Volume XXI | 15 August 2021

In this issue:

GLOBAL

1. Kigali Amendment latest ratification

Congratulations to the latest country which has ratified the Kigali Amendment:

China, 17 June 2021

At the Twenty-Eighth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, held in Kigali from 10 to 15 October 2016, the Parties adopted, in accordance with the procedure laid down in paragraph 4 of article 9 of the 1985 Vienna Convention for the Protection of the Ozone Layer, a further amendment to the Montreal Protocol as set out in Annex I to the report of the Twenty-Eighth Meeting of the Parties (Decision XXVIII/1).

Kigali Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, Status of Ratification 15 October 2016 to **date**.

United Nations Treaty Collection
Image: UN Treaty Collection website

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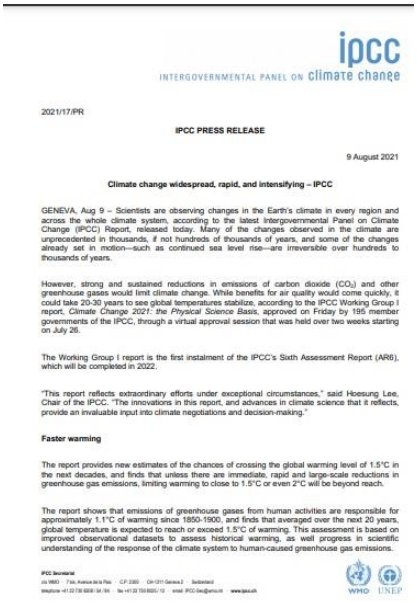
2. Climate change widespread, rapid, and intensifying – IPCC



ipcc
INTERGOVERNMENTAL PANEL ON climate change

2021/17/PR

IPCC PRESS RELEASE

9 August 2021

Climate change widespread, rapid, and intensifying – IPCC

GENEVA, Aug 9 – Scientists are observing changes in the Earth's climate in every region and across the whole climate system, according to the latest Intergovernmental Panel on Climate Change (IPCC) Report, released today. Many of the changes observed in the climate are unprecedented in thousands, if not hundreds of thousands of years, and some of the changes already set in motion—such as continued sea level rise—are irreversible over hundreds to thousands of years.

However, strong and sustained reductions in emissions of carbon dioxide (CO_2) and other greenhouse gases would limit climate change. While benefits for air quality would come quickly, it could take 20-30 years to see global temperatures stabilize, according to the IPCC Working Group I report, *Climate Change 2021: the Physical Science Basis*, approved on Friday by 195 member governments of the IPCC, through a virtual approval session that was held over two weeks starting on July 26.

The Working Group I report is the first instalment of the IPCC's Sixth Assessment Report (AR6), which will be completed in 2022.

"This report reflects extraordinary efforts under exceptional circumstances," said Hoesung Lee, Chair of the IPCC. "The innovations in this report, and advances in climate science that it reflects, provide an invaluable input into climate negotiations and decision-making."

Faster warming

The report provides new estimates of the chances of crossing the global warming level of 1.5°C in the next decades, and finds that unless there are immediate, rapid and large-scale reductions in greenhouse gas emissions, limiting warming to close to 1.5°C or even 2°C will be beyond reach.

The report shows that emissions of greenhouse gases from human activities are responsible for approximately 1.1°C of warming since 1850-1900, and finds that averaged over the next 20 years, global temperature is expected to reach or exceed 1.5°C of warming. This assessment is based on improved observational datasets to assess historical warming, as well progress in scientific understanding of the response of the climate system to human-caused greenhouse gas emissions.

IPCC Secretariat

WMO UNEP

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"This report is a reality check," said IPCC Working Group I Co-Chair Valérie Masson-Delmotte. "We now have a much clearer picture of the past, present and future climate, which is essential for understanding where we are headed, what can be done, and how we can prepare."

Every region facing increasing changes

Many characteristics of climate change directly depend on the level of global warming, but what people experience is often very different to the global average. For example, warming over land is larger than the global average, and it is more than twice as high in the Arctic.

"Climate change is already affecting every region on Earth, in multiple ways. The changes we experience will increase with additional warming," said IPCC Working Group I Co-Chair Panmao Zhai.

The report projects that in the coming decades climate changes will increase in all regions. For 1.5°C of global warming, there will be increasing heat waves, longer warm seasons, and shorter cold seasons. At 2°C of global warming, heat extremes would more often reach critical tolerance thresholds for agriculture and health, the report shows.

But it is not just about temperature. Climate change is bringing multiple different changes in different regions – which will all increase with further warming. These include changes to wetness and dryness, to winds, snow and ice, coastal areas and oceans. For example:

- Climate change is intensifying the water cycle. This brings more intense rainfall and associated flooding, as well as more intense drought in many regions.
- Climate change is affecting rainfall patterns. In high latitudes, precipitation is likely to increase, while it is projected to decrease over large parts of the subtropics. Changes to monsoon precipitation are expected, which will vary by region.

- Coastal areas will see continued sea level rise throughout the 21st century, contributing to more frequent and severe coastal flooding in low-lying areas and coastal erosion. Extreme sea level events that previously occurred once in 100 years could happen every year by the end of this century.
- Further warming will amplify permafrost thawing, and the loss of seasonal snow cover, melting of glaciers and ice sheets, and loss of summer Arctic Sea ice.
- Changes to the ocean, including warming, more frequent marine heatwaves, ocean acidification, and reduced oxygen levels have been clearly linked to human influence. These changes affect both ocean ecosystems and the people that rely on them, and they will continue throughout at least the rest of this century.
- For cities, some aspects of climate change may be amplified, including heat (since urban areas are usually warmer than their surroundings), flooding from heavy precipitation events and sea level rise in coastal cities.

For the first time, the Sixth Assessment Report provides a more detailed regional assessment of climate change, including a focus on useful information that can inform risk assessment, adaptation, and other decision-making, and a new framework that helps translate physical changes in the climate – heat, cold, rain, drought, snow, wind, coastal flooding and more – into what they mean for society and ecosystems.

This regional information can be explored in detail in the newly developed Interactive Atlas interactive-atlas.ipcc.ch as well as regional fact sheets, the technical summary, and underlying report.

Human influence on the past and future climate
"It has been clear for decades that the Earth's climate is changing, and the role of human influence on the climate system is undisputed," said Masson-Delmotte. Yet the new report also reflects major advances in the science of attribution – understanding the role of climate change in intensifying specific weather and climate events such as extreme heat waves and heavy rainfall events.

The report also shows that human actions still have the potential to determine the future course of climate. The evidence is clear that carbon dioxide (CO_2) is the main driver of climate change, even as other greenhouse gases and air pollutants also affect the climate.

"Stabilizing the climate will require strong, rapid, and sustained reductions in greenhouse gas emissions, and reaching net zero CO_2 emissions. Limiting other greenhouse gases and air pollutants, especially methane, could have benefits both for health and the climate," said Zhai.

The Intergovernmental Panel on Climate Change (IPCC), 9 August 2021
Image: IPCC website

See also >>>

- **The IPCC Sixth Assessment Report (AR6) Climate Change 2021: The Physical Science Basis**

- This is the do-or-die decade for climate change, world scientists warn, The Hill, 9 August 2021

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3. IPCC Includes GWPs for Hydrocarbons in New Report

Propane has a 20-year GWP of only 0.072, much lower than previously assumed, according to the Intergovernmental Panel on Climate Change.

The Intergovernmental Panel on Climate Change (IPCC) released its Climate Change 2021 – The Physical Science Basis report on Monday (August 9), which includes official global warming potential (GWP) figures for hydrocarbons for the first time.

The report states that popular natural refrigerant propane (R290) has a 20-year GWP of 0.072 and a 100-year GWP of 0.02. Butane (R600) has a GWP20 of 0.022 and a GWP100 of 0.006.

These figures are much lower than traditionally assumed. Historically, R290 has been assumed to have a GWP of 3 due to its chemical formula, which includes three carbon atoms. Three is very low, compared to most HFCs, but still many times higher than the actual value.

"Historically, people assumed the GWP of R290 was 3, because the chemical formula for propane is C_3H_8 — meaning it has 3 carbon atoms," explained Dr Daniel Colbourne of Re-phridge in the UK. "So, when it degrades in the atmosphere it will combine with oxygen (O_2) to produce three CO_2 molecules, hence a GWP of 3, and this proliferated throughout reports and papers."

The addition of hydrocarbons to the list of GWP values is not the only change. R32, one of the commonly used HFC competitors to hydrocarbons in single-split air conditioning, has had its GWP100 updated by the IPCC. It is tradtionally given as around 675, meaning it is below the 750 GWP limit for new single-split units coming into force in the EU from January 1, 2025. However, the updated figures from the new IPCC report, give R32's 100-year GWP as 771, meaning that it most likely no longer will be possible to use in new equipment from that date.

The 20-year GWP for R32 is much higher at 2690, according to the IPCC report. Read more about the 20-year vs 100-year GWP debate **here**

The Big Picture

The overall conclusions of the new IPCC report do not make for very optimistic reading.

"The report shows that emissions of greenhouse gases from human activities are responsible for approximately 1.1°C (1.98°F) of warming since 1850-1900, and finds that

averaged over the next 20 years, global temperature is expected to reach or exceed 1.5°C (2.7°F) of warming," the panel stated in a press release.

"Unless there are immediate, rapid and large-scale reductions in greenhouse gas emissions, limiting warming to close to 1.5°C (2.7°F) or even 2°C (3.6°F) will be beyond reach."

The full IPCC report is available **here**

Hydrocarbons21, 20 August 2021, By Tine Stausholm

Image: Hydrocarbons21 website

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4. Published evidence supports very low yields of TFA from most HFOs and HCFO

Summary

EFCTC has analysed the most current, peer reviewed scientific papers on the potential contribution of HFOs and HCFOs, containing the CF3CH= moiety, to existing and future TFA levels. The conclusion from these papers is that the very low yields of TFA from these substances mean that their expected contribution to TFA in the environment is extremely small.

In addition, and taking into account a wider number of substances, the UNEP Environmental Effects Assessment Panel, in its Summary Update 2020 for Policymakers [5], summarised these scientific conclusions for TFA: The current low concentration of trifluoroacetic acid (TFA) produced by the degradation of several hydrofluorocarbons (HFCs) and hydrofluoro-olefins (HFOs), is currently judged not to pose a risk to human health or to the environment.

This EFCTC analysis is in response to the UBA report on Persistent degradation products of halogenated refrigerants.

In the EU the substances with the CF3CH= moiety reported as supplied on the EU market are HFO-1234ze, HFO-1336mzz and HCFO-1233zd.

Click **here** to read the EFCTC Position paper.

European Fluorocarbons Technical Committee (EFCTC), August 2021

Image: EFCTC website

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

Registration is now open for our Sustainable Refrigeration Summit! This FREE virtual summit will bring together commercial refrigeration, energy, environmental, and policy stakeholders to advance solutions for a zero-emissions future for supermarket refrigeration.

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

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

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

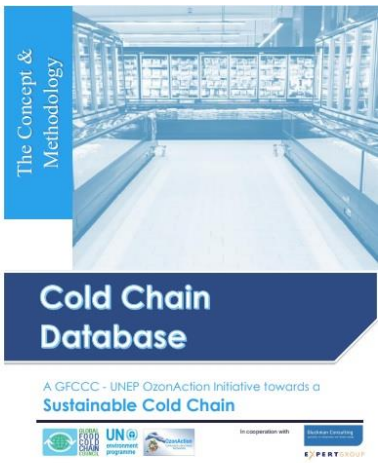
Check out the *preliminary program* and stay tuned for more session details!.

Learn More / **Register Now**

The North American Sustainable Refrigeration Council, August 2021

Image: NASRC website

6. OzonAction and GFCCC launch the methodology questionnaires the Cold Chain Database Initiative



The Global Food Cold Chain Council (GFCCC) and the United Nations Environment Programme (UNEP) OzonAction announced the launch of their Cold Chain Database and Modeling initiative.

The initiative marks the first formal step to assist developing countries in identifying their cold chain baseline along with consumption of relevant HCFCs or HFCs or other refrigerants. The initiative was conceived in 2019 and kicked off during the 31st Meeting of Parties to the Montreal Protocol (Rome, Italy), which concluded with the Rome Declaration on "The Contribution of the Montreal Protocol to Food Loss Reduction through Sustainable Cold Chain Development". The launch also comes in advance of the United Nations Food Systems Summit.

With the support provided by the Montreal Protocol's Multilateral Fund, the Cold Chain Database initiative is currently being piloted in six countries – Bahrain, Bosnia and Herzegovina, Maldives, North Macedonia, Paraguay, and Senegal. From the pilot data gathering initiatives, a model is being developed that will allow the projection of benefits of cold chain expansion.

GFCCC is an independent not-for-profit industry organisation that seeks to simultaneously reduce food waste, and related greenhouse gas emissions in the processing, transportation, storage, and retail display of cold food by expanding and improving access to energy efficient low-global warming potential technology.

The Cold Chain Database concept, methodology and data collection questionnaires are offered to interested countries and partners to help in assessing local cold chain capacities and designing respective action plans and policies.

> To read GFCCC Press Release about the cold chain database initiative, please see

GFCCC-UNEP OzonAction Cold Chain Modelling Press Release

> For more details about the database concept and methodology, please see **GFCCC-UNEP Cold Chain Database Methodology Final**

> For countries or partners interested to use the model data collection detailed questionnaires, please fill in the Expression of Interest form and return to ***Ayman Eltalouny***

Expression of Interest and NDA of Cold Chain Database.

Contact: Ayman Eltalouny, Coordinator International Partnerships, UNEP, OzonAction

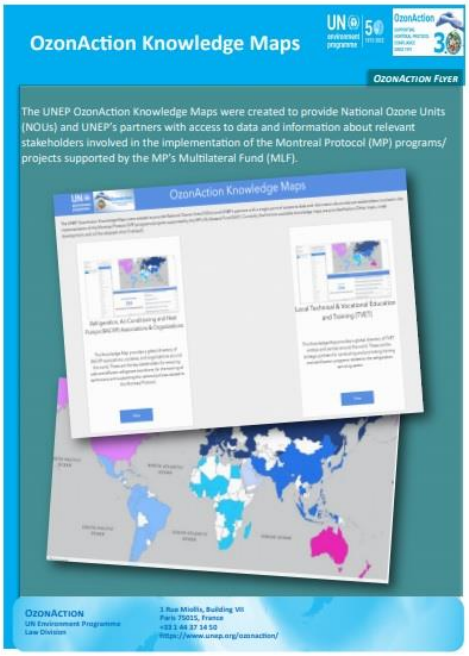
United Nations Environment Programme (UNEP), OzonAction

Image: OzonAction

7. New OzonAction Knowledge Maps tool

The UNEP OzonAction Knowledge Maps tool was developed to provide the National Ozone Units (NOUs) and different UNEP partners with a simple tool to help them access data and information about relevant stakeholders, who are mainly involved in the implementation of programmes and projects under the Montreal Protocol (MP) supported by Multilateral Fund (MLF).

Currently, the first two available knowledge maps are described below:



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

Local Technical & Vocational Education and Training (TVET): This Knowledge Map provides a global directory of TVET entities and centres around the world. These are the strategic partners for conducting and promoting training and certification programmes related to the refrigeration servicing sector.

To develop this tool, UNEP OzonAction collected and reviewed different datasets from multiple sources, and then presented the collected datasets into a common platform and format (mainly in the form of a global map so that data can be geographically displayed). Kindly note that the data and information provided will be updated regularly through the feedback that will be received from NOUs and partners to update and/or add new records. Other maps are currently under development which will include access to other key data and information of importance to the implementation of Montreal Protocol programmes.

Click **HERE** to access the OzonAction Knowledge Maps tool

Click **HERE** to download the OzonAction Knowledge Maps tool flyer

OzonAction UN Environment Programme Law Division, 30 June 2021
Image: OzonAction

AFRICA

8. Cooling the planet using environmentally friendly refrigerants

For several decades, the depletion of the earth's ozone layer has been a major concern to scientists and policymakers, especially given the health implications such as skin cancer, eye cataracts among others. As a result, the Montreal Protocol, the first international treaty to regulate the production and use of ozone depleting chemicals was adopted and subsequently came into force in 1989 with Ghana as one of the signatories.

Ghana through various interventions such as formulation of policies/regulations on the importation and usage of some refrigerants with high Global Warming Potential (GWP); and institutional and individual capacity building activities, has achieved the target of attaining the 35% consumption reduction of Hydrochlorofluorocarbons.

To consolidate the success achieved and continue to meet other obligations under the Protocol, the United Nations Development Programme (UNDP) has been supporting the Environmental Protection Agency (EPA) to organize series of trainings for technicians in the refrigeration sector. This is to sensitize the technicians on how to handle and use energy efficiency and environmentally friendly refrigerants to reduce the associated impacts on the ozone to reduce climate change.

''We have realized that the most common refrigerant used in air conditioners is a significant ozone depleting chemical with climate threat potential. We are building the capacity of the technicians with the support of UNDP, to enable them effectively adopt the use of alternative refrigerants to protect the environment'', stated Mr. Emmanuel Quansah, Acting Director of Climate Change and Ozone at the EPA.

This initiative by the UNDP and the EPA is building the capacity of the technicians to transition from the use of Hydrochlorofluorocarbons (HCFC 22) which is an ozone depleting chemical to a more environmentally friendly chemical, Hydrocarbon (HC 290) , with the aim of phasing out the HCFC 22 eventually.

The training is particularly significant as it also provides a pathway for technicians by preparing them for the certification process regardless of their educational qualification. This will help streamline activities in the refrigeration sector. For Solomon Quaye, a beneficiary of previous trainings, it provides an opportunity to revolutionize his air conditioning business for sustainability.

''The training has significantly impacted my operations over the years. Following the training, I was able to acquire certification which has now allowed me to transition into the use of HC 290. Beyond the positive impact I am making on the environment, this chemical is cost effective, so I am able to make extra income from using the right chemical'', noted Solomon Quaye, a technician at Quick Mechanical and Engineering Services.

Eric Qwamina Arhin, a technician at Excellent Cooling Technologies also recounts how the training did not only help him transition to the environmentally friendly chemical for the

good of the planet and people, but it has also equipped him with the knowledge on how to ensure the safety of his workers when using the recommended chemical: HC 290.

"The environmentally friendly chemical is highly flammable, one of the important lessons I got from the training was on effective containment measures of the chemicals. So, since 2020, I have been able to apply the safety measures I leant from the training to keep my staff and clients safe", Eric added.

To mobilize more support from all levels for the protection of the planet and people, EPA with support from UNDP has widened their scope to train more technicians, especially members of the Air Conditioning and Refrigeration Workshop Owners Association.

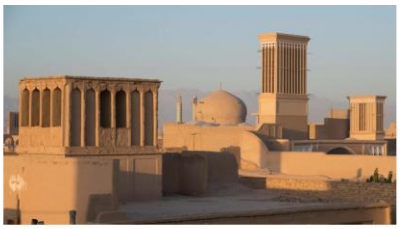
The trainings, which are being organized under the Hydrochlorofluorocarbons Phase-out Management Plan (HPMP) Stage 1 Project has so far built the capacity of over 2000 technicians across Ghana.

Modern Ghana,12 August 2021

Image: Modern Ghana website

ASIA AND THE PACIFIC

9. The ancient Persian way to keep cool



Yazd is said to have the most wind catchers of any city in the world (Credit: Alamy)

From ancient Egypt to the Persian Empire, an ingenious method of catching the breeze kept people cool for millennia. In the search for emissions-free cooling, the "wind catcher" could once again come to our aid.

The city of Yazd in the desert of central Iran has long been a focal point for creative ingenuity. Yazd is home to a system of ancient engineering marvels that include an underground refrigeration structure called yakhchāl, an underground irrigation system called qanats, and even a network of couriers called pirradaziš that predate postal services in the US by more than 2,000 years.

Among Yazd's ancient technologies is the wind catcher, or bâdgir in Persian. These remarkable structures are a common sight soaring above the rooftops of Yazd. They are often rectangular towers, but they also appear in circular, square, octagonal and other ornate shapes.

Yazd is said to have the most wind catchers in the world, though they may have originated in ancient Egypt. In Yazd, the wind catcher soon proved indispensable, making this part of the hot and arid Iranian Plateau livable.

Though many of the city's wind catchers have fallen out of use, the structures are now drawing academics, architects, and engineers back to the desert city to see what role they could play in keeping us cool in a rapidly heating world.

As a wind catcher requires no electricity to power it, it is both a cost-efficient and green form of cooling. With conventional mechanical air conditioning already accounting for a fifth of total electricity consumption globally, ancient alternatives like the wind catcher are becoming an increasingly appealing option.

There are two main forces that drive the air through and down into the structures: the incoming wind and the change in buoyancy of air depending on temperature – with warmer air tending to rise above cooler, denser air. First, as air is caught by the opening of a wind catcher, it is funneled down to the dwelling below, depositing any sand or debris at the foot of the tower. Then the air flows throughout the interior of the building, sometimes over subterranean pools of water for further cooling. Eventually, warmed air will rise and leave the building through another tower or opening, aided by the pressure within the building.

The shape of the tower, alongside factors like the layout of the house, the direction the tower is facing, how many openings it has, its configuration of fixed internal blades, canals and height are all finely tuned to improve the tower's ability to draw wind down into the dwellings below.

Using the wind to cool buildings has a history stretching back almost as long as people have lived in hot desert environments. Some of the earliest wind-catching technology comes from Egypt 3,300 years ago, according to researchers Chris Soelberg and Julie Rich of Weber State University in Utah. Here, buildings had thick walls, few windows facing the Sun, openings to take in air on the side of prevailing winds and an exit vent on the other side – known in Arabic as malqaf architecture. Though some argue that the birthplace of the wind catcher was Iran itself.

Wherever it was first invented, wind catchers have since become widespread across the Middle East and North Africa. Variations of Iran's wind catchers can be found in the barjeels of Qatar and Bahrain, the malqaf of Egypt, the mungh of Pakistan, and many other places, notes Fatemeh Jomehzadeh of the University of Technology Malaysia and colleagues.

The Persian civilisation is widely considered to have added structural variations to allow for better cooling – such as combining it with its existing irrigation system to help to cool the air down before releasing it throughout the home. In Yazd's hot, dry climate, these structures proved remarkably popular, until the city became a hotspot of soaring ornate towers seeking the desert wind. The historical city of Yazd was recognised as a Unesco World Heritage site in 2017, in part for its proliferation of wind catchers.

As well as performing the functional purpose of cooling homes, the towers also had a strong cultural significance. In Yazd, the wind catchers are as much a part of the skyline as the Zoroastrian Fire Temple and Tower of Silence. Among them is the wind catcher at the Dowlatabad Abad Gardens, said to be the tallest in the world at 33m (108ft) and one of the few wind catchers still in operation. Housed in an octagonal building, it overlooks a fountain stretching past rows of pine trees.

The emissions-free cooling efficacy of such wind catchers make some researchers argue that they are due a revival.

Parham Kheirkhah Sangdeh has extensively studied the scientific application and surrounding culture of wind catchers in contemporary architecture at Ilam University in Iran. He says inconveniences like pests entering the chutes and the gathering of dust and desert debris have meant many have turned away from traditional wind catchers. In their place are mechanical cooling systems, such as conventional air-conditioning units. Often, those options are powered by fossil fuels and use refrigerants that act as powerful greenhouse gases if released into the atmosphere.

The advent of modern cooling technologies has long been blamed for the deterioration of traditional methods in Iran, the historian of Iranian architecture Elizabeth Beazley wrote in 1977. Without constant maintenance, the harsh climate of the Iranian Plateau has worn away many structures from wind catchers to ice houses. Kheirkhah Sangdeh also sees the shift away from wind catchers as in part down to a tendency among the public to engage with technologies from the West.

"There needs to be some changes in cultural perspectives to use these technologies. People need to keep an eye on the past and understand why energy conservation is important," Kheirkhah Sangdeh says. "It starts with recognising cultural history and the importance of energy conservation."

Kheirkhah Sangdeh hopes to see Iran's wind catchers updated to add energy-efficient cooling to existing buildings. But he has met many barriers to his work in the form of ongoing international tensions, the coronavirus pandemic and ongoing water shortage. "Things are so bad in Iran that [people] take it day by day," says Kheirkhah Sangdeh.

Fossil-fuel-free methods of cooling like the wind catcher might well be due a revival, but to a surprising extent they are already present – albeit in a less magnificent form than those in Iran – in many Western countries.

In the UK, some 7,000 variations of wind catchers were installed in public buildings between 1979 and 1994. They can be seen from buildings such as the Royal Chelsea Hospital in London, to supermarkets in Manchester.

These modernised wind catchers bear little resemblance to Iran's towering structures. On one three-storey building on a busy road in north London, small hot pink ventilation towers allow passive ventilation. Atop a shopping centre in Dartford, conical ventilation towers rotate to catch the breeze with the help of a rear wing that keeps the tower facing the prevailing wind.

The US too has adopted wind-catcher-inspired designs with enthusiasm. One such example is the visitor center at Zion National Park in southern Utah. The park sits in a high desert plateau, comparable to Yazd in climate and topography, and the use of passive cooling technologies including the wind catcher nearly eliminated the need for mechanical air-conditioning. Scientists have recorded a temperature difference of 16C (29F) between the outside and inside of the visitor centre, despite the many bodies regularly passing through.

There is further scope for the spread of the wind catcher, as the search for sustainable solutions to overheating continues. In Palermo, Sicily, researchers have found that the

climate and prevailing wind conditions make it a ripe location for a version of the Iranian wind catcher. This October, meanwhile, the wind catcher is set to have a high-profile position at the World Expo fair in Dubai, as part of a network of conical buildings in the Austrian pavilion, where the Austrian architecture firm Querkraft has taken inspiration from the Arabic barjeel version of the wind tower.

While researchers such as Kheirkhah Sangdeh argue that the wind catcher has much more to give in cooling homes without fossil fuels, this ingenious technology has already migrated further around the world than you might think. Next time you see a tall, vented tower on top of a supermarket, high-rise or school, look carefully – you might just be looking at the legacy of the magnificent wind catchers of Iran.

BBC, 11 August 2021, By Kimiya Shokoohi

Image: Alamy

10. Energy Efficiency in Public Buildings in Bangladesh: Assessment of Best Available Technologies

This report identifies current technologies used in public buildings in Bangladesh and recommends alternative energy-efficient cooling and lighting technology best suited to the country. It also discusses the role of solar photovoltaic (PV) systems in reducing grid electricity use.

Finally, the report lists companies providing such climate-friendly equipment, aiming to assist key actors in making an informed decision. This publication was produced as part of the activities of Proklima, a programme within the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), funded by the German Federal Ministry for Economic Cooperation and Development.

As per the request of the Sustainable and Renewable Energy Development Authority (SREDA), GIZ has received a grant from the Kigali Cooling Efficiency Program (K-CEP) to implement a pilot project on Energy Efficiency in Public Buildings in Bangladesh (EEPB).

Under the pilot project, energy audits have been conducted in selected public buildings across Bangladesh.

Download the publication

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), August 2021

Image: GIZ/Rubel Karmaker

NORTH AMERICA

11. NASA Goddard Scientist Dr. Paul Newman awarded Cleveland Abbe Award

Dr. Paul A. Newman, Chief Scientist for Earth Sciences at NASA's Goddard Space Flight Center in Greenbelt, Maryland. *Credits: NASA*

Dr. Paul A. Newman, Chief Scientist for Earth Sciences at NASA's Goddard Space Flight Center Dr. Paul A. Newman, Chief Scientist for Earth Sciences at NASA's Goddard Space Flight Center in Greenbelt, Maryland has been awarded the Cleveland Abbe Award for Distinguished Service to the Atmospheric and Related Sciences, by the American Meteorological Society.

The Cleveland Abbe Award for Distinguished Service to the Atmospheric and Related Sciences by an Individual is presented on the basis of activities that have materially contributed to the progress of the atmospheric and related sciences or to the application of the atmospheric and related sciences to general, social, economic, or humanitarian welfare.

"I'm so honored, since Cleveland Abbe was a primary pioneer of weather forecasting and atmospheric science," Newman said.

Paul's award citation reads "For sustained leadership and service to science resulting in strengthened policy development for the Montreal Protocol, including contributions to the Kigali Amendment."

Dr. Newman is also the co-chair of the Scientific Assessment Panel (SAP) to the Montreal Protocol. The SAP is charged with drafting reports on the state of ozone depletion every four years. The current report is "The Scientific Assessment of Ozone Depletion: 2018."

He is principally involved in the analysis of stratospheric meteorological and trace gas observations. His major area of research is stratospheric (upper atmosphere) dynamics and chemistry. He has participated in numerous aircraft field campaigns with his NASA, NOAA, and University colleagues, and actively researches stratospheric dynamical processes.

Dr. Newman leads NASA Goddard analyses of high-resolution stratospheric data collected mainly by NASA high-altitude aircraft. He also directs research that ties products produced by Goddard's Earth system model (40 years of Modern-Era Retrospective analysis for Research and Applications, Version 2, or MERRA-2 reanalysis products) to atmospheric dynamic models to enhance our understanding of the dynamics, chemistry, and radiative properties of the middle atmosphere.

Click **here** for more information about the Cleveland Abbe award.

Click **here** for Paul Newman's Biography.

NASA Goddard Space Flight Center, Greenbelt, Md., 10 August 2021, By Rob Gutro

Image: NASA website

12. US EPA Takes AIM at HFCs

THE
NATIONAL LAW REVIEW

August 9, 2021
Volume XI, Number 221

US EPA Takes AIM at HFCs

Monday, August 2, 2021

It's déjà vu all over again. Over the course of more than thirty years, EPA and industry partners successfully wound down usage of ozone-depleting chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) under the Significant New Alternatives Policy (SNAP) in Title VI of the Clean Air Act, enacted following the 1987 Montreal Protocol. Under SNAP, HCFCs and CFCs were largely replaced with hydrofluorocarbons (HFCs) in a wide variety of industrial and commercial uses. But while HFCs are much less harmful to the ozone layer, modern science now recognizes HFCs as extremely potent greenhouse gases, so it has become necessary to replace the replacements. The international community began addressing HFC usage through the 2016 Kigali Amendment to the Montreal Protocol, and the United States followed suit with legislation at the end of last year.

The 2020 American Innovation and Manufacturing Act (AIM Act) authorizes EPA to promulgate rules to reduce HFC production and usage to 15% of baseline levels by 2036. The Act comes amidst a flurry of activity related to HFCs, including widespread state regulation and legislation. Recently, the EPA proposed a rule to enact the AIM Act's provisions by establishing a production and consumption allowance system. Meanwhile, a coalition of state and local governments recently petitioned for rulemaking seeking even more robust action against HFCs. Assertive legislation and rulemaking now looks to force HFCs the way of CFCs.

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Chlorofluorocarbons and hydrochlorofluorocarbons are classes of chemicals containing atoms of carbon, chlorine, and fluorine which were regularly used in the manufacture of aerosol sprays, blowing agents for foams, and packing materials, and as solvents and refrigerants. After discovering that these chemicals were harmful to the ozone layer which protects the planet from the sun's ultraviolet radiation, the United States signed the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer which requires countries to wind down their usage of CFCs. To implement this requirement, Congress passed Title VI to the Clean Air Act. Under Title VI, 42 U.S.C. § 7671k(a), the EPA established the SNAP program to replace CFCs and HCFCs with non-ozone-depleting alternatives, HFCs. The EPA provided an exhaustive list of permissible CFC-HFC replacements. For example, HFC-

134a was identified as an acceptable replacement for CFC-12 for household refrigerators. And so, it was—under SNAP, CFC usage plummeted and HFC use dramatically increased.

HFCs are similar to HCFCs and CFCs—hence the ready substitution—but lack chlorine and bromine and so do not have the same ozone-depletion potential. But while HFCs are not (directly) ozone depleting, it has become clear that HFCs are potent greenhouse gases contributing to climate change. In fact, HFCs are such potent greenhouse gases that HFCs have global warming potentials (GWPs) hundreds to thousands of times more potent than carbon dioxide (CO_2). Measure for measure, HFCs are some of the most potent greenhouse gases, although HFCs only account for about 1.5% of global emissions weighted by GWP.

The Consolidated Appropriations Act, 2021, Pub. L. No. 116-260, includes the AIM Act, section 103(e) of which authorizes the EPA to promulgate rules to reduce HFC production and use by 85% in fifteen years by issuing production and consumption allowances. Consumption and production is already targeted for a 10% reduction from baseline in 2020-2023. Calculating the baseline and establishing a system of production and consumption allowances is left to EPA to promulgate by rule.

Recently, the EPA issued a proposed rule to calculate the baselines and establish production and allowance mechanisms. Under this proposal, the EPA would establish an allowance system for the production and consumption of HFCs modeled on its prior success drawing down CFCs. In this, the EPA would use exchange value equivalents (EVe) which is the exchange value assigned by Congress specific to each HFC—these exchange values match the 100-year GWP for each gas established by the Intergovernmental Panel on Climate Change—multiplied by the weight of the pure gas. To illustrate, 1 kg of HFC-23, exchange value of 14,800, is 14,800 kgEVe or 14.8 MTEVe (metric tons of EVe) whereas 1 kg of HFC-143 (exchange value of 353) is only 0.353 MTEVe.

The formulas to calculate the production and consumption baselines are provided by statute: 2011-2013 HFC production levels weighted by exchange value plus 15% of the 1989 HCFC EV-weighted production and 0.42% of the 1989 CFC EV-weighted production level. EPA has already incidentally collected most of these values and estimates a baseline production allowance of 375 million MTEVe (MMTEVe) and 299 MMTEVe for consumption, to be reduced according to the schedule provided by the AIM Act.

By issuing allowances denominated in MTEVe, EPA's proposal would provide market flexibility in meeting these drawdown targets. The EPA indicates it is on schedule to issue the allowances for 2022 by October 1, 2021. But that's not fast enough for some—a coalition of state and local governments petitioned EPA for rulemaking on July 15 seeking more aggressive action against HFCs.

In the petition, a coalition led by the State of California and the California Air Resources Board (CARB) asks EPA to use its new authority under the AIM Act to reinstate its prior attempt at regulating HFCs under Section 612/SNAP, an effort which had previously been rejected by the courts in Mexichem Fluor, Inc. v. EPA, 866 F.3d 451 (D.C. Cir. 2017). CARB also seeks to have the EPA promulgate additional regulations modeled on CARB's own and to reinstate the refrigerant management requirements for HFCs that were previously part of EPA's regulations under the Clean Air Act's Section 608 Refrigerant Management Program. Several industry participants and trade groups have filed similar petitions,

seeking a streamlined approach to HFCs between the EPA and CARB. EPA has not yet responded.

California's petition joins a growing chorus of private and government voices seeking to aggressively move away from HFCs and it complements a growing body of state regulation. California and CARB have already adopted regulations to manage HFC emissions in refrigeration and foam end-uses and are currently considering additional rules. California is joined by Maine, Washington, Virginia, Delaware, Massachusetts, Maryland, and more.

We can expect that this is only the tip of the iceberg for HFCs. As the climate continues to worsen and extreme weather becomes the norm, pressure to address HFCs and other greenhouse gas emissions will only mount. Squire Patton Boggs will continue to monitor EPA's enforcement of the AIM Act and state and federal regulation of HFCs.

The National Law Review, Volume XI, Number 221, 2 August 2021

Image: National Law Review website

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13. GreenChill webinar: Lessons Learned – Successfully Using Hydrofluoroolefin (HFO) Refrigerant Blends for Retrofits in Cold Chain Applications

24 August 2021 from 2 – 3 PM ET.

Representatives from two GreenChill refrigerant producer partners, Honeywell and Chemours, will discuss how to successfully use HFO refrigerant blends in retrofits for cold chain applications.

This webinar will cover topics such as conversion guidelines, performance, energy results, and key lessons learned.

Microsoft Teams meeting - Join on your computer or mobile app - **Click here to join the meeting**

Or call in (audio only) - **+1 202-991-0477,,769435869#** United States, Washington DC Phone Conference ID: 769 435 869# - **Find a local number** | **Reset PIN**

The US Environmental Protection Agency (US EPA), August 2021

Image: US EPA GreenChill website

EUROPE & CENTRAL ASIA

14. Q&A: We need to think differently about how we cool things down

European Commission

HORIZON
The EU Research & Innovation Magazine

Q&A: We need to think differently about how we cool things down

11 August 2021

by *Richard Gray*

Cold chains are dependent on industry but governments need to see them as crucial for a resilient society and meeting climate and sustainable development goals, says Prof. Toby Peters. Image credit - ICARDA, licensed under CC BY-NC-ND 2.0

The ability to keep food, medicines, vaccines, and our buildings cool underpins much of our modern way of life, but it is also a major source of greenhouse gas emissions.

If the world is to meet its development goals and climate change targets over the coming decades, we need to rethink how we keep things cold, says Professor Toby Peters, an expert in the cold economy at the University of Birmingham in the UK.

What is the 'cold chain' and why is it important?

Vaccines and medicines in hospitals, along with much of the food we buy from supermarkets, get to these places through a long logistics chain that is temperature controlled. It is not just cold storage, but all of the elements – from a farm, for example, right through to the refrigerator in our homes – and how they work together seamlessly to keep food fresh. As soon as food is harvested, it is essentially dying, so keeping it cool helps to slow down that process. I found it very concerning when everyone was talking about developing vaccines against Covid-19 in February and March 2020, but no one was talking about how to deliver it and keep it cold.

What are the consequences of an inadequate cold chain?

In Africa and India about 25% of vaccines are lost due to broken cold chains. There is no point having expensive temperature-controlled processes to deliver a vaccine when for the final couple of miles to a clinic, it is put in a bag on the back of a bike, and it spoils. All that effort and energy earlier in the chain is wasted. When we are talking about the kind of volumes needed for the Covid-19 vaccinations, 25% is pretty important. Likewise, in Africa, they can lose 40% of food due to inadequate cold chains.

What are the problems that you think need to be fixed?

The real challenge is how do we ensure cold chains are resilient while also meeting the net-zero targets on carbon emissions needed to tackle climate change? The cold chain today

is very dependent on diesel and fossil fuels to drive the cooling demand of a warehouse and in the vehicles moving everything around. And while the diesel engines that drive refrigerated trucks have to meet stringent emissions standards in Europe, the refrigeration unit on the back also runs on diesel and is relatively unregulated by comparison. Yet it accounts for about 12%-20% of the energy consumption of that vehicle, and six times more nitrogen oxide emissions and 29 times more particulate matter than the engine pulling it around.

There is actually little really good data about what the direct emissions of the cold chain are, and that is part of what my colleagues and I are trying to understand through our research. But (emissions) exist on a number of levels. Food wastage is a huge source of unnecessary emissions. About 1.3 billion tonnes of edible food is lost or wasted each year – think of all the resources that went into producing and transporting that. It is responsible for about 4.4 gigatonnes of carbon dioxide each year, and around 1 gigatonne of that is due to a lack of cold chain. In the developing world, this is a particular cause of food loss.

How is the demand for cooling likely to rise in the future?

Cooling currently accounts for about 7% of global greenhouse gas emissions. As many parts of the world become wealthier, that is being accompanied by a massive, rapid growth in demand for air conditioning and refrigeration. At the same time, as global temperatures increase due to climate change, there is going to be more and more need for cooling. And it is not something we can do without, as without it we lose food, we lose productivity when it is too hot. Even cows produce less milk when they overheat, so need to be kept in air-conditioned facilities in some parts of the world.

What's the solution?

It is going to need a different way of thinking. Generally, when we talk about green energy, we mean electricity. But cooling is really a thermal energy issue – we don't necessarily need to convert energy to electricity to cool things down. What is the point of charging up a battery with solar energy to run a fridge through the night, when you can just freeze a block of ice and use that to keep your fridge cool?

There are large amounts of low-grade waste heat from industry, for example, that could be used to enhance cooling with the help of absorption chillers (which refrigerate through a sudden change of pressure, driven by heat).

Refrigeration units also produce a lot of heat out of the back end, and that could be used to provide hot water and heating for nearby buildings. Buildings and systems can also be designed better to mitigate the need for cooling. A good example of this is a project in Africa set up by a drone company called Zipline to deliver blood to rural clinics. They have a central warehouse where they store the blood, it is taken out of the chiller, put into an insulated pack, and flown to the location in 20 minutes and parachuted down. It has negated the need for refrigerated transport vehicles to be driving along the uneven roads for hours.

It is about changing the way our systems work and this is what is known as the cold economy – making the cooling systems and business models we use as efficient as possible.

So how might the cold economy work?

What is important to remember here is that there isn't going to be a single panacea solution. We are going to need a portfolio of solutions that have strengths and weaknesses spending on their use. Running refrigerated transport on batteries, for example, isn't necessarily the optimum solution.

One alternative is to use liquid air. I am one of the co-inventors of liquid air energy storage, which means renewable energy can be used to cool air to the point where it turns into a liquid and is currently used as large-scale energy storage. When you expose the liquid air to ambient temperatures again, you get a rapid expansion, producing a high-pressure gas that can drive a turbine or a piston in an engine. The cold can also be cycled back to the liquidation end to increase efficiency.

If you were to put this into something like a transport refrigeration unit (as a Dearman engine that uses the expanding gas to move a piston), you can use the liquid air to drive the vehicle, harnessing the cold and power to keep the stuff in the back cool. This is something we have been exploring as part of the CryoHub project, which is led by Professor Judith Evans at London South Bank University.

What are you hoping to do with CryoHub?

The aim is to put liquid air energy storage to work in a supermarket refrigerated warehouse, so CryoHub was investigating the potential to do this on a large scale. It installed a demonstrator at a cold storage warehouse in Lommel, Belgium, and that is now being tested to see how it performs. But if it is successful, there are more than 1,000 sites across the EU and UK that could have a system like this integrated into their cold storage warehouses.

Are there things that could be done more immediately?

We could take the example of liquid natural gas – the gas is taken out of the ground, cooled to -162°C to make it easier to transport and then shipped around the world. When it reaches its destination, it is heated again (to turn it back into gas), and all that cold is discarded into the sea. We are theoretically throwing away billions of Euros (worth) of cooling, as well as burning fossil fuels to create electricity to drive cooling systems. We could use that cold by transferring it to other cooling systems (in warehouses or data centres) or use it to create district cooling systems (where cold is piped into homes in a nearby community) and so reduce the demand for electricity to run air conditioners.

What's stopping us?

It's not all about the technology. A lot of it is about behaviour and the way cooling is approached. One of the biggest problems is getting all parts of the system working together so that temperature management is seamless. For food, it has to work from the field, to the packhouse, to the retailer and into our homes.

But we are also facing a lack of skills and training in many parts of the world. By simply cleaning and maintaining existing refrigeration systems, we could often deliver a 25% increase in energy efficiency (compared to unmaintained equipment). And as we move

towards more cooling to meet demand and new types of systems, we are going to need more skilled people able to manage the new technologies.

Governments are also going to need to start thinking about how they can build more integrated and resilient cold chains. At the moment it is mainly left up to industry and most people are largely blind to the cold chain despite how important it is for a resilient society.

What impact could a better cold economy have?

For me, the reason why this is really important is when you think about the three big goals the world has set itself. There are the UN Sustainable Development Goals, the Paris Agreement on climate change and the Montreal Protocol, along with the Kigali Amendment, on refrigerant use. The cold chain underpins all of them. If you want to feed the world, you need more resilient food supplies that can deliver food and reduce waste. Less waste means less water is being used and fewer resources, while farmers' incomes increase.

Equally, if you can keep medicines and vaccines at the right temperature up to the moment they are delivered, you can improve health. Then there is the impact of the cold chain on the climate – all the energy used and emissions that come from burning fossil fuels to keep them running. And finally, the refrigerants themselves are also potent greenhouse gases. If we want to meet these goals, then solving the problems of the cold chain is going to be essential.

HORIZON, The EU Research and Innovation Magazine, 11 August 2021, By Richard Gray
Image: European Commission website - Image credit - ICARDA, licensed under CC BY-NC-ND 2.0

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15. Refrigerant found amongst smuggled tobacco

BULGARIA: Customs officers from Burgas have found HFC refrigerant amongst an illegal shipment of cigarettes concealed in a truck from Turkey.

The driver, a Turkish citizen, presented customs officials with documents for the groupage goods transported from Iraq to Great Britain.

An inspection of the truck found the undeclared tobacco and 10 cylinders, totalling 50.1kg, of R134a, R404A, R407A and R410A not described in the customs documents.

The smuggled goods were seized, and the driver issued with two charges under the Bulgarian Customs Act – one for smuggling excise goods and the other for smuggling the refrigerant.

CoolingPost, 13 August 2021
Image: CoolingPost website

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16. RACHP Training Database goes

The RefNat4LIFE website recently launched an online training provider database which makes it possible to find just what you need, to help improve knowledge and skills regarding natural refrigerants.

There are many opportunities of online courses in various languages as well as physical trainings all over Europe, from introductory classes to dedicated hydrocarbon or CO_2 refrigeration courses.

Click here to find the right course / Lean more.

Refrigerants, Naturally! for LIFE (RefNat4LIFE)
Image: RefNat4LIFE

FEATURED

OZONE SECRETARIAT

[Overview for the meetings of the ozone treaties in 2021]

67th IMPCOM
Online meeting, | 20 - 21 Oct 2021

12th COP (part I) – 32nd MOP Bureau
Online meeting, | 22 Oct 2021

12th COP (part II) – 33rd MOP
Online meeting, | 23 - 29 Oct 2021

Click here for past and upcoming Montreal Protocol Meetings Dates and Venue.

The UN Environment Assessment Panels

The Assessment Panels have been vital components of ozone protection since the Montreal Protocol was first established. They support parties with scientific, technological, and financial information in order to reach decisions about ozone layer protection and they play a critical role in ensuring the Protocol achieves its mandate. The Assessment Panels were first agreed in 1988 to assess various direct and indirect impacts on the ozone layer. The original three panels are:

- **The Technology and Economic Assessment Panel**
- **The Scientific Assessment Panel**
- **The Environmental Effects Assessment Panel**

In the past there were 4 main panels. The Panels for Technology and Economic Assessments were merged in 1990 into one Panel, now called the Technology and Economic Assessment Panel.
Why are the three current panels important to ozone layer protection? Each carries out assessment in its respective field. Every four years, the key findings of all panels are consolidated in a synthesis report. **Learn more** >>>

World Ozone Day 2021

celebrating the Montreal Protocol that is:

Keeping us, our food and vaccines cool

THE MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL

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

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

  The present document consists of the following two parts:

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

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

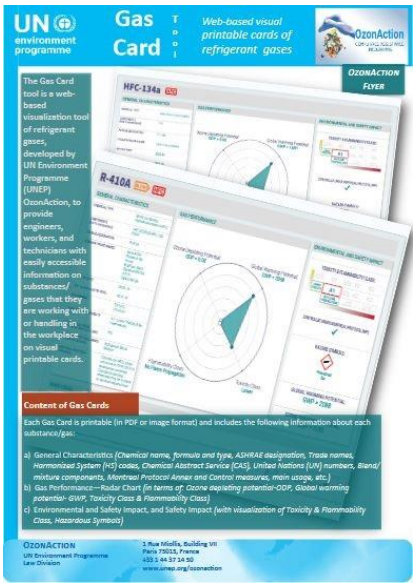
- Click here for the Executive Committee upcoming and past Meetings and related documents..
- **Executive Committee Primer – 2020** - An introduction to the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol.

OzonAction

OzonAction Compliance Assistance Programme produces and outreaches a wide variety of information and capacity building materials and tools that support the implementation of the Montreal Protocol programs and assist Article-5 countries in meeting the compliance targets. These include publications, technology briefs and factsheets, mobile applications, videos, e-Learning, modelling and database programs and special educational or certification programs.

The section below features several of our most recent products.
Visit **OzonAction website** for more information, discover the entire range of products.

Images in this section are by OzonAction

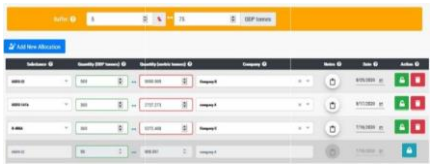


Gas Card Tool: Web-based Visual Printable Cards of Refrigerant Gases developed by the UN Environment Programme (UNEP) OzonAction, to provide engineers, workers, and technicians with easily accessible information on substances/ gases that they are working with or handling in the workplace on visual printable cards.
Content of Gas Cards - Each Gas Card is printable (in PDF or image format) and includes the following information about each substance/gas: a) General Characteristics (Chemical name, formula and type, ASHRAE designation, Trade names, Harmonized System (HS) codes, Chemical Abstract Service (CAS), United Nations (UN) numbers, Blend/ mixture components, Montreal Protocol Annex and Control measures, main usage, etc.) b) Gas Performance—Radar Chart (in terms of: Ozone depleting potential-ODP, Global warming potential- GWP, Toxicity Class & Flammability Class) c) Environmental and Safety Impact, and Safety Impact (with visualization of Toxicity & Flammability Class, Hazardous Symbols).
More Information - The Gas Card web-based tool is part of UNEP OzonAction's portfolio of activities and tools to assist various stakeholders in developing countries, including customs officers and technicians, to achieve and maintain compliance with the Montreal Protocol on Substances the Deplete the Ozone Layer. In the left navigation bar of the Gas Card tool web page, you will find a list of commonly used HFCs and HFC Blends in different sectors.*

Using the Gas Gard web-based tool

- The Gas Gard tool is available online on the **OzonAction website**
- Read the full **2021 annual iPIC report**
- See the **flyer** introducing the new iPIC platform

* Based on the Overall Analysis of the Results of the Survey of ODS Alternatives Report (conducted in 119 countries from 2012 to 2015)



HCFC Quota and Licence Tracker - UNEP OzonAction launches a new desktop application to assist with HCFC licences and quotas - National Ozone Officers have the great responsibility of managing the allocation and monitoring of quotas for substances controlled under the Montreal Protocol. This process can be complex with many importers, especially if the country imports a range of different hydrochlorofluorocarbons (HCFCs) and mixtures containing

HCFCs. To address this challenge, OzonAction developed a new desktop application that helps Ozone Officers with the tasks of planning, calculating, monitoring and managing consumption quotas and licences. It can be used on a daily basis to track and manage the current year's quota allocations for different importers, or for future planning by trying different scenarios that adjust the type of substances imported, their quantity, or the number of importers. The HCFC Quota and Licence Tracker allows Ozone Officers to see the effect of such scenarios on the national HCFC consumption and helps ensure that the quotas stay within agreed HCFC Phase-out Management Plan (HPMP) targets. For countries that have ratified the Kigali Amendment, in the future OzonAction will extend the tracker to include hydrofluorocarbons (HFCs) once countries begin designing their quota systems for those controlled substances.

Access the:

- **HCFC Quota tracker app**
- **Flyer for more information on the tracker**
- **Short video tutorial on the OzonAction YouTube Channel**

GWP-ODP Calculator Application - Updated

"Quickly, efficiently and accurately convert between values in metric tonnes, ODP tonnes and CO_2-equivalent tonnes"

Data are extremely important for the Montreal Protocol community, and the data reporting formats for both A7 and CP have changed recently, to a large degree triggered by the Kigali Amendment. HFCs, blends, CO_2-equivalent values, etc, now have to be addressed much more frequently by Ozone Officers during their daily work. Sometimes the terminology and values are complex and can be confusing, and it helps to have it all the official facts and figures in one place. Conversion formulas need to be applied to calculate CO_2-eq values from both GWP and metric tonne values. This free app from OzonAction is a practical tool for Ozone Officers to help demystify some of this process and put frequently needed information at their fingertips.

What's new in the app:

- An updated more user-friendly interface
- Multilingual interface: English, French, and Spanish
- A new Kigali Amendment mode - in this mode the GWP values used to calculate the refrigerant blends/mixtures only include GWP contributions from components that are controlled HFCs
- Latest updated ODP and GWP values from the recent reports from the Montreal Protocol technology and scientific expert panels as well as the Intergovernmental Panel on Climate Change (IPCC) reports

- References added for sources of all values
- New refrigerant mixtures (with ASHRAE -approved refrigerant designations)

The new and updated UNEP OzonAction **GWP-ODP Calculator** application will help you to convert between values in metric tonnes, ozone depleting potential (ODP) tonnes and CO_2-equivalent tonnes of substances controlled by the Montreal Protocol and their alternatives.

This application, available at no cost, is particularly useful for National Ozone Officers to assist with understanding and calculating quantities of controlled substances, both pure substances and mixtures, for quota assignment, reporting requirements, etc. Other stakeholders interested in ODP and global warming potential (GWP) values of controlled substances and their alternatives will also find this tool useful.

Operation of the application is very simple — just select a substance from the dropdown list and enter the known value in the appropriate field; the calculator will automatically perform the conversion between metric tonnes, ODP tonnes and/or CO_2-equivalent tonnes and display the corresponding converted values. The ODP, GWP and information about the substance is provided. For mixtures, the components of the mixture and their relative proportions (metric, ODP, CO_2- equivalent tonnes) are also calculated.

The updated **GWP-ODP Calculator** application now includes a new Kigali Amendment mode. The app can now be used in two different modes: the regular "Actual Values" mode and the "Kigali Amendment" mode. In the Kigali Amendment mode, the GWP values provided are those specified in the Kigali Amendment to the Montreal Protocol, i.e., GWP values are only assigned to controlled HFCs. In this mode the GWP values used to calculate the refrigerant blends/mixtures only include GWP contributions from components that are controlled HFCs. The user can effortlessly switch between modes.

The OzonAction GWP-ODP Calculator uses standard ODP values and GWP values as specified in the text of the Montreal Protocol to make the conversions. Other ODP and GWP values from the recent reports of the Montreal Protocol Technology and Economic Assessment Panel and Scientific Assessment Panel as well as the Intergovernmental Panel on Climate Change (IPCC) are used when appropriate, with references to sources of all values used. The app includes new refrigerant mixtures (with ASHRAE- approved refrigerant designations).
This application is designed primarily for use by Montreal Protocol National Ozone Units and other related stakeholders. The application was produced by UN Environment Programme (UNEP) OzonAction as a tool principally for developing countries to assist them in meeting their reporting and other commitments under the Protocol and is part of the OzonAction work programme under the Multilateral Fund for the Implementation of the Montreal Protocol.

If you already have the application installed on your device, be sure to update to benefit from the new features. The app can be viewed in English, French or Spanish.

Smartphone Application: Just search for “GWP-ODP Calculator” or UNEP in the Google Play store or use the QR code – free to download! If you already have the application installed on your device, be sure to update to benefit from the new features.

Desktop Application: GWP-ODP Calculator is also available online on the OzonAction **website**

Watch the new short introductory tutorial video on the GWP-ODP Calculator - available now on **YouTube**

>>> Read/download the **flyer** for more information

OzonAction WhatGas? Updated

New features:
- An updated more user-friendly interface
- Multilingual interface: English, French and Spanish
- HFCs and HFC containing mixtures
- Latest updated ozone depleting potential and global warming potential values from the recent reports from the Montreal Protocol technology and scientific expert panels as well as the Intergovernmental Panel on Climate Change; as well as the standard ODP and GWP values as specified in the text of the Montreal Protocol
- References to sources of all values used
- New refrigerant mixtures (with ASHRAE approved refrigerant designations)
- Values for ‘actual GWP’ and ‘Kigali Amendment context’ GWP for pure substances and mixtures (i.e. only including GWP values/components assigned to controlled hydrofluorocarbons - HFCs).

The WhatGas? application is an information and identification tool for refrigerant gases: ozone depleting substances (ODS), HFCs and other alternatives. It is intended to provide a number of stakeholders, including Montreal Protocol National Ozone Officers, customs officers, and refrigeration and air-conditioning technicians with a modern, easy-to-use tool that can be accessed via mobile devices or the OzonAction website to facilitate work in the field, when dealing with or inspecting ODS and alternatives, and as a useful reference tool. If the user requires additional information or assistance in identifying a refrigerant gas they are inspecting or that is described in the relevant paperwork, this can be easily obtained by consulting the application.

Using the application:

If you already have the application installed on your device, be sure to update to benefit from the new features.

Smartphone Application: Just search for “WhatGas?” or UNEP in the Google Play store or use the QR code – free to download!

Desktop Application: WhatGas? is also available online on the OzonAction **website**

For more information: Watch the new short introductory tutorial **video** on WhatGas? available on **YouTube**

See/download the **WhatGas? flyer**

Over 10,000 installations on Android and iOS devices to date!

RAC Technician Videos - Full length films!

Two ‘full length’ videos for refrigeration and air-conditioning (RAC) sector servicing technicians: on 1) Techniques, Safety and Best Practice and 2) Flammable Refrigerant Safety.

The OzonAction Refrigeration and Air-Conditioning Technician Video Series consists of instructional videos on techniques, security and best practice and flammable refrigerant safety. They are intended to serve as a complementary training tool RAC sector servicing technicians to help them revise and retain the skills they have acquired during hands-on training. The videos are not intended to replace structured formal technician training, but to supplement and provide some revision of tips and skills and to build on training already undertaken.

These videos are based on the successful UNEP OzonAction smartphone application, the RAC Technician Video Series app. This application has been downloaded on more than 86,000 devices since its launch.

Following many requests to make the videos more versatile and better suited to classroom and training settings, OzonAction has responded to this demand and produced two ‘full-length’ instructional videos.

You may wish to share this message and the flyer with:

- Your national/regional RAC associations
- Training or vocational institutes
- Master RAC trainers in your country
- Any other interested national stakeholders

You can watch these videos on the OzonAction YouTube Channel:

- **Techniques, Safety and Best Practice**
- **Flammable Refrigerant Safety**

The videos are also available for download by request from UNEP OzonAction: unep-ozonaction@un.org

If you prefer to access the video clips via the OzonAction smartphone application, just search for "RAC Technician Video Series" or UNEP in the Google Play Store and iTunes/App Store or scan the QR code –Free to download!

The flyer is available from the **OzonAction website**.

Refrigerant Cylinder Colours: What has Changed

A new UNEP OzonAction factsheet on the new AHRI revised guideline on a major change to refrigerant cylinder colours

One of the ways in which refrigeration cylinders are quickly identified is by cylinder colour. Although there was never a truly globally-adopted international standard, the guideline from the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) although not required by law was used by the vast majority of industry and chemical producers around the world.

An AHRI revised guideline, first published in 2015, now removes paint colour assignments for refrigerant containers and specifies that all refrigerant containers should have the same paint colour from 2020 onwards.

NOOs and technicians should be aware of this change and inform national stakeholders, as well as familiarising themselves with relevant container labels and markings for refrigerants.

Read/download the **factsheet**

Update on **new refrigerants designations and safety classifications**

The latest version of the factsheet providing up to date information on refrigerant designations and safety classifications is now available (September 2020 update).

The factsheet, produced by ASHRAE in cooperation with UN Environment Programme OzonAction is updated every 6 months.

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

Read/download the factsheet

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

Contact: Ayman Eltalouny, OzonAction, UN Environment Programme

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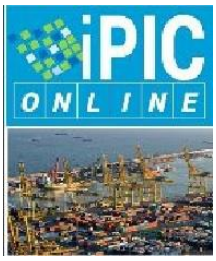
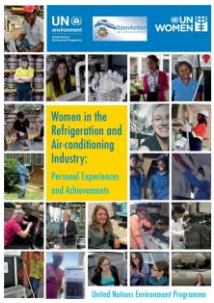
OzonAction's iPIC platform - Updated



Collaboration between China and Thailand using OzonAction's informal Prior Informed Consent (iPIC) system has resulted in the prevention of a huge consignment of ozone-depleting and climate damaging hydrochlorofluoro-carbons (HCFCs).

Those chemicals, which are primarily used as refrigerants for air conditioners and fridges, are controlled under the Montreal Protocol on Substances that Deplete the Ozone Layer and are being phased out by all countries according to a specific timeline.

Women in the refrigeration and air-conditioning industry: Personal experiences and achievements



The United Nations Environment Programme's (UNEP), OzonAction, in cooperation with UN Women, has compiled this booklet to raise awareness of the opportunities available to women and to highlight the particular experiences and examples of women working in the sector and to recognise their successes.

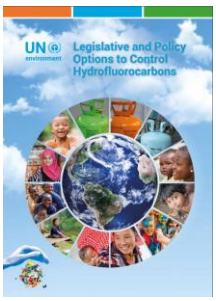
All of the professionals presented in the booklet are pioneers. They

are role models whose stories should inspire a new generation of young women to enter the weld and follow in their footsteps.

Read/download the **publication**

PUBLICATIONS

Legislative and Policy Options to Control Hydrofluorocarbons



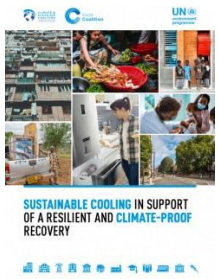
In order to follow and facilitate the HFC phase-down schedules contained in the Kigali Amendment, the Parties, including both developed and developing countries, will have to implement certain measures.

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

Read/download

Latest issue of Centro Studi Galileo magazine, Industria & Formazione, **n. 450 - 2021** (in Italian).

Sustainable Cooling in support of a Resilient and Climate Proof Recovery, Report by the Climate and Clean Air Coalition (CCAC), 2021.



Solar Cooling (2020), 40th Informatory Note on Refrigeration Technologies. Summary - Solar cooling is a promising and environmentally friendly technology that can help meet the growing global demand for space cooling. Solar cooling can be achieved by various technologies. The two main commercial options are photovoltaic (PV)-driven vapour compression chillers and heat-driven cooling machines powered by solar collectors. Thermal cooling equipment can be coupled with various types of solar collectors with different efficiencies and costs. Overall system efficiencies of PV-driven and solar thermal-driven plants may not have such different values. Economic analysis indicates that the investment cost for the PV solution is at least half that of other systems. Solar cooling may have a very positive environmental impact by reducing the use of fossil fuels, and the technology may be considered mature to compete with conventional cooling equipment.

* This Informatory Note is an update of a previous version published in April 2017. It was prepared by Renato Lazzarin (President of IIR Section E).

A Summary for policy makers - Solar Cooling 2020 is **available** in English and French languages.

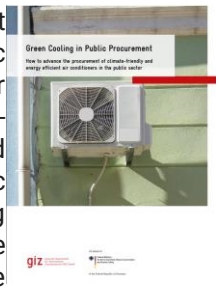
International Institute of Refrigeration, March 2021

Leaks, maintenance and emissions: Refrigeration and air conditioning equipment report details common faults identified in both residential and commercial refrigeration and air conditioning equipment. The report also lists the impacts of these faults and how routine maintenance of the equipment has the potential to significantly reduce electricity use, refrigerant leaks and emissions.

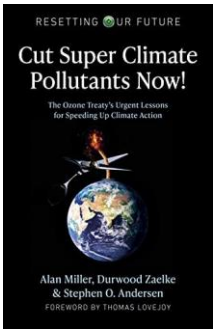
The research was supported by an extensive survey of international and domestic literature included as Appendix B to the report.

Australian Government, Department of Agriculture, Water and the Environment, Expert Group, 2021

Green Cooling in public procurement How to advance the procurement of climate-friendly and energy-efficient cooling equipment in the public sector? Air conditioning in public buildings is often responsible for around 50% of total electricity consumption. Switching to climate-friendly cooling technologies ("Green Cooling") can reduce costs and energy consumption and improve the carbon footprint of public buildings. This study takes a closer look at the benefits of Green Cooling in the public sector and discusses current barriers and possible solutions. The information presented provides a solid basis to revise current procurement criteria for sustainable cooling systems in public buildings. Read/Download the **study**



Cut Super Climate Pollutants Now!: The Ozone Treaty's Urgent Lessons for Speeding Up Climate Action (Resetting Our Future). We have a decade or less to radically slow global warming before we risk hitting irreversible tipping points that will lock in catastrophic climate change. The good news is that we know how to slow global warming enough to avert disaster. Cut Super Climate Pollutants Now! explains how a 10-year sprint to cut short-lived "super climate pollutants" -- primarily HFC refrigerants, black carbon (soot), and methane -- can cut the rate of global warming in half, so we can stay in the race to net zero climate emissions by 2050.



Authors: Alan Miller, Durwood Zaelke, Stephen O. Andersen.

MISCELLANEOUS

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

The United Nations Environment Programme, OzonAction, in collaboration with Marco Gonzalez and Stephen O. Andersen are updating and expanding the "Montreal Protocol Who's Who".

We invite you to submit your nomination*, and/or nominate Ozone Layer Champion(s). **The short profile should reflect the nominee's valuable work related to the Montreal Protocol and ozone layer protection.**

Please notify and nominate worthy candidates through the **on-line form**.

We look forward to receiving your nomination(s), and please feel free to contact our team for any further assistance concerning your nomination.

Take this opportunity to raise the profile of women and men who made an important contribution to the Montreal Protocol success and ozone layer protection.

- View the «Montreal Protocol Who's Who» **Introductory video**
- Contact : **Samira Korban-de Gobert,** UN Environment Programme, OzonAction

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

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R744.

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R744.com

Originally established in 2006, the new and improved **R744.com** offers a trusted source for the latest CO_2 products, services and news from around the world with a key feature being the new marketplace. In addition to the latest CO_2 news and information about the site's partners, the users can browse available products, and filter for a wide variety of criteria, including components and services. It is also possible to narrow your search to include only products available in your home region. **Watch this space!**

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