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GLOBAL

1. Combating the illegal trade of substances that impact ozone layer recovery and fuel climate warming

For over thirty years, parties to the Montreal Protocol, a multilateral environmental agreement (MEA), have controlled man-made chemicals used largely in refrigeration and air-conditioning that were destroying the ozone layer. Without these controls, increasing levels of harmful ultraviolet radiation would have reached Earth, damaging human and planetary health.

The vigilance has paid off, with over 99 per cent of ozone-depleting substances (ODS) banned, and the ozone hole now repairing itself. However, an increasingly limited supply of these chemicals, some of which are still widely used, creates a potentially lucrative black market prompting a number of unscrupulous individuals and companies to trade these illegally. This can be due to numerous reasons such as continued demand, high profit margins and the low risk of being prosecuted. Use and continued emissions of these controlled substances not only undermines ozone layer recovery, but also the environment, as many are also potent climate warming gases contributing to climate warming.

To combat the threat of illegal trade, the Montreal Protocol has put in place safeguards such as the requirement for its parties to establish export and import licensing systems to monitor movement of refrigerants domestically and internationally. The parties to the Protocol are also requested to voluntarily report on any cases of illegal trade intercepted at their borders to share information with each other on practices used by national authorities to detect and prevent illegal trade. In 2023, the parties held a workshop organized by the Protocol's Secretariat to assess, as well the challenges and successes of enforcement and reporting to date.

Effective border controls

During a workshop on strengthening effective implementation and enforcement of the Montreal Protocol convened in 2023 for the parties, one of the key points addressed was the scale and scope of the global illegal trade in controlled substances. The export, import, and re-export of goods may take place within free trade zones, as part of trans-shipments with an intermediate destination, or across territorial borders with very little monitoring or customs control. The extent of such illegal trade is generally unknown but widely believed to go beyond the cases reported by the parties.

To support country-standard border controls, customs authorities also cooperate with their environmental counterparts deploy various methods to detect and intercept attempts to illegally move substances, including risk profiling, document inspection and random checks at the border. The informal prior informed consent (iPIC) mechanism of OzonAction and the World Customs Organization (WCO) Advance Cargo Information Systems have emerged as important ways to prevent such trade. Collaboration with industry helps to get useful insight and intelligence on the market situation and potentially fraudulent activities. These examples indicate that addressing the issue requires a multifaceted approach. Training and capacity building of customs and border officials and trans-boundary and border authority collaboration also need to be part of this framework approach.

More punitive measures can also be invoked by parties in cases of non-compliance when the required license is lacking, for example, or the allocated quota has been exceeded. All measures not only help combat illegal trade but also help prevent it by better informing stakeholders, who are often not fully aware of the processes and procedures. Public information of the national measures to control the production and consumption of controlled substances also help promote awareness, compliance and create a culture of compliance.

Building better together

Synergies and information sharing to build on lessons learned and experiences relating to trade between different MEAs such as the Basel, Rotterdam and Stockholm Conventions, the Minamata Convention on Mercury and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) help create a more coordinated approach. Training

programmes and workshops targeting customs and border control officers, such as UNEP's Green Customs Initiative or World Customs CLiKC Platform promote capacity building and improved interception rates.

As long as the demand for substances monitored or banned under the Montreal Protocol remains, trading beyond quotas or illegal trafficking across borders could also remain. The overarching consensus of the parties noted that prevention and combatting of the illegal trade in controlled substances require a strategic "whole-of-government-approach" that involves the mobilization and effective collaboration of different agencies and industry stakeholders, both domestically, regionally and internationally in pursuit of a common objective.

About the Montreal Protocol

The Montreal Protocol on Substances that Deplete the Ozone Layer is one of the most successful multilateral environment agreement (MEA) to date. It is a global protecting the Earth's ozone layer by phasing out the chemicals that deplete it. Thanks to the collaborative effort of nations around the world, the ozone layer is well on its way to recovery.

The parties to the Protocol meet once a year to make decisions aimed at ensuring the successful implementation of the agreement. These include adjusting or amending the Protocol; most recently the Kigali Amendment to address hydrofluorocarbons (HFCs) used in cooling equipment.

HFCs were used as replacements for ozone-depleting substances eliminated by the original Montreal Protocol. Although they do not deplete the ozone layer, they are powerful greenhouse gases contributing to climate change. Countries that ratify the Amendment commit to phasing down HFCs which could reduce temperatures by 0.5°C by 2100. If combined with the conversion of equipment to become more energy efficient, these gains could potentially double during the same time.

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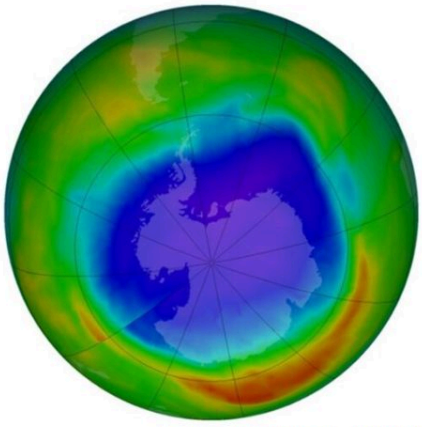
Source/Image: UNEP Ozone Secretariat, 24 January 2025

2. Whatever Happened to the Hole in the Ozone Layer

The ozone hole was a hot-button issue in the 1980s, so why don't we hear about it anymore?



False color view of total ozone over the Antarctic pole. Purple and blue represent areas where there is the least ozone, yellows and reds where there is more ozone. (NASA Ozone Hole Watch)

In 1930, Thomas Midgley Jr., a mechanical engineer at General Motors, inhaled a lungful of chlorofluorocarbons (CFCs) and promptly blew out a candle. His experiment was an effort to show the American Chemical Society the safety of his new invention, a gaseous compound of chlorine, fluorine, hydrogen, and carbon that was an alternative to previous, toxic refrigerant gases like ammonia and sulfur dioxide.

The emerging chemical was non-flammable, non-toxic, and would soon be in the homes of millions of American people.

That same year, General Motors and DuPont came together to create the Kinetic Chemical Company, a corporation that would produce Freon — a DuPont trade name for CFCs. By 1935, Frigidaire, General Motors, and DuPont had sold 8 million refrigerators that used Freon-12. Due to their non-toxicity, CFCs became so popular in refrigerators and air conditioning units that city governments all over the U.S. named Freon the only coolant allowed for use in public buildings.

By the 1950s and 1960s, CFCs were found in a wide array of products due to their versatility. Properties such as being non-flammable, non-explosive, and non-toxic to humans allowed for CFC use in everything from Styrofoam to cleaning products to propellant in aerosols. It was also a cheap method for air conditioning homes and offices. At their peak use, CFCs were raking in about a billion dollars a year in the U.S.

But then two chemists at the University of California discovered that when CFCs were exposed to UV radiation, they became a major inorganic source of chlorine in the stratosphere, and this excess chlorine was leading to the destruction of the ozone in the stratosphere.

Made up of a high concentration of ozone gas, or O3, the ozone layer is a region in the lower part of Earth's stratosphere, the second layer of Earth's atmosphere, and is responsible for protecting Earth from the strong ultraviolet radiation of the sun. Overexposure to UV radiation could lead to harmful effects for humans, such as skin cancer, weakened immune systems, and cataracts; it can also lead to reduced crop yield and food chain disturbances because of UV's harmful effects on plant tissues and enzymes.

These findings led scientists to determine that holes had been created in the ozone layer, and the situation was getting worse every year. Researchers discovered the hole was largest over the Antarctic region due to certain chemical reactions and cold temperatures. Antarctic temperatures are an important factor because polar stratospheric clouds form when the temperatures drop below -108° F (-78° C). The ice crystals in these clouds, alternatively known as *nacreous clouds*, provide a surface where chlorine and bromine become highly reactive, and nitrogen, which regulates chlorine's impact, is removed. When chlorine and bromine reach the ozone, they destroy its molecules; one chlorine atom can destroy over 100,000 ozone molecules, leaving holes in the ozone layer.

These effects made it clear: It would be crucial to regulate CFCs.

The phase-out of CFCs progressed swiftly, driven by widespread public awareness of the problem's severity. This awareness was rooted in the dynamic environmental movement thriving in the United States at the time. The public consensus for action, a result of concerns about air and water pollution, pushed President Nixon to establish the Environmental Protection Agency in 1970. Alongside the creation of the EPA, landmark legislation like the Clean Air and Clean Water Acts were passed, continuing the wave of environmental activism. While Nixon was signing bills, grassroots organizations such as Friends of the Earth and the Sierra Club launched their first major campaigns focusing on protecting the ozone layer. They promoted boycotts of products containing CFCs, such as Styrofoam and aerosol sprays, to rally public support These efforts not only raised awareness in the U.S. but also inspired civil groups globally to pressure governments and businesses into action.

While the global protest was important, collaboration from companies that produced CFCs and the development of alternative chemicals were also critical. Because a small group of

companies controlled global CFC production, it was easier to achieve agreement. The minor economic importance in combination with DuPont's investment in other chemicals set the tone for the rest of the industry and allowed for the alignment of industry and government interests.

The global movement ultimately led to the Vienna Convention for the Protection of the Ozone Layer, a convention calling for the reduction of ODS — ozone-depleting substances. The agreement was negotiated from 1981 to 1985 and serve d as a framework for the creation and signing of the Montreal Protocol in 1987. The Protocol, which was developed to advance the goals of the Vienna Convention, took effect in 1989. By 2008, it was the first and only U.N. environmental agreement to achieve universal ratification by 197 countries, every country in the U.N.

Since its establishment, around 99 percent of ozone-depleting substances have been phased out. In 1987, ozone-depleting substances hit a high of about 1.6 million tons of global emissions, with CFCs making up a little over one million tons. Now, global ODS emissions have dropped to nearly zero. While it's taken several decades to see substantial improvement, the ozone hole started to heal in 2000. In 2021, the hole over Antarctica was the seventh smallest since recovery started in 1992.

Though the success is largely due to global cooperation and collaboration, it is also a result of amendments to the Montreal Protocol in the wake of new risks. In 2016, after a meeting in Kigali, Rwanda, the protocol was amended to reduce the use of hydrofluorocarbons (HFCs), a quick-fix substitute for CFCs. Eight years later, the United States finally became the 137th country to ratify this amendment.

Though the Kigali Amendment highlights the substantial progress made, the ozone hole requires a long time and ongoing compliance with the Montreal Protocol to heal. This protocol and the international environmental negotiations that permitted it serve as a reminder that regulation and multinational action can address environmental threats with rapid success. Precautionary work through the use of consumer boycotts and other organizing methods can lead to cooperation from companies and an overall change in the public's consumer behavior. The UN Environment Programme predicts that, if we stay the course, the Artic ozone hole will close by 2045 and the Antarctic ozone hole will close by 2066.

Source: The Saturday Evening Post, by Grace Yanucci, 28 January 2025
Image: The Saturday Evening Post

3. As heat records fall, experts call for reductions in this often-overlooked greenhouse gas

Last week, several prominent scientific organizations confirmed what had been predicted for months: 2024 was the hottest year on record.

This sparked renewed calls for countries to rein in emissions of greenhouse gases, which superheat the planet and drive the climate crisis. Amid those pleas, experts urged nations not to forget about one often-overlooked gas: nitrous oxide.

The compound warms the planet hundreds of times faster than carbon dioxide and, at the same time, destroys the stratospheric ozone layer, the barrier which protects the planet from harmful solar radiation.

“Nitrous oxide is not as well known by the public as some other greenhouse gases, but it can be a remarkably destructive substance,” says Martina Otto, Head of Secretariat of the Climate and Clean Air Coalition, which is convened by the United Nations Environment Programme (UNEP). “The good news is that with strong policymaking and international cooperation, it is possible to slow emissions of this super pollutant – and save millions of lives around the world.”

Here is everything you need to know about the hidden perils of nitrous oxide and how humanity can curb its impact on the planet.

What is nitrous oxide?

Nitrous oxide is a molecule comprised of two nitrogen atoms and one oxygen atom. While it has long been used in medical settings as an anaesthetic colloquially known as laughing gas, at elevated levels, it’s a super-pollutant. Nitrous oxide traps heat in the atmosphere, contributing to climate change. It also breaks down the molecules that form the stratospheric ozone layer, which shields Earth from damaging ultraviolet radiation from the sun.

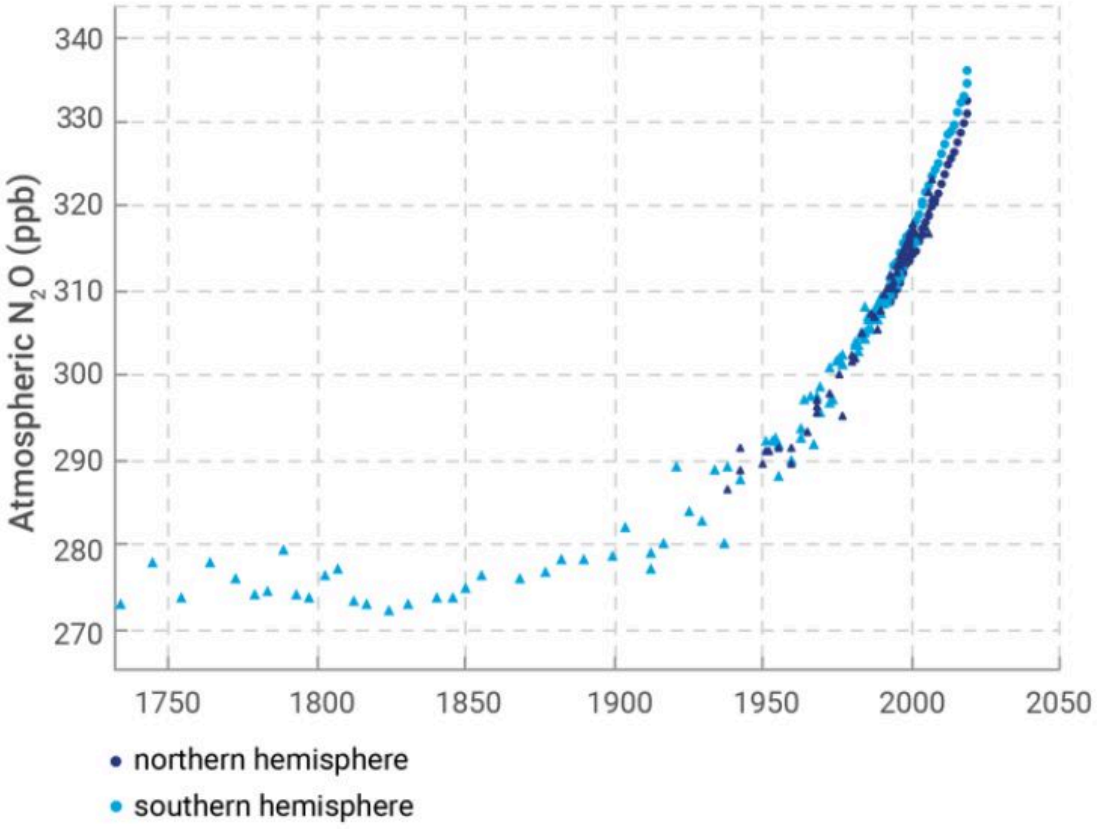
What are the main sources of nitrous oxide?

Nitrous oxide is part of the nitrogen cycle. It occurs naturally in soil and water when bacteria break down nitrogen through processes called nitrification and denitrification.

It is also common byproduct of agriculture. When too much nitrogen-based fertilizer is used on crops, nitrogen can leach out of the soil and into the broader environment, forming nitrous oxide. Some 75 per cent of human-made nitrous oxide emissions since 1980 have come from the farming sector. Industrial sources account for 5 per cent of human-caused releases, while the remaining 20 per cent comes from fossil fuel combustion, wastewater treatment and other sources.

Are nitrous oxide emissions rising?

Yes, and much faster that had been thought, found a report released last year by UNEP and the Food and Agriculture Organization (FAO) of the United Nations. More than 28 million tonnes of nitrous oxide were emitted in 2020, compared to 17 million tonnes in an average year before the industrial revolution. A key driver of this spike is the increased use of synthetic fertilizers to feed the world’s surging population, the report says.



The concentration of nitrous oxide in the atmosphere has skyrocketed during the last 70 years. Credit: UNEP

Where does nitrous oxide rank in the pantheon of greenhouse gases?

Nitrous oxide is the third-most prevalent human-produced greenhouse gas, behind carbon dioxide and methane. It has been responsible for around 10 per cent of global warming since the industrial revolution. While it remains in the atmosphere for around 120 years, about a tenth as long as carbon dioxide, it traps 270 times more heat per tonne than its fellow greenhouse gas. Nitrous oxide is also the most significant ozone-layer-depleting substance emitted today, not controlled by the Montreal Protocol, a global agreement to protect the ozone layer.

Why is nitrous oxide often overlooked compared to carbon dioxide and methane?

Carbon dioxide alone is responsible for more than half of the global warming we experience today. It also accumulates in the atmosphere, so it has been a focus of climate activists for decades. Methane, which is short-lived, is increasingly in the world's crosshairs because it is responsible for at least a third of current warming. It is also 80 times more potent than carbon dioxide in the first 20 years after its emission.

Compared to these two powerful greenhouse gases, tackling nitrous oxide has fallen through the cracks. But cutting emissions is vital to keeping alive the world's hopes of limiting global warming to 1.5°C above pre-industrial levels, a key target of the Paris Agreement, says David Kanter, co-chair of the UNEP-FAO report, the Global Nitrous Oxide Assessment.
"Only through addressing all three of these greenhouse gases do we stand a chance of staving off the most devastating effects of climate change, from extreme heat, to droughts, to more frequent and more intense storms," he said.

Some 75 per cent of human-made nitrous oxide emissions since 1980 have come from agriculture. Credit: China via AFP

How can countries reduce nitrous oxide emissions?

There are several ways. The quickest and most cost-effective solutions lie in eliminating nitrous oxide releases from the industrial sector. Using existing low-cost technologies, industry could slash its emissions by 2.5 billion tonnes of carbon dioxide equivalent by 2050.

In the agriculture sector, improving fertilizer management and better managing crops could limit nitrous oxide emissions without jeopardizing food security.

Importantly, nitrous oxide falls under the purview of several international environmental accords, including the Paris Agreement on climate change. So, ambitious countries can create reduction targets for nitrous oxide in their Nationally Determined Contributions and other climate plans.

Would this improve public health?

Yes. Measures to address nitrous oxide emissions would tackle other air pollutants, improving air quality and preventing deaths around the world. It would also protect the ozone layer, reducing the potential proliferation of skin cancers and cataracts.

The Sectoral Solution to the climate crisis

UNEP is at the forefront of supporting the Paris Agreement goal of keeping global temperature rise well below 2°C, and aiming for 1.5°C, compared to pre-industrial levels. To do this, UNEP has developed the Sectoral Solution, a roadmap to reducing emissions across sectors in line with the Paris Agreement commitments and in pursuit of climate stability. The six sectors identified are: energy; industry; agriculture and food; forests and land use; transport; and buildings and cities.

About the Climate and Clean Air Coalition

The UNEP-convened Climate and Clean Air Coalition is a partnership of over 190 governments, intergovernmental organizations, and non-governmental organizations. It works to reduce powerful super

pollutants that drive both climate change and air pollution. It connects ambitious agenda setting with targeted mitigation action within countries and sectors. Robust science and analysis underpin its efforts and bolstered by its Trust Fund, the CCAC has given rise to high-level political commitment, in-country support, and a range of tools that support the case for action and implementation.

Source/Images: UNEP, January 2025

4. Green Cooling Summit 2025: Sustainable Cooling and Heating in Buildings

Join our Green Cooling Summit 2025 on 20 and 21 May 2025 to discuss how solutions using natural refrigerants are beneficial for the environment, the climate, and the people. This year we are focusing on sustainable cooling and heating in buildings.

The worldwide demand for cooling in buildings is projected to triple by 2050, driving emissions to an alarming 6.1 billion tons of CO2 equivalent (Global Cooling Watch, UNEP, 2023). To avoid that, implementing sustainable cooling and heating solutions combined with passive building measures are essential. Join us on 20 and 21 May 2025 to discuss this topic. The virtual Summit jointly organized by the German Environment Agency (UBA(opens in a new window)) and GIZ Proklima on behalf of the German Federal Ministry for Environment, Nature Conversation, Nuclear Safety and Consumer Protection (BMUV(opens in a new window))will highlight how solutions using natural refrigerants are beneficial for the environment, the climate, and the people. It will demonstrate that these solutions are available and competitive, making them a future-proof option. We are looking forward to welcoming many of you to our Green Cooling Summit 2025!

More information will follow soon.

Source/Image: Green Cooling Initiative, January 2025

5. How the pact to protect the ozone layer is helping counter climate change

In 1985, three British scientists published a paper in the journal *Nature* that revealed there was a large hole in the ozone layer above the Antarctic. The research sent shockwaves around the world. The ozone layer shields the planet from the sun's harmful ultraviolet radiation and its loss would decimate life on Earth.

The crisis led to the Montreal Protocol, a landmark global agreement that has put the ozone layer on the path to recovery. But the Protocol also has the potential to do something else: slow climate change. By implementing its key obligations, countries could prevent what experts call a massive amount of global warming, key at a time when the planet's temperature is going through the roof.

"The Montreal Protocol has helped protect the world from the sun's deadly ultraviolet radiation," said Megumi Seki, Executive Secretary of the Ozone Secretariat administered by the United Nations Environment Programme (UNEP). "It is also helping us combat another catastrophe."

Here's a closer look at the Montreal Protocol and how it's countering climate change.

What exactly is the ozone layer?

Located 15–35 km above the Earth's surface, the ozone layer acts as a shield, protecting humans, animals and plants from harmful ultraviolet (UV) radiation from the sun, in particular UV-B. Without the ozone layer, the Earth would be a very different place: crops would fail, and humans would be blighted by everything from cataracts to skin cancer.

What has the Montreal Protocol done?

The accord has led to the phase out of 99 per cent of ozone-depleting substances, including chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs). These refrigerants were once commonly found in fridges, air conditioners, foams, spray cans and fire extinguishers. Their demise has put the ozone layer on the road to recovery; scientists estimate it will return to pre-1980s levels by 2066.

How is the Montreal Protocol tackling climate change?

Most ozone-depleting substances also contribute to global warming. By reining in these substances and protecting carbon sinks, like forests, from damaging ultraviolet radiation, the protocol is expected to prevent about 0.5°C to 1°C of warming by the end of the century.

But that's not the end of the story. CFCs and HCFCs, have been largely replaced by hydrofluorocarbons (HFCs). Although harmless to the ozone layer, HFCs are potent greenhouse gases. Some are thousands of times more adept at trapping heat than carbon dioxide, the most common greenhouse gas, says Seki.

Adopted in 2016, the Montreal Protocol's Kigali Amendment aims to gradually reduce HFC production over the next 30 years. So far, 162 states and the European Union have ratified the treaty.

What effect could the Kigali Amendment have on global warming?

Eliminating HFCs could prevent up to 0.5°C of planetary heating by the end of the century. Seki says that could make a big difference in the trajectory of climate change. "For every fraction of a degree the Earth warms, the impacts of climate change – from droughts to wildfires, to superstorms – become more severe," she says.

According to UNEP's latest *Emissions Gap Report*, a 0.5°C temperature rise would increase the frequency and severity of heat extremes, heavy rainfall events and regional droughts.
Energy efficiency is also a pillar of the global effort to implement the Kigali Amendment. As nations phase down HFCs, they are also working to transition to cooling equipment that uses less electricity, helping to lower the greenhouse gas emissions associated with power generation.

Does the Kigali Amendment support other efforts to limit greenhouse gas emissions?

Yes. HFCs, also fall under the Paris Agreement, which aims to limit global warming to well below 2°C this century. The amendment also serves as the foundation of voluntary initiatives like the Global Cooling Pledge. Launched in 2023 it aims to reduce cooling-related emissions by more than two-thirds and dramatically improve the efficiency of air conditioners while also promoting passive cooling solutions.

What is UNEP doing in this area?

UNEP hosts the Secretariat of the Montreal Protocol and the Multilateral Fund for the Implementation of the Montreal Protocol. The fund is helping 144 developing countries to phase out ozone-depleting substances, phase-down HFCs and at the same time, improve the energy efficiency of cooling. Meanwhile, UNEP through its OzonAction programme, strengthens the capacity of developing nations and industry to implement the Montreal Protocol.

Finally, the UNEP-convened Climate and Clean Air Coalition supports action on super climate pollutants, like HFCs, including through partnerships and by funding transformative projects at the global, regional and country levels.

What needs to happen next to harness the full cooling potential of the Kigali Amendment?

The amendment needs to be fully ratified by all parties to the Montreal Protocol; so far, 163 of the 198 parties have done so. Seki says universal ratification and full implementation of the amendment is key to maximizing its contribution to reducing global temperature rise. As well, energy efficiency improvements, which should take place amid the phase down of HFCs, are crucial for meeting a rapidly increasing demand for cooling while minimizing further warming

of the planet.

Montreal Protocol Ozone Secretariat

The Montreal Protocol Ozone Secretariat based in Nairobi, Kenya, housed within the United Nations Environment Programme (UNEP) is the administrative office for two important ozone protection treaties/agreements: the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer. Both play a major role in safeguarding the ozone layer, an invisible shield around the Earth that protects all living things from the effects of the sun's harmful ultraviolet (UV) radiation. Through the Protocol's Kigali Amendment adopted in 2016, countries that ratify the Amendment are helping to cool the planet. By phasing down hydrofluorocarbons (HFCs) - potent climate-warming refrigerants – this will avoid an estimated 0.5°C of warming by 2100. Combined with improvements in energy efficiency of equipment in the cooling sector, this could be doubled, making the Kigali Amendment a powerful climate action tool.

Source: UNEP, 29 January 2025

Image: AFP/STR

ASIA AND THE PACIFIC

6. Vietnam Emphasizes Importance of Natural Refrigerants in National Cooling Action Plan

HFCs, which dominate Vietnam's cooling sector, pose a 'major threat' to the country's climate goals, according to an industry expert.

Vietnam is prioritizing natural refrigerants under its National Green Cooling Action Plan (NGCAP) to curb cooling-related emissions, according to an op-ed in the Vietnam Investment Review by Do Manh Toan, Country Program Coordinator for the Southeast Asia Energy Transition Partnership (ETP).

Vietnam is shifting from ozone-depleting HCFCs and high-GWP HFCs and is focusing on sustainable alternatives like propane (R290), ammonia (R717) and CO2 (R744). This transition, alongside improved energy efficiency, is critical to meeting Vietnam's Nationally

Determined Contributions (NDCs) and achieving net-zero emissions by 2050 as cooling demand surges.

“Vietnam’s continued use of HFCs presents a major threat to its climate goals,” said Toan. “By embracing green cooling technologies, Vietnam is not only reducing its carbon footprint but also setting an example for sustainable development in the region.”

The NGCAP was developed by ETP and Vietnam’s Ministry of Natural Resources and Environment (MONRE) under its National Green Cooling Program (NGCP), an initiative supported by the Department of Climate Change and the UN Economic and Social Commission for Asia-Pacific. The ETP is a program of the UN Office for Project Services.

“Vietnam’s continued use of HFCs presents a major threat to its climate goals. By embracing green cooling technologies, Vietnam is not only reducing its carbon footprint but also setting an example for sustainable development in the region.”

Do Manh Toan, Country Program Coordinator for the Southeast Asia Energy Transition Partnership

Cooling demand on the rise

As global temperatures rise and Vietnam undergoes rapid modernization and urbanization, cooling demand has surged, growing by 2.3% annually between 2018 and 2022. Residential and commercial air-conditioning saw a 7.6% increase, with the number of air conditioners expected to triple from 20 million in 2022 to 75 million by 2050.

Industrial cooling, including food processing, cold storage and pharmaceuticals, is also expanding rapidly.

This rise in cooling demand threatens to escalate emissions, both directly through high-GWP refrigerants and indirectly through fossil fuel-generated electricity. Under a business-as-usual scenario, Vietnam’s cooling sector could emit more than 115 million tons of CO2 equivalent annually by 2050, up from 64.7 million tons in 2022.

According to Toan, refrigerants account for around 16% of Vietnam’s cooling-related emissions.

Making the transition

Vietnam will phase out HCFCs by 2040 and phase down HFCs by 80% by 2045 under the Kigali Amendment to the Montreal Protocol, which it ratified in September 2019. While there is a general trend toward using lower-GWP refrigerants, stronger policy interventions are needed to ensure the wider adoption of natural alternatives.

According to a report from the NGCP, hydrocarbons are not yet widely used outside the residential refrigeration sector due to safety concerns and related issues around standards and technician training. Training initiatives are already being implemented in Vietnam to support the transition to natural refrigerants.

However, the program urges the immediate introduction of R290-based air-conditioning to support Vietnam’s HFC phasedown. To achieve its NDC and net-zero targets, the NGCP report sets a goal of introducing R290-based technologies to the residential and commercial AC market in 2025, achieving 5% penetration in 2030 and 80% penetration by 2050.

The country also plans to expand ammonia- and R290-based chillers in commercial sectors and CO2 and ammonia in industrial applications, including refrigerated transport. The NGCP also calls for accelerated research into new refrigerants, addressing concerns such as the flammability of hydrocarbons, the toxicity of ammonia and the environmental and health impacts of HFOs.

Improving efficiency

Beyond refrigerant transitions, the NGCAP also prioritizes energy efficiency improvements in cooling systems. Cooling already accounts for more than 25% of Vietnam's electricity use, a figure expected to triple by 2050 without intervention.

The plan advocates for stronger Minimum Energy Performance Standards (MEPS), aiming to improve AC efficiency by 50% by 2050 – or up to 80% with best-available technologies. Natural refrigerants offer better energy efficiency, further reducing emissions.

By enhancing cooling efficiency, Vietnam could cut energy use by up to 62 terawatt hours by 2050, strengthening energy security, reducing air pollution and lowering electricity costs for households and businesses.

According to Toan, enhancing the energy efficiency of cooling equipment alone could cut Vietnam's overall greenhouse gas emissions by more than 9%.

Source: Natural Refrigerants, 6 January 2025
Image: Neil Cox / Shutterstock

EUROPE AND CENTRAL ASIA

7. Ukraine seeks to adopt EU F-gas rules

UKRAINE: As a candidate for accession to the European Union, Ukraine is working to adopt the new European F-Gas and ozone depleting substances regulations.

The European Council opened accession negotiations with Ukraine in December 2023. Candidate countries must demonstrate a strong administrative capacity at national and local levels to properly apply and enforce environmental laws.

Ukraine's Ministry of Environment is now seeking input from businesses, public organisations, and individuals with expertise in environmental protection as part of plans to ensure broad consensus and effective outcomes.

The country has been a major pathway for smugglers bringing illegal refrigerant into the EU.

Source/Image: Cooling Post, 26 January 2025

8. Cold chain conference to explore market trends

DENMARK: The changes to trade policy landscapes and macro trends and their implications for Europe's temperature-controlled logistics sector will be explored at a major conference in Denmark in March.

More than 200 cold chain professionals are expected to gather for the Global Cold Chain Alliance's 28th European Cold Chain Conference at the Copenhagen Marriott Hotel on 26-28 March.

Delegates will explore market developments, discuss upcoming trends and discover the latest cold chain innovations at the only European forum bringing together multiple segments of the cold chain – from temperature-controlled warehousing, refrigerated transportation and supply chain to specialist cold chain construction, technology and equipment.

The conference's keynote speech will be delivered by John Clarke, former director for international relations in DG Agri and a previous chief negotiator for agriculture in the European Commission.

He will lead the discussion on the future direction of global trade policy, examining how it will impact food production, imports, exports and the European supply chain, and considering what this means for cold chain businesses in Europe and the wider world.

"The cold chain in Europe is changing fast. In addition to the continuing advent of new technologies, regulatory changes and evolving customer requirements, in 2025 we can also expect significant implications for temperature-controlled logistics as a result of a shifting trade and policy landscape," said the Global Cold Chain Alliance (GCCA) director for Europe Julie Hanson.

The conference programme will also include sessions focusing on consumer trends and market dynamics; future-proofing energy systems for cold chain logistics; digital transformation such as paperless transport flows and AI-led operations; adaptive supply chain strategies; opportunities and implications around a potential change in freezing temperatures; and the current cold chain estate in Europe.

Further details and registration on the GCCA website.

Source/Image: Cooling Post, 28 January 2025

9. AREA: (Air conditioning and Refrigeration European Association) Vision 2025

Cooling is essential to modern life and it makes people's lives better: refrigeration preserves foodstuff and vaccines whilst air conditioning provides thermal comfort and keeps data centres running. Versatile and omnipresent, cooling has become absolutely critical to people's well-being and will be even more so in the face of climate change and digital transformation

Contractors fulfil an essential mission: they ensure the proper design, installation and functioning of the refrigeration, air conditioning and heat pump systems that satisfy these various societal needs.

The refrigeration, air conditioning and heat pump contracting sector is undergoing profound changes driven by 4 main factors: increased demand for cooling, sustainable cooling, technological developments, and attracting, retaining and upskilling personnel. In this context and with a new EU political cycle starting, AREA would like to present its strategic vision for the European refrigeration, air conditioning and heat pump contracting industry for the next 5 years. This also follows on from the Vision 2020 presented in 2014.

The AREA Vision 2025 consists of 4 pillars:

- Refrigerants: succeeding in the transition towards alternative refrigerants
- Sustainable innovation: supporting energy and resource efficiency principles in a lifecycle approach
- Human capital: supporting members in attracting and retaining skilled personnel
- Framework conditions: promoting a coherent and supportive regulatory and standardisation framework.

These pillars will serve as overarching strategic imperatives that will guide AREA's activities in the next 5 years. To ensure internal consistency, AREA has also restructured its working organisation with the creation of 4 Working Groups reflecting the 4 pillars of AREA Vision 2025 and replacing the existing Task Forces.

With this, AREA is well-equipped to take up the challenges ahead and looks forward to continuing the cooperation with other industry stakeholders and decision-makers at international, European and national levels. Read more…

Source/Image: AREA, January 2025

LATIN AMERICA AND THE CARIBBEAN

10. Belize hosts workshop for Youth in Refrigeration Servicing Sector

Belize City, Belize, 19 November 2024 – The UN Environment Programme (UNEP) OzonAction Compliance Assistance Programme (CAP), Latin America and the Caribbean team organized a Workshop for Youth in the Refrigeration Servicing Sector (RSS) in the English-speaking Caribbean Region and Haiti in Belize City, Belize, from 18–20 November 2024.

The workshop was attended by 29 participants (15 men and 14 women) including National Ozone Officers and Youth Refrigeration and Air Conditioning (RAC) Technicians from the Caribbean Region.

Mrs. Donnalyn Charles, Caribbean Regional Coordinator, and Mrs. Cindy Cunil, National Ozone Officer, Ministry of Sustainable Development and Climate Change officially opened the workshop and welcomed the participants. Mrs Cunil, in her opening statement, reaffirmed Belize's support for OzonAction's mandate.

The purpose of the workshop was to assist the 14 Caribbean countries of the region in achieving their 2025 67.5% HCFC (hydrochlorofluorocarbons) reduction target in maintaining the 2024 freeze in HFC (hydrofluorocarbons) consumption, engage young RAC technicians in the RAC Sector, and increase their participation, ensure the continuing engagement of the RSS in the Caribbean Region towards the effective implementation of the Montreal Protocol and enhance the capacity of countries to comply with the Montreal Protocol and Kigali Amendment obligations.

The workshop explored potential gender-based barriers that exist for young professionals in the sector and looked for solutions that can help attract more youth, both male and female.
The workshop also included an assessment component to determine the technical capacity of young RAC technicians, following the model of UNEP's Refrigerant Driver's License (RDL) Programme. The assessment was conducted by one of UNEP's trained Assessors under the RDL and was held at the Belize Institute of Technical Vocational Education and Training (ITVET). Recommendations for improvement were received from the participants and training and other initiatives for future development and growth in the industry were incorporated into a Draft Pathway to Increase Participation of Youth in the RSS.

The Youth workshop was organized as part of UNEP OzonAction's 2024 CAP Workplan under the Multilateral Fund for the implementation of the Montreal Protocol and was in response to the region's priorities.

For more information:
Donnalyn Charles
Caribbean Montreal Protocol Regional Coordinator
UNEP OzonAction

Source/Images : OzonAction, 2 December 2024

NORTH AMERICA

11. New York Finalizes Ambitious Update to HFC Regulations

The new rules include 20-year GWP limits of 10 for many new HVAC&R systems starting in 2034, giving a boost to natural refrigerants.

The New York State Department of Environmental Conservation (DEC) on December 23, 2024, announced that it has finalized updated regulations to reduce emissions of HFCs, including 20-year GWP limits of 10 for many new HVAC&R systems starting in 2034, thereby helping to foster the adoption of natural refrigerant-based applications.

The new regulations amend 6 NYCRR Part 494, Hydrofluorocarbon Standards and Reporting, establishing GWP thresholds for refrigerants and requirements on equipment leakage. The amended regulations also target reductions of sulfur hexafluoride (SF6), another potent greenhouse gas. They do not require the replacement of existing equipment prior to the end of its useful life

The original regulations were adopted in 2020 to backstop SNAP Rules 20 and 21 set by the U.S. Environmental Protection Agency (EPA) and align with states belonging to the US Climate Alliance.

New York's amended HFC regulations are among the most ambitious in the U.S., surpassing in some respects the American Innovation and Manufacturing (AIM) Act, implemented by the EPA. Other states with proactive HFC regulations include California and Washington. But New York, unlike the EPA or other states, uses a 20-year GWP (GWP20) value for gases rather than the traditional 100-year GWP (GWP100) value. (Some of the New York regulations refer to federal rules that use GWP100.)

The new rules are designed to help implement New York's Climate Leadership and Community Protection Act, which requires the state to reduce greenhouse gas emissions from 1990 levels by 40% by 2030 and by 85% by 2050, achieving net zero emissions by 2050.

"New York State continues to advance efforts to reduce the harmful pollution fueling climate change, with HFCs and SF6 among the worst offenders," said Interim DEC Commissioner Sean Mahar. "The new requirements finalized today will help phase down the use of these climate pollutants over time and bolster the use of alternatives that are better for public health

and our shared environment and more cost-effective for impacted businesses." …

Source: Natural Refrigerants, Michael Garry, 7 January 2025

12. High Emissions from Feedstocks and Aged Equipment are Delaying Ozone Recovery

Scientists analyze the impact of ozone depleting substances on the ozone layer using data acquired from a variety of platforms, including high altitude balloons and aircraft that can obtain air samples in the stratosphere. Data from these platforms help guide the analysis in the Lickley et al. paper. The image shows the landing of the NASA ER-2 aircraft in Fairbanks, Alaska. Photo credits: Ross Salawitch

New study investigates the 17-year discrepancy in projections for ozone recovery timelines, highlighting gaps in global reporting, compliance, and opportunities for action—as well as the ongoing impact of emissions from feedstocks and legacy equipment containing ozone-depleting substances

Washington, DC, December 2, 2024 – A new study published in **Atmospheric Chemistry and Physics** reveals a 17-year delay in the projected recovery of the ozone layer since 2006, underscoring the need for enhanced global environmental policies and enforcement. The recovery date is an estimated year when the key ozone-depleting gases will be back to 1980 levels. Estimated recovery dates provide a benchmark for measuring progress on the global coordinated effort to reduce emissions of ozone-depleting chemicals. The findings are part of a comprehensive analysis led by Georgetown University Earth Commons scientist Megan Lickley and co-authored by University of Maryland Earth System Science Interdisciplinary Center professor Ross Salawitch alongside an international team of researchers.

The study focuses on the recovery of equivalent effective stratospheric chlorine (EESC), a critical metric for estimating stratospheric ozone depletion, and explores why the timeline projected by the scientific assessment of EESC returning to pre-1980 levels has been extended from 2049 as of a 2006 report to 2066, as reported in 2022.

Researchers identified key contributors to this delay, including changes in modeling assumptions, unanticipated emissions, and larger-than-expected sources of lawfully produced ozone-depleting substances (ODS) —some manufactured recently to be used as feedstock, others leaking from old equipment—are significantly delaying the recovery of the ozone layer. Subsequent revised calculations of ODS' atmospheric lifetimes and updates to historical emissions estimates accounted for part of the delay.

"The 2022 International Scientific Assessment of Ozone Depletion showed that our expected return date was now 17 years later than the 2006 assessment had projected, and this delay caused us to wonder, 'why'?" said Lickley. "Our paper shows that part of the delay is due to improved understanding of how long these chemicals last in the atmosphere, as well as how we estimate their precise impact on ozone depletion. However, another very important part of this delay is that humans have emitted more of these chemicals into the atmosphere than had initially been anticipated."

Undocumented production of ODSs, such as carbon tetrachloride and CFC-11, further contributed to the delay, reflecting gaps in compliance and monitoring under the Montreal Protocol. Updated calculations revealed significant reservoirs of CFC-11 and other ODSs in old equipment that continue to emit harmful agents into the atmosphere, delaying ozone recovery by years.

"Our study shows that the ozone layer will not recover as quickly as had once been expected due to depletion caused by human release of ozone depleting substances," says Salawitch, who also holds appointments in the departments of Atmospheric and Oceanic Science and Chemistry and Biochemistry. The ozone layer protects the ecosystem, including humans, animals, and crops, from harmful solar ultraviolet radiation. A delay in the recovery of the ozone layer means that higher amounts of solar UV will reach Earth's surface than would have occurred without the emission of these pollutants, with a number of deleterious effects including higher rates of human skin cancers."

The study highlights opportunities for accelerating ozone recovery through tighter controls on feedstock emissions and aged equipment, enhanced monitoring and enforcement mechanisms, and efforts to recover and safely destroy existing ODS stocks from equipment and foam applications.

Lickley concludes that, while the Montreal Protocol helped avoid catastrophic ozone loss, and while cheating on protocols has been shown to play only a minor role in further ozone depletion, "Ongoing scientific work, continued monitoring of the atmosphere, and updating of the Montreal Protocol agreement when called for are all necessary to ensure progress."

FEATURED

nal information is available at Ozone Secretariat activities here >>> Atmospheric Chemistry and

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Source/Image: University of Maryland, Earth System Science Interdisciplinary Center, 2 December 2024

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