

OzoNews

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

Volume XXI | 15 December 2021

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GLOBAL

1. Kigali Amendment latest ratifications

Congratulations to the latest countries which have ratified the Kigali Amendment:

Turkey, 10 November 2021
St. Lucia, 2 November 2021
Serbia, 8 October 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

2. Status of Patents and Legal Challenges: Patents Related to the use of HFO-1234yf in Auto Air Conditioning

3 December 2021 – The 2016 Kigali Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal Protocol) phases down the production and consumption of hydrofluorocarbon (HFC) greenhouse gases. Since 2016, the vast majority of countries that use and produce HFCs, including the United States, China, India, and European nations have agreed to avoid and curtail these potent GHGs. One of the major challenges to transitioning to lower global warming potential (GWP) alternatives identified by Parties to the Montreal Protocol is intellectual property rights (IPR), particularly in the automotive sector (including passenger automobiles, light trucks, and commercial and industrial vehicles used on- and off-road), where low-GWP refrigerant hydrofluoroolefin (HFO)-1234yf has become the predominant solution used in automobiles manufactured or exported to developed countries worldwide. Because a few transnational companies filed a large number of the patents on low-GWP chemical substitutes for HFCs, multiple developing countries (Article 5 Parties under the Montreal Protocol) have raised concerns that these patents could impede their ability to meet HFC reduction goals, significantly increase the costs of doing so, or put their industries at a competitive disadvantage if they do not. Furthermore, because the agreed incremental costs (including IPR) of the Article 5 Parties' transition is paid from the Multilateral Fund for the Implementation of the Montreal Protocol (MLF), there is concern over affordability among Parties from developed countries (non-Article 5 Parties) donating to that fund.

A new paper, **Status of Patents and Legal Challenges: Patents Related To the Use of HFO-1234yf In Auto Air Conditioning (2021)** published by the Institute for Governance & Sustainable Development, addresses what has been described as a primary concern related to patents: even if chemical companies in Article 5 Parties can develop their own methods of producing HFOs or using them in the products they make, they could be prevented (absent a license) from selling their products at home and in key markets abroad in countries where restrictive patents have been granted to other companies, at least until the time when challenges to patents are decided or these patents expire.

The authors reviewed the status of patents granted on HFO-1234yf in automotive air conditioning (AC) in the US, Europe, and China, covering the largest automotive manufacturing regions in the world, primarily focusing on patents on the use of HFO-1234yf in automobiles, as opposed to patents on the manufacture of HFO-1234yf. There are multiple manufacturing pathways for HFO-1234yf which may be reviewed in a future paper. In the US and Europe, most patents on the use of HFO-1234yf in automobile AC systems were invalidated following legal challenge. However, this has not prevented the same chemical manufacturers from gaining or maintaining similar IPR in China, where some of the patents have yet to be challenged or overturned. This raises both legal and diplomatic questions about the validity of such patents

STATUS OF PATENTS AND LEGAL CHALLENGES: PATENTS RELATED TO THE USE OF HFO-1234YF IN AUTO AIR CONDITIONING

By Kristin N. Tadhoni, Xiangyi Sun, Ted Ferris, and Dr. Stephen O. Andersen, Institute for Governance & Sustainable Development
7 December 2021

Executive Summary

The 2016 Kigali Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal Protocol) phases down the production and consumption of hydrofluorocarbon (HFC) greenhouse gases (GHGs). Since 2016, the vast majority of countries that use and produce HFCs, including the United States (US), China, India, and European nations have agreed to avoid and curtail these potent GHGs. One of the major challenges to transitioning to lower global warming potential (GWP) alternatives identified by Parties to the Montreal Protocol is intellectual property rights (IPR), particularly in the automotive sector (including passenger automobiles, light trucks, and commercial and industrial vehicles used on- and off-road), where low-GWP refrigerant hydrofluoroolefin (HFO)-1234yf has become the predominant solution used in automobiles manufactured or exported to developed countries worldwide. Because a few transnational companies filed a large number of the patents on low-GWP chemical substitutes for HFCs, multiple developing countries (Article 5 Parties under the Montreal Protocol) have raised concerns that these patents could impede their ability to meet HFC reduction goals, significantly increase the costs of doing so, or put their industries at a competitive disadvantage if they do not. Furthermore, because the agreed incremental costs (including IPR) of the Article 5 Parties' transition is paid from the Multilateral Fund for the Implementation of the Montreal Protocol (MLF), there is concern over affordability among Parties from developed countries (non-Article 5 Parties) donating to that fund. This paper addresses

what has been described as a primary concern related to patents: even if chemical companies in Article 5 Parties can develop their own methods of producing HFOs or using them in the products they make, they could be prevented (absent a license) from selling their products at home and in key markets abroad in countries where restrictive patents have been granted to other companies, at least until the time when challenges to patents are decided or these patents expire.

This paper reviews the status of patents granted on HFO-1234yf in automotive air conditioning (AC) in the US, Europe, and China, covering the largest automotive manufacturing regions in the world. This paper primarily focuses on patents on the use of HFO-1234yf in automobiles, as opposed to patents on the manufacture of HFO-1234yf. There are multiple manufacturing pathways for HFO-1234yf which may be reviewed in a future paper. In the US and Europe, most patents on the use of HFO-1234yf in automobile AC systems were invalidated following legal challenge. However, this has not prevented the same chemical manufacturers from gaining or maintaining similar IPR in China, where some of the patents have yet to be challenged or overturned. This raises both legal and diplomatic questions about the validity of such patents, and the environmental, financial, and trade-related benefits that could be realized if legal barriers to unrestricted use were removed.

This paper updates and expands upon a preceding publication co-authored by Stephen Senaldi of the Center for Climate and Energy Solutions and Christine R. Ehrhardt of Eckert Seamans Cherin & Mellott LLC, published in July 2016 and titled "Status of Legal Challenges: Patents Related to the Use of HFO-1234yf in Auto Air Conditioning" (referred to hereinafter as the July 2016 report). The Institute for Governance & Sustainable Development (IGSD) gratefully acknowledges the work of Jonathan (J.R.) Van and Hao Wu of Foley & Lander LLP who conducted the updated patent search and without whom this report would not be possible, as well as reviews from mobile AC experts including Professor Jianxin Hu, Peking University; Shuang Yu, Shanghai Jiao Tong University; Wand Atkinson, Sun Test Engineering; William (Bill) Hill, retired-GM; Timothy Criss, Melissa Technologies; and Dwayne Taylor, Denso.

4016-1024-0002.2

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This paper updates and expands upon a preceding publication co-authored by Stephen Seidel of the Center for Climate and Energy Solutions and Christine R. Ethridge of Eckert Seamans Cherin & Mellott LLC, published in July 2016 and titled "[Status of Legal Challenges: Patents Related to the Use of HFO-1234yf in Auto Air Conditioning](#)".

Read/Download "Status of Patents and Legal Challenges: Patents Related to The use of HFO-1234yf in Auto Air Conditioning" [here](#)

Image: IGSD website

3.14 Nations Commit to Improving Appliance Efficiency

Fourteen countries have signed the Product Efficiency Call to Action, which aims to double the efficiency by 2030 of four priority products – air conditioners, refrigerators, industrial motor systems and lighting – that account for 40% of global energy consumption.



The countries include Australia, Brazil, Chile, Colombia, Denmark, Germany, Ghana, India, Indonesia, Japan, Korea, Nigeria, Sweden, and the U.K., according to a post on the website of CLASP, an NGO dedicated to improving appliance efficiency. These commitments were made leading up to and during the COP26 climate summit in Glasgow, U.K., in November.

"These endorsements amount to the largest commitment ever between governments to improve product efficiency," said Sharon Ikeazor, Nigeria's Minister of State for Environment.

The total CO₂e emissions savings potential of this commitment amounts to almost 465 coal-fired power stations avoided over approximately 10 years, added Ikeazor. A 2018 knowledge brief by the Clean Cooling Collaborative (formerly K-CEP), estimated that improving the efficiency of cooling equipment between then and 2050 could prevent about 80Gt of CO₂e emissions.

The Product Efficiency Call to Action was launched in September by the Super-Efficient Equipment and Appliance Deployment (SEAD) Initiative, of the Clean Energy Ministerial and its partners. Those include CLASP, the International Energy Agency (IEA) and the U.K. Department for Business, Energy, and Industrial Strategy. The Product Efficiency Call to Action is also working in partnership with EP100 and the Race to Zero to engage businesses to commit to fast action on energy efficiency. [...]

Improving energy efficiency is viewed as helping to pave the way to achieving net-zero emission targets. [...]

[r744, 6 December 2021, By Shirshah Amerkhail](#)

Image: The Federal Secretariat building, Abuja, Nigeria; photo by OtuNwachinemere via Wikimedia Commons

See also >>> [The Road to Net Zero: Paving the Way with Appliance Energy Efficiency Action](#), CLASP, November 2021.

4. New source of potent greenhouse gas emissions identified in permafrost

It may not be the headline star of the climate change discussion, but nitrous oxide (N₂O) is still a potent greenhouse gas – and now it looks like we may have underestimated how much is being released. A new study has identified thawing permafrost as a huge, previously unknown source of N₂O.



Carbon dioxide is the primary greenhouse gas of concern, followed by methane and then nitrous oxide. But don't discount the bronze medallist there – what N₂O lacks in concentration it more than makes up for in potency. Pound for pound, nitrous oxide is a warming agent 298 times stronger than carbon dioxide, and it can degrade the ozone layer too.

Worse still, its saving grace – that at least there isn't as much of it up there – may not hold true for long either. A recent report found that we may be underestimating levels of N₂O emissions from agriculture, where it's produced as a by-product of nitrogen-rich fertilizers. Oceans also emit a decent chunk that's growing as human activity makes the waters more acidic.

And now the permafrost can be added to the list of increasing sources. New research led by scientists at the University of Eastern Finland has found that nitrous oxide emissions from a type of permafrost known as Yedoma are growing faster than expected.

Yedoma permafrost contains a huge amount of organic material and covers more than 1 million sq km (386,000 sq miles) across Siberia, Alaska, and Canada. Previously it was assumed that the nitrogen cycle in these cold soils was a slow process that wouldn't result in significant nitrous oxide emissions, but for the new study the team measured those emissions at different points along the Lena and Kolyma rivers in East Siberia.

The team found that the most recently thawed Yedoma permafrost did start off producing very low N₂O emissions, but within a few years those emissions accelerated drastically. Eventually they were found to be emitting between 10 and 100 times more nitrous oxide than normally expected from other permafrost soils.

On closer inspection, the researchers uncovered the mechanism behind this increase. As the sediments dry out and stabilize after thawing, the microbial communities living in them change. The population of microbes that produce nitrous oxide precursors grows, while those that consume the gas shrinks.

Further study will be needed to assess the extent of these emissions and incorporate their impact into climate models.

The research was published in the journal [Nature Communications](#) - Marushchak, M.E., Kerttula, J., Diáková, K. et al. Thawing Yedoma permafrost is a neglected nitrous oxide source. *Nat Commun* **12**, 7107 (2021). <https://doi.org/10.1038/s41467-021-27386-2>

[New Atlas, 8 December 2021, By Michael Irving](#)

Image: New Atlas website / A researcher measures nitrous oxide emissions from the Yedoma permafrost in East Siberia-Johanna Kerttula

ASIA AND THE PACIFIC

5. Vanuatu ODS module launched!

The Ozone Depleting Substances (ODS) Module, to be operated under the Department of Environmental Protection and Conservation (DEPC), is now live on the Vanuatu electronic Single Window (VeSW) System. Adopted from Timo Leste, the module is now being used by only 2 of the 100 plus countries worldwide that use the ASYCUDA system.

The launching of the ODS Module took place on 1st of December 2021 at the Ministry of Climate Change Adaptation's compound under the coordination of the VeSW Project. The first importer to use the electronic system in a live exercise during the launching was one of Vanuatu's own car dealer companies, Intraco.

This is the first VeSW module for the Department and the second for the Ministry of Climate Change, following the implementation of the Energy Efficient appliance module earlier in April 2021. Such initiatives demonstrate Vanuatu's commitment to implementing practical solutions to protecting the climate and environment. Other modules to be implemented for the Ministry are the NDMO module and, hopefully, the e-CITES module in the future.

The ODS module will tremendously benefit DEPC to facilitate the issuance of import permits for ODS refrigerants and related equipment containing these controlled substances. This means assisting DEPC to digitally control the national quota for Hydrochlorofluorocarbons (HCFC) and also to set a reasonable quota for Hydrofluorocarbons (HFC) by the year 2024. Using the VeSW will also assist DEPC to control and monitor the importation of these regulated products through Customs, thus improving compliance.

The system will further assist DEPC to have access, for the first time ever, to real time data of ODS permits and imports, and be able to provide reliable reporting to the United Nations Environment Program (UNEP), as required under the Vienna Convention for the Protection of the Ozone Layer.

The second goal under the Environment Pillar of the Vanuatu National Sustainable Development Plan outlines the approach of an economy that fosters sustainable growth and development through low impact industries and modern technologies to ensure the well-being of the future generation. The Government through the Ministry of Trade, Tourism, Commerce and Ni-Vanuatu Business, believes that the implementation of the VeSW system in Vanuatu will assist the country in achieving many of its NSDP goals.

[Vanuatu Electronic Single Window Project Monthly newsletter, Issue 19, 10 December 2021](#)

Image: VES website



6. Philippines Targets 80% Reduction in HFC Use by 2045

The Philippine government has issued an HFC order in preparation for ratification of the Kigali Amendment.



The Philippine government's Department of Environment and Natural Resources (DENR) recently announced new regulations targeting an 80% reduction in HFC importation and use in the country by 2045.

This puts the Philippines in accordance with a developing country's obligation under the Montreal Protocol's Kigali Amendment, which the country is close to ratifying.

On October 13, the DENR officially announced the publication of its [DENR Administrative Order No. 2021-31](#), which states that "by 01 January 2045, imports [of HFCs] shall have been reduced by 80% based on the recorded baseline consumption in CO2 equivalent."

Baseline consumption is the average production and consumption of HFCs in the Philippines in 2020, 2021 and 2022, plus 65% of HCFC baseline production and consumption, the order states.

To date, regulations in the Philippines have only targeted the phase out of HCFCs under DENR Administrative Order No. 2013-25.

The announcement of the regulations targeting HFCs is part of the Philippine government's efforts to conclude its ratification of the Kigali Amendment.

According to a presentation by the DENR during an [online webinar](#) in June, the process should be nearing its final stages.

The required "Certificate of Concurrences" issued by the Philippine government's inter-agency technical working group meeting on the Kigali Amendment has been "provided to the DENR Secretary for his endorsement and submission to the Department of Foreign Affairs together with the supporting documents," said Onofre P. Escota, Project Evaluation and Monitoring Officer for the DENR's Environmental Management Bureau.

In Escota's presentation, several natural refrigerants were identified as "available alternatives to HFCs in the Philippines."

These include isobutane (R600a) for domestic refrigeration, propane (R290) for domestic air-conditioning, transport and commercial refrigeration, ammonia/NH3 (R717) for commercial refrigeration and CO₂ (R744) for refrigeration and air conditioning.

[Ammonia21, 15 December 2021, By Devin Yoshimoto](#)

Image: Ammonia21 website/Manila, Philippines © Yooran-Park, 123RF.com

7. China consults on a draft list of alternatives to HCFCs

Proposes 24 substances to replace domestically produced hydrochlorofluorocarbons.

The Chinese Ministry of Ecology and Environment (MEE) is consulting until 31 December on a draft list of recommended alternatives to hydrochlorofluorocarbons (HCFCs) used in products sold in the country.



The list, published on 23 November, is part of China's efforts to phase out HCFCs in accordance with the Montreal Protocol on Substances that Deplete the Ozone Layer.

The list proposes 24 alternative substances to replace the following HCFCs produced domestically:

- 1,1-dichloro-1-fluoroethane (HCFC-141b);
- 1-chloro-1,1-difluoroethane (HCFC-142b); and
- difluoro monochloromethane (HCFC-22)

And proposes using the alternative substances in:

- three application types comprising nine refrigerants, six foaming agents and nine cleaning agents; and
- puts forward the main applications of the proposed alternative substances in the products listed.

In preparing the list, the MEE worked with various industry associations to understand and study suitable alternatives to HCFCs for different industries. The list was further revised based on feedback from industry associations, scientific research institutions, universities, companies, and industry experts.

In 2010, the State Council published the Regulation on the management of ozone-depleting substances (ODS), which forms the legal basis for the elimination and management of ODS.

Ozone indicators

The list includes the global warming potential (GWP) and ozone depletion potential (ODP) of the 24 proposed alternative substances.

The GWP is a measure of the global warming effects of different gases. It assigns a value to the amount of heat trapped by a certain mass of a gas relative to the amount of heat trapped by a similar mass of carbon dioxide over a specific period of time.

The Chinese regulation specifies a 100-year period. According to the UN environment programme, the most commonly used HCFC is nearly 2,000 times more potent than carbon dioxide in terms of its GWP. The MEE's list only contains substances with a low GWP, which it counts as being below 750.

The ODP is the ratio of the impact on the ozone of a chemical compared to the impact of a similar mass of trichlorofluoromethane (CFC-11). The Chinese regulation only lists alternatives with an ODP of zero.

[MEE notice \(in Chinese\)](#)

List of alternatives (in Chinese)

[Chemical Watch, 8 December 2021](#)

Images: Concept - Ozone depletion © Megaloman 1ac stock.adobe.com

8. Asia-Pacific launch a year-long Ozone2Climate Art Contest



“How can our daily life contribute to the ozone layer protection?” Mr. Siwakorn Maneethein, a third-year student of Geological Sciences at the Faculty of Science, Chiang Mai University, Thailand, enthusiastic about sustainable natural resources and environmental preservation shared his understanding of this significant question at a press conference of the launch of the [Asia Pacific Ozone2Climate Art Contest](#) on World

Ozone Day, 16 September 2021.

In 2015, Maneethein, then a junior high school student aged 14, won the national contest essay on the topic ‘How does our daily life protect the ozone layer?’ organized by the National Ozone Unit of Thailand. Beforehand, Maneethein and two fellow students had thoroughly researched ozone layer protection and consulted with teachers on the subject. Maneethein then presented his views and saw the value of everyone in participating towards reducing the destruction of the ozone layer and global warming. He particularly appealed to his generation to contribute by choosing products not containing ozone depleting substances (ODS) but environmentally friendly ones. Satisfied that Thailand had successfully phased out CFCs in 2010 and switched to less damaging substances, Maneethein emphasized that the ozone layer and climate protection cannot be achieved individually, but requires cooperation among all, especially youth like himself who are the future generation.

Due to restrictions caused by the ongoing COVID-19 pandemic, the public awareness raising Ozone2Climate Art Contest was launched online by United Nations Environment Programme (UNEP) OzonAction, the United Nations Educational, Scientific and Cultural Organization (UNESCO), and more than 30 countries in the Asia Pacific region. A key factor of the Art Contest is to engage the general public especially the youth like Mr. Siwakorn Maneethein to link daily life activities and choices with the common environmental challenges faced globally, and consider how to be engaged to identify solutions, and most importantly, how everyone can contribute to addressing the challenges.

Officially opened on World Ozone Day, 16 September 2021, **the Art Contest will run its course and close on 31 March 2022**, followed by the regional contest of nominated winners. The final winners in the three categories of artworks - photography, drawing, and graphic design, will be evaluated and announced on World Ozone Day in 2022.



As highlighted by Mr. James S. Curlin, Head of UNEP OzonAction, the role of industry and the public in the promotion of Ozone2Climate safe alternative technologies to replace ODS and high-global warming potential refrigerants is critical for the success of achieving ozone layer protection and climate-friendly targets. He further called on “everybody in the Asia-Pacific region and world at large to take action and play their role” noting especially that “the procurement power of the public will guide the market to favour Ozone2Climate products.”

Mr. Alex Rendell, UNEP’s National Goodwill Ambassador for Thailand, whose video message was pre-recorded, invited everyone to join this art contest to learn more about the issue that is critical to our lives and our well-being by sharing their ideas through the contest to show how ozone layer depletion and climate change can be solved. He further shared his idea on how everyone can contribute to protecting the ozone layer and climate by making conscientious and more environmentally friendly choices such as buying refrigerators and air-conditioners that are energy efficient and use climate-friendly refrigerants and maintaining that equipment in good condition to minimize refrigerant leakage and enhance energy performance.

Other high-level participants who addressed the press and public, and responded to questions were, Ms. Megumi Seki, Executive Secretary of UNEP’s Ozone Secretariat, Ms. Isabelle Louis, Deputy Regional Director at UNEP’s Asia Pacific Office, Ms. Rika Yorozu, Head, Executive Office and Regional Programme Coordinator for UNESCO Bangkok, and Mr. Jackrit Suthakorn, Dean of the Faculty of Engineering, Mahidol University, a supporting partner of the regional contest.

As of today, 33 developing countries in the region – Bangladesh, Bhutan, Cambodia, China, Cook Islands, Fiji, India, Indonesia, Iran, Kiribati, Republic of Korea, Lao PDR, Malaysia, Maldives, Marshall Islands, Micronesia, Mongolia, Myanmar, Nauru, Niue, Palau, Pakistan, Papua New Guinea, Philippines, Samoa, Solomon Islands, Sri Lanka, Thailand, Timor-Leste, Tonga, Tuvalu, Vanuatu, and Viet Nam, have joined the regional initiative.

The art contest was organized as part of the Asia-Pacific Regional Networks of Ozone Officers, as part of UNEP’s workplan under the Montreal Protocol’s Multilateral Fund.

For more information about the contest, please visit: www.ozone2climate.org

Contact: [Shaofeng Hu](#), Senior Montreal Protocol Regional Coordinator, UNEP, [OzonAction](#) Compliance Assistance Programme (CAP) Asia-Pacific.

Images: OzonAction

LATIN AMERICA AND CARIBBEAN

9. ¿Tenemos los refrigerantes del futuro?

Análisis sobre la actualidad y los escenarios futuros de los refrigerantes para AC/R en América Latina.

Introducción: Debido a los daños que causaron y aún causan las fugas de refrigerantes no naturales o sintéticos a nuestro planeta como son la destrucción de la capa de ozono y el calentamiento global, se eliminaron los refrigerantes CFC; estamos en etapa de eliminación de los refrigerantes HCFC y muy pronto viene la eliminación gradual de muchos refrigerantes HFC.



Ante éste panorama, para todas las aplicaciones de refrigeración y de aire acondicionado se están buscando reemplazos tales como refrigerantes naturales orgánicos, se están volviendo a usar algunos refrigerantes naturales inorgánicos y también usando nuevos refrigerantes sintéticos; además se usan y se buscan nuevas mezclas de refrigerantes.

Todas las alternativas con el objetivo de que no destruyan la capa de ozono (PAO = ODP = 0) y que a la vez no produzcan calentamiento global (PCA = PCG = GWP = 0 o muy bajo).

Por lo mencionado, en la actualidad existen 3 tendencias que buscan disminuir/solucionar esos problemas medio ambientales originados en mayor o menor proporción por los refrigerantes:

- Refrigerantes naturales
- Refrigerantes sintéticos
- Mezcla de refrigerantes

[...]

Reemplazo de refrigerantes más comunes

Actualmente se siguen usando principalmente el HCFC-22 o R-22 que ya tiene calendario que se viene cumpliendo para la eliminación de los HCFC en el 2030. También se están usando HFC puros y mezclas como R-134a, R-404A, R-507, R-410A que tienen calendario conocido para empezar a eliminar todos éstos HFC, como por ejemplo: para los países del Grupo A5 al cuál pertenecemos los países latinoamericanos y según la Enmienda de Kigali comenzará el año 2029.

Mientras tanto se siguen buscando reemplazos con las tres tendencias que hemos explicado y todo parece indicar que para el futuro los más prometedores son los refrigerantes naturales, sin embargo, los fabricantes de refrigerantes sintéticos y mezclas no se han quedado con los "brazos cruzados" habiendo logrado muchos y siguen buscando refrigerantes que no dañen al medio ambiente con cada vez más bajo GWP.

[...]

Conclusiones

A pesar de que hemos mostrado algunas tablas de referencia para reemplazos de refrigerantes; es muy importante que en la práctica, antes de proceder al reemplazo de refrigerantes cargados en equipos de refrigeración y aire acondicionado por otros nuevos refrigerantes que causen menores o nulos problemas medio ambientales, es mejor pedir información a los fabricantes de compresores (principalmente en refrigeración), fabricantes de equipos de aire acondicionado o de refrigeración y a los fabricantes de refrigerantes para saber si lo recomiendan como un sustituto directo o hay que hacer cambios de aceite, cambios

de componentes o de todo el equipo, para estar seguro de la compatibilidad o no del equipo con el nuevo refrigerante así como de la mejora o pérdida de la eficiencia energética.

Es importante saberlo porque se dan los siguientes escenarios:

A.- Reemplazar refrigerante de equipo existente por otro que tenga ODP=0 y GWP=bajo; sin cambiar nada (se recomienda cambiar filtro secador). En inglés lo denominan "Drop-In".

B.- Reemplazar refrigerante de equipo existente por otro que tenga ODP=0 y GWP=bajo; cambiando aceite al compresor, limpieza del circuito frigorífico y cambio de filtro secador. En inglés lo denominan "Light Retrofit".

C.- Reemplazar refrigerante de equipo existente por otro que tenga ODP=0 y GWP= muy bajo; cambiando aceite al compresor (recomendable cambiar compresor compatible o fabricado para el nuevo refrigerante), limpieza del circuito frigorífico, cambio de válvula de expansión y cambio de filtro secador). En inglés lo denominan "Deep Retrofit".

D.- reemplazar equipo existente por un nuevo equipo preparado y fabricado para ser usado con el nuevo refrigerante que tenga ODP=0 y GWP= 0 o muy bajo.

En aplicaciones de refrigeración hay que ser más cuidadosos, analizando cada caso, porque se trabajan a temperaturas más variadas (desde +15°C hasta -40°C e inclusive a ultra bajas temperaturas en sistemas "en cascada") y se debe seleccionar/balancear las capacidades de las Unidades Condensadoras con las Unidades Evaporadoras.

En aplicaciones de aire acondicionado es más sencillo porque los equipos trabajan casi a la misma temperatura de evaporación y generalmente las Unidades Condensadoras vienen balanceadas con sus respectivas Unidades Evaporadoras.

- Repetimos que para el futuro los más prometedores son los refrigerantes naturales, sin embargo, los fabricantes de refrigerantes sintéticos y mezclas siguen buscando muchos otros que no dañen al medio ambiente con cada vez más bajo GWP.

- Para nuestros países que conforman el Grupo A5 la eliminación gradual del uso de refrigerantes HFC está muy cerca, la Enmienda de Kigali establece que a partir del año 2029 empiece el programa de eliminación y debemos estar preparados para afrontarlo. Nos está sirviendo de ayuda la decisión de la Unión Europea, que no se rige por los mandatos de la Enmienda de Kigali, porque optó por tener su propio Reglamento F-Gas (UE-517/2014) para eliminar más rápido los refrigerantes con alto GWP.

Por ejemplo, indica que desde enero del 2020 está prohibida la comercialización de refrigeradores/congeladores/exhibidores con refrigerantes HFC cuyo PCA = GWP sea igual o superior a 2500 y equipos portátiles de aire acondicionado con refrigerantes cuyo PCA = GWP sea igual o superior a 150. A partir del 1 de enero del 2025, se prohíben usar en los sistemas tipo split de aire acondicionado refrigerantes con un PCA = GWP igual o superior a 750. Su objetivo más importante: desde el 2015 hasta el 2030 es reducir las emisiones de gases fluorados en la Unión Europea en dos tercios con respecto a los niveles del 2014.

Las restricciones mencionadas y otras prohibiciones están obligando no solo a usar refrigerantes naturales sino a encontrar nuevos refrigerantes sintéticos puros y/o mezclas que los estamos usando y que seguramente muchos otros que vengan en el futuro nuestros países los adoptarán.

[ACR Latino America, 13 Diciembre 2021, Por Ing. Ernesto Sanguinetti R](#)

Image: ACR website

NORTH AMERICA

10. EarthTalk – Have the benefits of protecting the ozone layer been calculated?

1987's Montreal Protocol, a landmark international agreement calling on the nations of the world to ban the production and distribution of man-made chemicals that deplete the stratospheric ozone layer, has been billed as one of the greatest examples of international cooperation to date. And while everyone party to the Montreal agreement agreed that the substance of the treaty--banning so-called chlorofluorocarbons and related ozone-stripping chemicals--was a big win for the environment and human health, we have had no idea how to quantify just how many lives have been saved or improved as a result.



Until now, that is. Researchers from the National Center for Atmospheric Research (NCAR), ICF Consulting, and the U.S. Environmental Protection Agency (EPA) found that the Montreal Protocol and its subsequent amendments will have prevented some 443 million cases of skin cancer and 63 million cases of cataracts in the U.S. alone by the end of the 21st century. They used computer models to plot how much ultraviolet (UV) radiation would have reached the Earth's surface through holes in the ozone layer without the ban on CFCs and other fluorocarbons, extrapolating from there.

"We peeled away from disaster," NCAR scientist Julia Lee-Taylor, a co-author of the study, told *ScienceDaily*. "What is eye popping is what would have happened by the end of this century if not for the Montreal Protocol." According to projections from the researchers' modeling, without the agreement, UV radiation would triple by 2080. "After that, our calculations for the health impacts start to break down because we're getting so far into conditions that have never been seen before."

"It's very encouraging," she added. "It shows that, given the will, the nations of the world can come together to solve global environmental problems."

Indeed, recent attempts to forge a global carbon drawdown have the potential for perhaps even bigger health impacts for humanity (and others) moving forward. The World Health Organization (WHO) considers global warming the greatest health threat ever facing humanity. This United Nations-backed international body charged with directing and monitoring global public health initiatives expects climate change to cause 250,000 additional deaths per year from a combination of factors including malnutrition, malaria, diarrhea, and heat stress. Additionally, global warming will end up tacking some \$2-\$4 billion per year onto our global health care bill. And sadly, but not surprisingly, lesser developed countries and regions will fare worse given their weaker health infrastructures.

Indeed, the success of the Montreal Protocol and the urgency of the climate crisis provide all the reasons we need to encourage the leaders of the United States and other nations around the world to forge ahead with the strongest possible international climate agreement with binding and meaningful emissions reduction targets. Our future may very well depend upon it.

[Kiowa County Press, 14 December 2021, By Roddy Scheer & Doug Moss](#)

EUROPE & CENTRAL ASIA

11. "Heat Pumps to Save the World" Technology roundtable and exhibition booth on ozone-friendly, energy- efficient and climate friendly HVAC&R technologies...

Belgrade, 1-3 December 2021 - As part of Serbia's HCFC phase-out management plan (HPMP), the Ministry of Environmental Protection, SMEITS / KGH and UNEP OzonAction organized a technology roundtable and an exhibition booth on ozone layer-friendly, climate-friendly, and energy-efficient technologies. The intention was to raise awareness on alternative technology options including alternatives to high-global warming HFCs.

Following Serbia's ratification of the Kigali Amendment in October 2021, the shift to energy-efficient and climate-friendly technologies has become even more important. Serbia committed itself to reducing its HFC consumption (measured in CO₂ equivalent tonnes) 80% below the baseline by the year 2045 – in less than 24 years.

The first control measure will be the freeze of the HFC consumption at the baseline level starting in 2 years (2024-2028) and the 10% reduction below the baseline level starting in 7 years (2029-2034). If fully implemented by all countries, the Kigali Amendment is expected to avoid 0.4 degrees of global warming in the year 2100. This would be a significant contribution to limiting global warming to 1.5 degrees by the end of the century.

Serbia's refrigeration, air-conditioning and heat-pump sector will play a crucial role in achieving this objective, through promoting alternative and energy-efficient technologies, enhanced training to ensure a skilled workforce able to handle new refrigerants safely, good servicing practices to avoid leakages, certification of service technicians, recovery and recycling, and much more.

The Ministry of Environmental Protection in cooperation with key stakeholders, our partner agency UNIDO and UNEP OzonAction will join hands to prepare Serbia's HFC phase-down strategy, or so-called Kigali HFC implementation plan (KIP). During Session 4 on the HFC policy & legislative options in Serbia and the European F-gas legislation, Ms. Bojana Radeski, Head of



the Ozone Depletion Group, Ministry of Environmental Protection of Serbia, explained the current and future activities, policy measures and legislation to be put in place, including the HFC quota system.

The presentations during the technology roundtable (Session 3) focused on the wide range of RACHP applications using natural refrigerants, and explained the potential of integrated cooling, heating, and hot water production to reduce the climate impact of heating and cooling:

1. Natural refrigerants in all applications. is it possible? by Armin Hafner and Risto Ciconkov
2. Why large industrial heat pumps and where are they used? by Alexander Cohr Pachai
3. Polyvalent units fitted with low GWP refrigerant for sustainable cooling & heating in modern buildings by Emiliano Pellis
4. Benefits and reliability of air-to-water heat pumps in residential applications, using R-290 refrigerant by Luca Brotto
5. Heat pumps in service of residential heating decarbonization by Hrvoje Krapanic REHVA organized a workshop on "Heat pumps with natural refrigerants and multiple renewable sources for the decarbonization of multi-family buildings" with the following presentations:

1. Trigenation systems based on heat pumps with natural refrigerants and multiple renewable energy sources by Dani Carbonell
2. Heat pumps with natural refrigerants and multiple renewable energy sources for the decarbonization of multi-family buildings – social acceptance of trigenation heat pump systems by Thomas Friedrich
3. Heat pumps with natural refrigerants by Raphael Gerber
4. Experimental results of the dual-source R290 heat pump system by Xabier Peña Anton

Integrated heat pump applications can use natural refrigerants and renewable energy sources. They are energy-efficient and expected to replace boilers for heating and hot water production in the future. Some experts believe that "Future cities will be heat pump cities". They will also play a crucial role in electric vehicles. It is a growing sector and new heat pump installations should avoid using high global warming fluids. Heat pump related policies, legislation and strategy elements should be incorporated into HPMPs and KIPs. Heat pumps alone will not save the world, but they can make a difference.

The recordings, exhibition photos and the KGH journal with the Ozone Pages are available from the conference website:

1. [Program recordings](#)
2. [Exhibition photos](#)
3. [KGH journal \(4th quarter 2021\)](#)

Congratulations to SMEITS / KGH for the professional and successful organization of the congress and exhibition, and its 50th anniversary, and congratulations also to the Government of Serbia, the Ministry of Environmental Protection, and its Ozone Depletion Group for the ratification of the Kigali Amendment.

Contact: [Halvart Koeppen](#), Montreal Protocol Regional Coordinator for Europe & Central Asia (ECA), UN Environment Programme, Law Division, OzonAction

Image: OzonAction website

12. EU remains on track to phase-down use of climate-damaging F-gases

The supply and use of climate-warming fluorinated greenhouse gases (F-gases) rose slightly across the European Union and United Kingdom in 2020, according to the latest annual update on the EU's progress of phasing down the use of F-gases published by the European Environment Agency (EEA) today.

Consumption of **hydrofluorocarbons** (HFCs) by European industry continued to decline in line with EU commitments under United Nations agreements, according to the EEA briefing '[Fluorinated greenhouse gases 2021](#)'

The briefing provides an update on the data reported by companies on the production, import, export, and destruction of **fluorinated greenhouse gases** in the EU and the UK for 2007-2020. The briefing also outlines the key trends in the **EU supply of F-gases and monitors progress** under the hydrofluorocarbon phase-down schemes of the EU's F-gas Regulation and the UN's Montreal Protocol and its so-called Kigali Amendment. Industry is substituting these F-gases with more climate-friendly products.

F-gases contribute to **climate change** and made up **2.3% of total EU greenhouse gas emissions**, according to the latest data from 2019. These synthetic chemicals are predominantly used in refrigerators, air conditioners and heat pumps. They are considered potent greenhouse gases and have been regulated in the EU since 2006 to reduce their use and impact on global warming.

The EEA assessment also details the different amounts of F-gases supplied for various industrial applications. These are expressed both in physical amounts (in tonnes) and in 'global warming amounts', i.e., physical amounts weighted by the global warming potential of hydrofluorocarbon gases and measured in CO₂-equivalent tonnes (CO₂e).

EU contribution to global phase-down

In 2020, EU-wide placing of hydrofluorocarbons on the market was 4% below the 2020 overall market limit set by the quota system (2% in 2019). The companies that did not fully use their quota counterbalanced the few cases of quota exceedance by importers of bulk HFCs and equipment importers. While the demand for refrigerants remains high, there has been a shift to alternatives with lower global warming potential (GWP).

Other Key Findings:

- In 2020, the total supply of fluorinated gases (F-gases) to the EU increased slightly after a continuous decrease from 2015 to 2019. Refrigeration and air conditioning continue to be key applications for these gases.
- Despite a 7% increase in hydrofluorocarbons (HFC) consumption compared with 2019, EU consumption of HFCs in 2020 was 52% below the maximum imposed by the Montreal Protocol's Kigali Amendment.
- The EU remains on track under the HFC phase-down phase of the EU F-gas Regulation: EU-wide placing on the market of HFCs in 2020 was 4% below the market limit.



- As available HFC quotas have not been fully needed to cover the demand, the reserve of quota authorisations eligible to cover imports of refrigeration, air conditioning and heat pump equipment under the HFC phase-down continues to grow. The current size of the reserve accounts for about seven times the amount of such equipment imported in 2020 or 111% of the 2021 EU maximum quantity of HFCs.

Read/Download "[Fluorinated greenhouse gases 2021](#)"

[European Environment Agency, 2 December 2021](#)

Image: © Thalles Cazaroto from Pexels

FEATURED



OZONE SECRETARIAT

Overview for the meetings of the ozone treaties in 2022

[68th IMPCOM](#), Venue – to be determined, | 09 July 2022

[44th OEWG](#), Venue – to be determined, | 11 - 15 July 2022

[69th IMPCOM](#), Venue – to be determined, | 29 October 2022

[33rd MOP Bureau](#), Venue – to be determined, | 30 October 2022

[34th MOP](#), Venue – to be determined, | 31 October - 04 November 2022

Click [here](#) for past and upcoming Montreal Protocol Meetings Dates and Venue.

Upcoming meetings

2022 ^

68th IMPCOM

Venue – to be determined, | 09 Jul 2022

44th OEWG

Venue – to be determined, | 11 - 15 Jul 2022

69th IMPCOM

Venue – to be determined, | 29 Oct 2022

33rd MOP Bureau

Venue – to be determined, | 30 Oct 2022

34th MOP

Venue – to be determined, | 31 Oct - 04 Nov 2022

Summary of the Combined Twelfth Meeting of the Conference of the Parties to the Vienna Convention for the Protection of the Ozone Layer (part II) and the Thirty-Third Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer: 23-29 October 2021.

[The Earth Negotiations Bulletin, 1 November 2021, Vol. 19 No. 157](#)

See also >>> [IISD Daily coverage and photos](#)

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 >>>](#)



[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 87th meeting, presented in the order of the agenda of the meeting.

- Click [here](#) for the Executive Committee upcoming and past Meetings and related documents..



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

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

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 that 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)*

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.

> [GFCCC-UNEP OzonAction Cold Chain Modelling Press Release](#)

> [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 and NDA of Cold Chain Database](#) form and return to [Ayman Eltalouny](#)*

Contact: [Ayman Eltalouny](#), Coordinator International Partnerships, UNEP, OzonAction

United Nations Environment Programme (UNEP), OzonAction

Image: OzonAction



[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 CO₂-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, CO₂-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 CO₂-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 CO₂-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 CO₂-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, CO₂-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



[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.

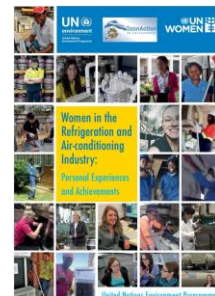


[Women in the refrigeration and air-conditioning industry: Personal experiences and achievements](#)

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](#)



As part of IIR and UNEP OzonAction's partnership, a set of Cold Chain Technology Briefs was released over the past few years, which includes in-depth summaries about the cold chain in different key sectors. They include descriptions of technology, refrigerant options and trends and conclude with prospects and challenges. They cover the main cold chain sub-sectors, i.e., [Production & Processing](#), [Cold Storage](#), [Transport Refrigeration](#), [Commercial & Domestic](#), and [Fishing Vessels](#).



Download the Cold Chain Technology brief in
[English](#) | [French](#) | [Russian](#) | [Spanish](#)

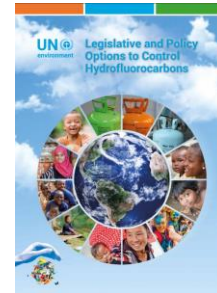
PUBLICATIONS

[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. [9-2021](#)
(in Italian).



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



[Status of the Global Food Cold-Chain: Summary Briefing-Food Cold Chain Food saved is as important as food produced.](#)

The UNEP-led Cool Coalition in collaboration with the Climate & Clean Air Coalition (CCAC), United Nations Environment Programme (UNEP), United Nations Food and Agriculture Organization (FAO), OzonAction and the Ozone Secretariat, with the support of the Italian Government, are producing a status report on the global food cold-chain, which will include case studies to show the current state and development across areas such as technologies, design approaches, finance and business models, policy, and planning. This brief is a short summary of the full report that will be published in December 2021. The aim is to help better identify and accelerate solutions to simultaneously feed the world, support smallholder and marginal farmers, and protect our environment.

[Cool Coalition Secretariat, September 2021](#)

Image: Cool Coalition



[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](#)

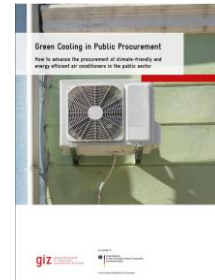
[Leaks, maintenance and emissions: Refrigeration and air conditioning equipment report](#)

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.

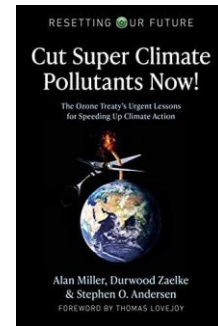


Green Cooling in public procurement How to advance the procurement of climate-friendly and energy-efficient cooling equipment in the public sector? Air conditioning in public buildings is often responsible for around 50% of total electricity consumption. Switching to climate-friendly cooling technologies ("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

VIDEO



Mario Molina: a life in profile. In loving memory 1943-2020

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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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