launched report: *[Chilling Facts VII]()* , *Chilling Facts I-VI* reports available [here]()

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

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

[The Dirtiest Contraband in Gibraltar](), El Pais, 8 August 2017

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



MISCELLANEOUS

Announcement!

The UN 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 celebration of the 30th Anniversary of the Montreal Protocol - which was agreed as 16 September 1987.

The new website will be launched during the upcoming 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 an 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]()

Looking forward to receiving the 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 important contribution to the Montreal Protocol success and ozone layer protection.

Contact : Samira Korban-de Gobert, UN Environnement, OzonAction

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

How will the heat pump market move towards natural refrigerants? Eric Delforge talks about the energy-efficient properties of natural refrigerants when used in heat pump applications.

Watch on r774's YouTube channel

UN knowledge platform launches live-tracking tools to review progress towards SDGs, UN Environment's dynamic online platform designed for sharing contextualized data...

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

- Immediate and permanent access to the latest research and to IJR archive
- Access the latest articles as soon as they become available online.
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- 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

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

EPA-GreenChill Webinar: **Using Refrigeration Batteries to Manage Energy Use**,

Date: Tuesday, September 5, 2017 | **Time**: 2:00 pm to 3:00pm (Eastern time)

Description: Amrit Robbins (President and Co-Founder of Axiom Exergy) and Tristam Coffin (Director of Sustainability & Facilities at Whole Foods Market) will discuss Axiom Exergy's first full-scale installation of its Refrigeration Battery platform at a Whole Foods Market in Northern California. The webinar will include an overview of the Refrigeration Battery technology, its value proposition for refrigerated facilities and the grid, and Axiom Exergy's vision for the future of refrigeration. We will also discuss the potential energy and climate impacts of the Refrigeration Battery platform.

To join the webinar: 1. Visit the webinar access page: Using Refrigeration Batteries to Manage Energy Use<http://epawebconferencing.acms.com/batteries/>. 2. Select "Enter as a Guest". It is important that you select the option to enter as a guest. 3. Enter your name. 4. Click "Enter Room". 5. Click "OK".

For audio: 1. Call the toll free call-in number: 1-866-299-3188 (706-758-1822 from outside the U.S.), 2. Use Conference Code: 202 343 9185#

Learn more

First look of Kadvi Hawa launched by UNEP head Erik Solheim - New Delhi, Aug 10 (PTI) The poster of Nil Madhab Pandas film "Kadvi Hawa", which addresses the burning issue of climate change, was unveiled today by Erik Solheim, the general and executive director, United Nations Environment Programme.

Nicolas Hulot ferme les vannes des hydrocarbures - Un projet de loi vise à interdire tout nouveau permis d'exploration et d'exploitation sur le territoire national. La fin de la production de pétrole et de gaz est programmée pour 2040. Le Monde, 26 Août 2017, Par: Pierre Le Hir

UNFCCC Issues PCCB Progress Report, Initiatives Build Climate Forecasting Capacity - 24 August 2017: The latest developments in climate change capacity building have included initiatives by the World Meteorological Organization (WMO) and partners aimed at improving meteorological services in Asia-Pacific, and an Intergovernmental Authority on Development (IGAD) Climate Prediction and Applications Centre (ICPAC) workshop on drought risk management. The UNFCCC Secretariat has issued an annual technical progress report of the Paris Committee on Capacity-building (PCCB).

SPAIN: Advanced materials lessen cooling load - An architectural educational and research centre claimed to have developed a series of materials and systems which could reduce air conditioner use by more than 25%. The Institute for Advanced Architecture of Catalonia (IAAC) says it has developed five alternatives based on bioclimatic architecture which could reduce indoor temperatures by up to 5ºC, and thus reduce air conditioning loads…

The Montreal Protocol Who's who

See the latest nominations /

Nominate Ozone Layer Protection Champion

From Your Country /Region >>

http://www.unep.fr/ozonaction/montrealprotocolwhoswho

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http://www.youtube.com/ozonaction

Prepared by: Samira Korban-de Gobert, OzonAction

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