



OzoNews

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

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In this issue:

1. Is Earth's ozone layer still at risk? 5 questions answered
2. Hydrochlorofluorocarbon market set explosive growth to 2025
3. Fast mitigation to save lives and the planet in Latin America and the Caribbean
4. USEPA to start new rule-making on HFCs
5. HVAC manufacturers optimistic about the future of the refrigeration market
6. Reclamation of R-22 weakens in 2017, resulting in refrigerant concern
7. Oman and Jordan share experience on training and certification in the refrigeration and air conditioning
8. Cooling India with less warming: Affordable & Efficient ACs
9. NEW REPORT: Removing 'F-gases' could slow global warming by 0.5 degrees
10. ODS banks: Over 70 participants learned in GIZ webinar about environmental friendly disposal of old appliances in RAC sector

Global

1. Is Earth's ozone layer still at risk? 5 questions answered

Editor's note: Curbing damage to Earth's protective ozone layer is widely viewed as one of the most important successes of the modern environmental era. Earlier this year, however, a study reported that ozone concentrations in the lower level of the stratosphere had been falling since the late 1990s – even though the Montreal Protocol, a global treaty to phase out ozone-depleting chemicals, had been in effect since 1989. This raised questions about whether and how human activities could still be damaging the ozone layer. Atmospheric chemist A.R. Ravishankara, who co-chaired a United Nations/World Meteorological Organization Scientific Assessment panel on stratospheric ozone from 2007 to 2015, provides perspective.

What's the prevailing view among atmospheric scientists today about the state of the ozone layer?

The overall picture is clear: The Montreal Protocol reduced use of ozone-depleting chemicals and will lead to

healing of the ozone layer. This is an important goal because stratospheric ozone protects us from exposure to ultraviolet radiation, which can increase the risk of cataracts, skin cancer and other detrimental effects.

Of course, this forecast would be wrong if nations deviate from their treaty commitments, or if the scientific community fails to detect possible emissions of gases that could deplete the ozone layer but are not covered by the treaty.

Our understanding of stratospheric ozone depletion has grown steadily since the mid-1970s, when Mario Molina and F. Sherwood Rowland first suggested that the ozone layer could be depleted by chlorofluorocarbons, or CFCs – research that earned a Nobel Prize. In 1985 Joseph Farman reported on the formation of an “ozone hole” – actually, a large-scale thinning of the ozone layer – that develops over Antarctica every austral spring.

Further work by Susan Solomon and colleagues clearly attributed the ozone hole to CFCs and other ozone-depleting chemicals that contained the elements chlorine and bromine. They also highlighted unusual reactions that take place on polar stratospheric clouds.

In 1987, the United States and 45 other countries signed the Montreal Protocol, which required them to phase out use of ozone-depleting substances. Today 197 nations have ratified the treaty, which has prevented large-scale ozone layer depletion and its harmful consequences. Ozone-depleting substances are also greenhouse gases that trap heat in the atmosphere, so phasing them out under the Montreal Protocol has also helped to slow climate change.

It takes decades to cleanse CFCs and other ozone depleting substances from the atmosphere, so even after the Montreal Protocol went into effect, their concentrations did not peak until around 1998 and are still high. Nonetheless, based on atmospheric observations, laboratory studies of chemical reactions and numerical models of the stratosphere, there is general consensus among scientists that the ozone layer is on track to recover around 2060, give or take a decade. We also know that the future of the ozone layer is intricately intertwined with climate change.

What could explain the continued decline in ozone in the lower stratosphere that was reported earlier this year?

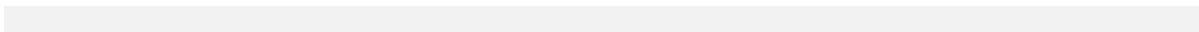
Of course, there are still some gaps in our knowledge of the ozone layer, and these two new reports have spotlighted such gaps.

The first study reported that although ozone concentrations were increasing in the upper stratosphere, they were still declining in the lower stratosphere. It suggested several possible causes, such as increases in uncontrolled, very short-lived gases produced from human activities that can deplete the ozone layer, as well as changes in atmospheric circulation due to climate change.

The second study identified rising levels of certain chlorinated chemicals, referred to as very short-lived substances that could continue to deplete the ozone layer.

These reports were a little surprising, but not shocking. Scientists expect that we will continue to add to our knowledge of ozone layer, and our understanding will emerge as we digest these findings. The Montreal Protocol requires the scientific community to carry out scientific assessments of ozone depletion every four years precisely because we expect that new information like this will continue to emerge. One of those reviews is under way now and will be published later this year.

If industrial activities causing this decline in the lower stratosphere, Montreal Protocol member countries can amend the treaty to address these new threats. They did so in 2016 to phase out hydrofluorocarbons – coolants, used in air conditioners and refrigerators that were found to be powerful greenhouse gases.





Ozone is constantly created and destroyed in Earth's atmosphere as oxygen interacts with ultraviolet light, but man-made chemicals can disrupt this process.

If ozone levels in the lower stratosphere have been decreasing for 20 years, why are scientists just detecting that trend now?

Ozone levels change naturally from year to year, so scientists need to look at data over long time periods to tease out trends. The potential for short-lived chlorine and bromine gases to affect the ozone layer has been recognized for a while. More recently, scientists have been measuring concentrations in the atmosphere of dichloromethane, a liquid that is widely used as a solvent, and deduced that if it continues to increase, it will be a potential problem. Trends in emissions of these compounds are uncertain, but some recent results suggest that they are not increasing as rapidly as they appeared to be a few years ago.

Did these studies find any changes in the ozone hole?

No, they did not. They examined ozone changes within 60 degrees of the equator, not over the Antarctic. We do not expect very short-lived substance emissions to significantly influence the ozone hole unless they increase drastically, but this is one more reason to keep an eye on them.

Do these recent findings make you question whether the Montreal Protocol is effective?

No! Indeed, they strengthen my trust in it.

With any environmental agreement, whether it addresses ozone depletion, acid rain, climate change or other issues, it is important to be vigilant during the "accountability phase" – the period after policy decisions have been made and before the targeted results are expected. I am confident that if scientific findings warrant it, Montreal Protocol countries will take further action, and that my granddaughters will see the day when we eliminate the ozone hole. In the meantime, Earth Day is a fitting time to celebrate the Montreal Protocol.

[The Conversation, 20 April 2018](#)

2. Hydrochlorofluorocarbon market set explosive growth to 2025



Image Credit : Refrigerants Archives - Uniform Refrigeration and Air-Conditioning

The foam, refrigeration and air-conditioning market has a scope for market growth in Asia Pacific and African markets due to high demand from end use industries. Blowing agents are required in construction, packaging and manufacture of appliances. Yet the environmental concerns of ozone layer depletion and global warming has led to restriction of HCFC as refrigerant and blowing agent. Hence, Asian and African markets face a challenge of meeting market needs and reducing climate change at the same time. A shift from fluorocarbons to alternatives is expected during the forecast period.

European Union has adopted measures, which go way beyond the requirements of the Montreal Protocol, and has actively promoted R&D for alternatives. HCFC use in many industrial sectors has been completely phased out. Similarly, in North America, the refrigeration market has seen a shift in CO₂-based refrigeration systems resulting in a withering market for HCFCs.

Latin American countries have also reduced HCFC and other ozone depleting substances by 60% according to UN Industrial Development Organization, despite burgeoning growth in refrigeration markets of Brazil and Chile. The region aims at a phase-out by 2030 meeting the Montreal Protocol requirements.

Under the Montreal Protocol complete phase out of HCFCs is slated for 2020 in developed countries and 2030 in emerging economies. Developed countries have already adopted or are in the process of adopting natural or less harmful artificial alternatives on a large scale, resulting in the phasing out of HCFC market in North America and Europe.

HCFC Market Taxonomy

On basis of type of HCFC: HCFC 22, HCFC 141b, HCFC 142b, HCFC 123, HCFC 124, HCFC 225ca, HCFC 225cb, HCFC 21, Others

On basis of Application: Refrigeration, Large Scale Refrigerators, Chillers, Air Conditioning

On basis of foam: Polyurethane Foam (PU), Polystyrene Foam (PS), Phenolic Foam Others

HCFC-22 was the most commonly used refrigerant, though it is being phased out in favor of HFC-134b.

Similarly, in the foam industry, HCFC 141b and HCFC 142b are being replaced by HFC-245fa. HCFC 123 are used in centrifugal chillers and fire extinguishers, HCFC 124 in air conditioning equipment. HCFC 225ca and HCFC 225cb are used as aerosol solvents.

The largest end user is refrigeration, though due to their adverse environmental effects, the market is rapidly shifting to HFC refrigerated systems, especially in the U.S. The stationary air-conditioning includes commercial and residential spaces, while mobile air-conditioning is employed in automotive and aviation industry. The rise in disposable incomes in developing markets has led to growth in automotive market which in turn has driven the air-conditioning market.

Coherent Chronicle, 20 April 2018, By: Debdoot Goswani

Latin America and Caribbean

3. Fast mitigation to save lives and the planet in Latin America and the Caribbean

The implementation of measures to reduce air pollution and short-lived climate pollutants – which include black carbon, methane, tropospheric ozone, and hydrofluorocarbons (HFCs) – will reduce warming in Latin America and the Caribbean (LAC) up to 0.9° C by 2050, whilst providing significant other co-benefits. These are the conclusions of the first ever Integrated Assessment of Short-lived Climate Pollutants (SLCPs) for the region.

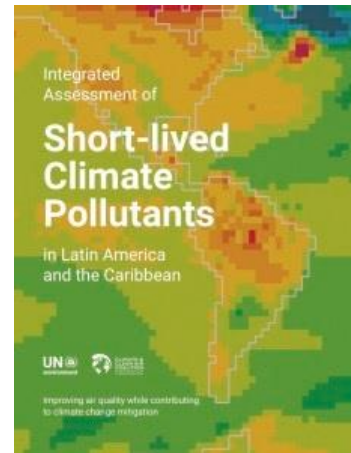
The assessment, developed by 90 authors and led by experts from the region, was released today by the United Nations Environment Programme (UN Environment) and the Climate and Clean Air Coalition (CCAC). It concludes, efforts to reduce air and climate pollutants in the region could also help countries reap immediate and long-term benefits for health, reducing premature deaths from pollution by at least 26% from fine particulate matter and 40% from ozone annually, and avoid the loss of 3 – 4 million tonnes of staple crops – soybeans, maize, wheat, and rice – each year.

“For LAC, and for the world, cutting SLCPs is critical for climate protection,” said Durwood Zaelke, President of the Institute of Governance and Sustainable Development and a CCAC partner. “We can’t win the fight against climate change without fast mitigation action like these, which will make the difference between living in a safe climate and suffering from uncontrollable impacts, not least from feedback mechanisms that risk irreversible and potentially catastrophic effects”.

The LAC assessment identifies six technical and policy measures targeting methane, nine addressing major sources of black carbon, and six for HFCs, which can reduce regional emissions of these pollutants by 45%, 69%, and more than 80% respectively by 2030, with many positive examples of the required measures already in place across the region. Of the six measures for eliminating high-warming HFCs the rapid ratification and implementation of the Kigali Amendment to the Montreal Protocol is noted, which itself can avoid up to 0.5° C globally by the end of the century.

“These proposed near-term goals will help focus global action towards immediately available opportunities to avoid disaster,” said contributing author of the Assessment Romina Picolotti, and IGSD Senior Counsel. “Quantifying the multiple benefits of air and super pollutant mitigation policies will allow for LAC to fully capitalize on the inherent synergies and co-benefits in these mitigation strategies, bringing the region closer to achieving their Paris Agreement commitments, and the 17 Sustainable Development Goals”.

The Integrated Assessment of Short-lived Climate Pollutants in Latin America and the Caribbean is [here](#)
[Institute for Governance & Sustainable Development \(IGSD\), 18 April 2018](#)



North America

4. USEPA to start new rule-making on HFCs

In short term, agency will follow court ruling barring it from replacing HFCs; meeting set for May 4.

The U.S. Environmental Protection Agency (EPA) last week issued a notice of guidance affirming that it would adhere to a Court of Appeals ruling that limits its ability to regulate HFCs while also stating its intention to commence a notice-and-comment rulemaking process to revisit how it can regulate HFCs.

The agency also announced a stakeholder meeting on May 4 at its Washington, D.C., headquarters to enable stakeholders to provide input as part of the rulemaking process.



The EPA's notice was issued "to dispel confusion and provide regulatory certainty" for end users of refrigeration, air conditioning and other applications affected by the EPA's Significant New Alternatives Policy (SNAP) program's Final Rule 20 issued on July 20, 2015, which delisted numerous HFCs for certain applications. That rule was in effect invalidated by the decision last August of the Court of Appeals for the District of Columbia Circuit.

"In the near term EPA will not apply the HFC listings in the 2015 rule, pending a rulemaking," the agency said in the notice of guidance, its first official response to the court ruling.

At the same time the EPA said it "plans to begin a notice-and-comment rulemaking process to address the remand of the 2015 rule." The agency added that it "intends to consider the appropriate way to address HFC listings under the SNAP program in light of the court's opinion" and also consider "the larger implications of the court's opinion remanding the rule to the agency."

The court gave the EPA several options for regulating HFCs, including "retroactive disapproval" and the use of other laws such as the Toxic Substances Control Act.

The National Automatic Merchandising Association (NAMA) reacted favorably to the guidance, which confirms the suspension of a January 1, 2019 deadline for phasing out HFCs in vending machines.

"This week's action delivers the positive result NAMA was working toward, a result that benefits manufacturers and operators alike -- providing valuable, additional time to work through challenges related to a transition away from HFCs," said NAMA's Senior Vice President, Eric Dell.

"Moving ahead, the industry will continue to work together with the EPA on this issue and remains committed to a transition away from HFCs," he added. "In fact, NAMA is undertaking research to determine optimal next steps and address concerns related to alternative refrigerants."

The Court of Appeals ruling was issued in the case *Mexichem Fluor, Inc. v. EPA*. The two plaintiffs in the case were manufacturers of HFCs: Mexican Mexichem Fluor and French company Arkema SA.

The ruling specifically vacated the 2015 EPA Final Rule 20 "to the extent that it requires manufacturers to replace HFCs with a substitute substance."

In January the court refused to rehear the case. Honeywell, an intervenor, has appealed the case to the U.S. Supreme Court.

Meanwhile, last month the California Air Resources Board (CARB) adopted a regulation prohibiting the use high-GWP HFCs refrigerants, thereby maintaining in California the HFC prohibitions previously established by the EPA.

The U.S. Congress has also begun to address this issue. In February two U.S. senators – John Kennedy (R-La.) and Tom Carper (D-Del.) – introduced a bipartisan bill, the American Innovation and Manufacturing Act, that would empower the EPA to issue rules phasing down HFCs through a cap-and-trade program and the "advancement of environmentally friendly technologies." It would also conform to the Kigali Amendment to the Montreal Protocol, which calls for a global phase-down of HFCs.

The Trump Administration is still mulling whether to refer the Kigali Amendment to the U.S. Senate, which would need to ratify it before the U.S. would be committed to the amendment's HFC phase-down.

[R744, 19 April 2018, By Michael Garry](#)

5. HVAC manufacturers optimistic about the future of the refrigeration market

Still, concerns remain over refrigerant regulations

The U.S. economy is looking more robust, with many economists predicting the gross domestic product (GDP) will grow between 2.5 and 3 percent this year. That is slightly higher than last year's GDP, which the Bureau of Economic Analysis reported as increasing 2.3 percent, but much higher than the increase of only 1.5 percent in 2016.

Other economic indicators are looking positive as well, including modest inflation, higher wages, increased consumer spending, and low unemployment. All these factors are leading manufacturers to believe 2018 will be a good year for the refrigeration market.

OPTIMISTIC OUTLOOK

A growing economy and high levels of consumer confidence have helped to get 2018 off to a good start, which is



why Danfoss is optimistic about the remainder of the year, according to Chris Nitz, marketing manager of commercial refrigeration —North America, Danfoss.

“Our business in the refrigeration segments last year was quite strong, and the marketplace was active and vibrant, especially in the area of foodservice,” he said. “We anticipate this growth will continue throughout 2018, impacted by favorable economic conditions in the United States influencing consumer behavior.”

The growth seen last year in the foodservice segment should continue, predicts Nitz, including the trend toward hydrocarbon (HC) refrigerants, which drive efficient and safe refrigeration system designs.

“One of the enabling components — the microchannel heat exchanger — is particularly well suited for these designs, as it is capable of either improving efficiency within the same footprint or reducing footprint while maintaining efficiency, compared to more traditional heat exchangers,” he said.

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old rooms, including the walk-in cooler and freezer applications found in many venues, such as convenience stores and supermarkets, also remain an important area of focus for the industry because of the ongoing demand for tighter temperature control and monitoring in order to ensure food safety and quality.

“As a result, Danfoss is seeing growing interest in electronic thermostat and controller products, which are popular because of the options and flexibility they offer refrigeration applications,” Nitz added.

Emerson saw positive sales in 2017, and the company anticipates 2018 will be even stronger, said Don Newlon, vice president and general manager, food retail, Emerson.

“We see foodservice showing solid growth, and we expect food retail, transportation, and industrial will be even stronger,” he said. “Since 2014, we’ve placed significant development emphasis on helping our customers be ready for refrigerant and energy advancements, and those products are growing nicely individually and inside higher value engineered solutions with controls and other components.”

The Hussmann Corp. believes this year’s growth in food retail will come from the convenience store segment as it continues to grow in square footage to compete with supermarkets and quick-service restaurants (QSRs) for the consumer-away-from-home food dollars, said Cheryl Beach, manager of marketing communications, Hussmann.

“We see more convenience stores focusing on retail foodservice programs that include commissary prepared foods or on-premise prepared foods with the goal to provide their customers with fast, healthy, fresh alternatives throughout the day,” she said.

LOOKING AHEAD

While manufacturers are optimistic about growth this year, there are lingering concerns over the current and future state of regulations and refrigerants.

“In 2017 we definitely were dealing with DOE [U.S. Department of Energy] regulations that impacted all the OEM refrigeration equipment manufacturers for display cases and walk-in coolers to ensure that our product portfolio was completely compliant with the new regulations,” noted Beach. “In 2018, we continue to hear conversations and see EPA [U.S. Environmental Protection Agency] guidelines around HFC and natural refrigerants. The industry is spending a lot of research and development on refrigerants, compressors, and systems to find the best product mix to meet food retailers’ needs.”

She added that food retail customers have a lot of questions and concerns as to how to balance their currently installed R-134a and R-404A refrigeration equipment while making decisions about new HFC blends and natural refrigerants for their new store projects.

“They are also being asked to consider business sustainability goals for carbon footprint, GWP, and ozone depletion while still maintaining the operating performance they need from their refrigeration equipment,” Beach said.

Adding to the confusion is the recent decision by the D.C. Circuit Court of Appeals to deny a petition to rehear its prior case that ruled the EPA does not have the authority to regulate HFC refrigerants.

“This is creating some uncertainty regarding the transition of equipment to low-GWP refrigerants,” said Nitz. “We believe this is only temporary, since large investments in resources and capital have already been made and some manufacturers are proceeding along the transition path.

“Additionally, some states, including California, are driving ahead to regulate HFCs using the U.S. EPA SNAP [Significant New Alternatives Policy] rules as a key part of their framework,” he continued.

That said, careful consideration needs to be given to any proposed regulation in order to allow manufacturers to effectively respond to potentially different state-by-state regulations, added Nitz.

“We believe that it is important that the United States ratify the Kigali Agreement to the Montreal Protocol so that the U.S. can continue to be seen as a leader in refrigeration technology innovation,” he said.

The recent SNAP ruling is a concern, said Newlon, as some end users and manufacturers are faced with questions about how to proceed.

“We are working with our customers to help determine their approach moving forward,” he explained. “Refrigeration is dealing with extraordinary dynamics right now, bringing both a challenge and an opportunity. We see our role as engineering simple and sustainable solutions to meet these challenges.” The transition to natural and alternative refrigerants will likely continue, according to Nitz.

“In addition to natural refrigerant deployment, there are a number of low-GWP refrigerants being developed that will jointly stimulate sustainable equipment sales,” he said. “Manufacturers that have invested heavily in their infrastructure in order to participate in the transition will benefit. However, it is also critically important for the industry to invest in training for contractors in order to ensure the successful and safe shift to hydrocarbon refrigerants, such as propane and isobutane.”

This last point is particularly important because without properly trained techs, refrigeration equipment cannot be installed and/or maintained correctly.

As manufacturers shift to new refrigerants, the industry will need to provide additional training to ensure contractors are able to install and service the next generation of equipment being offered.

[ACHR News, 2 April 2018](#)

6. Reclamation of R-22 weakens in 2017, resulting in refrigerant concern



Recovery efforts may not be enough to meet future needs

According to the U.S. Environmental Protection Agency (EPA), more than 9 million pounds of R-22 were reported as being reclaimed in 2016. That is up from 2014 and 2015, during which time a little less than 8 million pounds were reclaimed each year, but still significantly below the more than 10 million pounds of R-22 that were reclaimed in 2008.

While 2016 showed a bump in the amount of R-22 being reclaimed, 2017 showed distinct signs of softening. As a result, refrigerant reclamation companies are concerned that recovery and reclamation efforts will not be enough to meet the HVACR industry’s needs once the production of R-22 ends in 2019.

SALES SLOWDOWN

Without a doubt, 2016 was a very good year for reclamation, said Carl Grolle, president, Golden Refrigerant, but 2017 was a different story.

“The first half of the year was very robust, but in the second half, R-22 sales declined dramatically,” he said. “I do not have a prediction for 2018, as it hinges on too many factors that we cannot foresee, including weather, pricing and availability of import gases, and government regulatory changes. On the surface, the reduction of new R-22 should tighten the market. Whether the existing surplus will be enough to meet the demand is anybody’s guess.”

According to Taylor Ferranti, vice president, refrigerant, A-GAS, the R-22 market slowed down in 2017 for a variety of reasons, including a lot of product in the respective channels; a cooler season; price increases driving contractors to use more replacement refrigerants; the absence of “dry” R-22 units; and a good economy, which led to more equipment being replaced rather than repaired.

“Even with these market challenges, we had a strong year of growth in 2017,” he said. “We expect 2018 to be even better, given that we have expanded our mixed gas separation capacity and incoming reclaim gas stream.” Jay Kestenbaum, senior vice president of sales and purchasing, Aspen Refrigerants Inc., feels that the total amount of recovery and reclamation business over the past few years should have been greater, and the industry, as a whole, should be recovering much more than it has been.

“The market has not yet reached the level of overall recovery, reclamation, and reuse of refrigerants that will be necessary to service existing equipment following the 2019 end of production of R-22, based upon EPA’s estimates of continuing needs after that date,” he said.

The reason for that, according to Kestenbaum, may be linked to past EPA actions, through which production allowance caps were often restricted and then expanded.

“This may have given many a false sense of security in believing that there would be ample supply to cover future years,” he said. “The only true source for the long-term continuing supply of R-22 is recovery and reclamation, which needs to increase drastically.”

There is no question that the overall growth in reclamation of R-22 for the industry has been weak, said Kevin Zugibe, chief executive officer, Hudson Technologies Inc.

“Based upon EPA’s supply and demand estimates for R-22, it is evident that the reclamation market will need to

grow significantly to fill the impending void," he said. Zugibe expects greater growth in 2018, as the impending shortage of R-22 becomes more evident.

"We feel confident that the best refrigerant for existing R-22 systems is reclaimed R-22 and that the reclamation industry can provide the necessary R-22 supply for the future, as it has done for CFC [chlorofluorocarbons] needs for over two decades," he said.

Zugibe added that he has concerns over some R-22 substitutes, which he believes are not necessarily better than R-22 from a global warming potential (GWP) perspective and can lead to system failures if the change-out is not performed properly.

CHALLENGES AND OPPORTUNITIES

Kestenbaum also predicts stronger growth in 2018, thanks to the expanded and new regulations, the anticipated future phasedown of HFCs following the Kigali Amendment to the Montreal Protocol, and rising prices due to some industry anti-dumping actions.

"These should result in increased recovery and reclamation of many more products in greater quantities in 2018," he said. "While the reclamation of R-22 continues to be a primary component of our industry, the reclamation of HFCs presents a longer term opportunity, particularly in light of the anticipated phasedown of HFCs."

There will, of course, be challenges, said Kestenbaum, including the continued higher rates of mixed refrigerants coming back to reclamation facilities.

"The expanded array of refrigerant products, and the unfortunate continued trade practice by some to top off systems without using the same refrigerant, has resulted in higher mixed return rates, and will likely lead to premature failure of systems," he continued. "Mixed refrigerant returns require extra cost in reclamation and obviously inflate the cost of future supply."

Zugibe agreed, noting the use of many drop-in substitute blends has resulted in more cross-contamination every year.

"Although Hudson is a leader in fractional distillation, poor practices in the use of these substitutes result in more energy and cost to reclaim these refrigerants," he said. "However, we are optimistic that with the ultimate phaseout of R-22 less than two years away, we are now entering a time in which the supply shortage will be obvious to the industry, which should energize the growth in reclamation."

Grolle is also optimistic about 2018 and said his company is focused on gaining market share this year. Still, he noted that reclaimers have a very limited ability to select which refrigerants they receive in their collection programs, and that makes it difficult to adapt to changing market prices.

"We also face fixed costs associated with the reclamation and packaging of refrigerants," he said. "When prices drop, it usually ends up as losses to the claimer; conversely, when prices rise, it can result in a better bottom line for the company."

Looking ahead, Grolle expects the reclamation business to become even more technical, requiring sophisticated equipment and procedures to collect and process the newer blended refrigerants.

"The HFOs [hydrofluoroolefins], along with R-32, are mildly flammable gases, which will require another round of investment in order to safely process and handle them," he said.

This continuing evolution of refrigerants — and their accompanying regulations — means there will always be a need for reclaimers.

"Old habits die hard, but venting of refrigerants is illegal," said Ferranti. "And reuse of refrigerants is only allowed if the product remains with the existing owner. As a result, we are optimistic that contractors and wholesalers want to do the right thing for the environment and will continue to utilize companies, such as ourselves, and increase their reclamation activities."

[ACHR News, 9 April 2018](#)

7. Oman and Jordan share experience on training and certification in the refrigeration and air conditioning

In the framework of OzonAction's South-South Cooperation, officials from the Oman ministry of Man Power in addition to a National Ozone Unit representative visited Amman to share experiences and examine Jordan's national scheme for the training and certification of technicians working in the refrigeration and air conditioning service sector.

This is the only scheme of its kind that is operational in the region.

This visit will enhance the cooperation between the two countries after the initial visit of a Jordan delegation to Oman to exchange experiences on the operation of the e-licensing system for imports and exports of ozone depleting substances and other controlled substances.



Contact: [Ayman El-Talouny](#), UN Environment, OzonAction, Montreal Protocol Officer, Regional Office West Asia

Asia Pacific

8. Cooling India with less warming: Affordable & Efficient ACs

With Earth Day top of mind this week, what do you think is one of the top strategies to protect the planet from climate change? Would you guess improving air conditioners? That's true for India and the earth.

With rising income levels in India, and climate change fueling temperatures higher, the demand for air conditioners is increasing. Mumbai already hit a scorching 41°C (105.8°F), marking the hottest March day in seven years.

Less than 10 percent of Indian households currently use air conditioners, but sales are increasing by 10 to 15 percent every year as income levels rise. There's no one-size-fits-all solution that can keep 1.3 billion people—many who lack a reliable supply of electricity—cool, without adding to the burden of air pollution and ramping up the climate pollution that is making the heat worse.

Sales of room air conditioners have skyrocketed from 2 million units in 2006 to approximately 30 million units in 2017. These units burden electric grids with greater peak power demand, leading to higher power plant fuel consumption and increasingly poor air quality. Increased air conditioner use also exacerbates harmful climate change caused by emissions of carbon dioxide from power generation and the release of refrigerants, usually hydrofluorocarbons (HFCs), potent heat trapping gases used in air conditioners.

To beat the heat without harming the environment, India is looking at a combination of strategies, including climate-friendly air conditioners, cool roofs and energy efficient buildings. The Energy and Resources Institute, Natural Resources Defense Council, and the Institute for Governance and Sustainable Development have partnered together to examine strategies to improve air conditioning in our new report: Cooling India With Less Warming: Affordable and Efficient Room Air Conditioners.

The Opportunity: Improving Air Conditioning

Both in terms of the refrigerant greenhouse gases and energy efficiency – improving air conditioners offers major benefits. Leading AC manufacturers recognize the tremendous business opportunity and are aggressively working to increase market share. In October 2016, 197 countries reached a historic agreement, the Kigali Amendment to the Montreal Protocol, to cap and then phase down production and consumption of HFCs worldwide. HFCs have a thousand times higher global warming potential than carbon dioxide, and phasing down HFCs is one of the greatest opportunities to stave off the worst effects of climate change.

The benefits of improved ACs are huge. In India alone, fulfilling the Kigali Amendment is expected to avoid the use of HFCs equivalent to between 2 and 6 billion tons of carbon dioxide through 2050 – about 20 to 25% of



which is likely to come from reductions in HFCs used for room ACs. India has an opportunity to avoid an additional 950 million tons of HFC use through 2050, by phasing down faster, on pace with the majority of developing countries under the Kigali agreement. Air conditioning manufacturers in India already offer ACs using refrigerants such as low global warming potential (GWP) hydrocarbon HC-290 (propane), with GWP 3, and transitional refrigerant HFC-32, with GWP 677, compared to the refrigerants HCFC-22 with GWP 1760 and HFC-410A with GWP 1924.

In addition to switching to better refrigerants, improving the energy efficiency of room ACs can deliver even more remarkable climate benefits. Lawrence Berkeley National Laboratory estimates that if by 2030, India's AC stock improves in average efficiency by 30% from 2015 levels, annual carbon dioxide emissions will decrease by approximately 180 million metric tons per year - equivalent to about 10% of the carbon dioxide emissions reductions expected from India's Nationally Determined Contribution (NDC) to the Paris Agreement in that year.

More than 50 room AC models that meet the climate-friendly LBNL scenario – having Indian Seasonal Energy Efficiency Ratios (ISEERs) of 4.0 or greater – are already on the Indian market. These energy efficient ACs include several using low-GWP refrigerant HC-290 (up to 1.5 tons) and lower-GWP HFC-32 (up to 1.8 tons). The best room ACs as of April 2018 have already reached ISEER 5.8 and upwards in the Indian market, sold by Daikin, Godrej, Panasonic, LG and Hitachi. Yet, more needs to be done to advance markets that improve air conditioning.

Energy efficient and climate-friendly room ACs are just part of the solution. Passive cooling techniques, such as using shading, ventilation, and cool roofs, homes built to energy conservation building codes, and adaptive thermal comfort strategies, will lessen dependence on mechanical cooling, saving energy and reducing pollution even before the AC turns on.

Six Strategies for Improving Air Conditioning

The issue brief identifies six strategies with varying ease of implementation to advance climate-friendly ACs in India and globally. Some strategies are already underway – such as energy efficiency standards, bulk procurement programs, and national cooling action plans – but may benefit from higher ambition or better integration. Other strategies require longer timeframes, such as localizing supply chains and raising consumer awareness. Some strategies call for government leadership while others rely on industry leadership.

- Opportunities under the Montreal Protocol. Room AC manufacturers phasing out HCFC-22 should continue leapfrogging traditional high-GWP HFCs in favor of the lower-GWP alternatives with funding support from the Montreal Protocol while also working with UN agencies to facilitate co-funding and/or financing energy efficiency upgrades.
- Energy Efficiency and Low-GWP Standards & Labels. The Bureau of Energy Efficiency Star Labeling program has succeeded in strengthening AC efficiency standards and labels by about 35% since 2006, representing major cost and energy savings in India. One immediate opportunity, consistent with the number of efficient room ACs entering the market in India, is to consider advancing the rate at which the Star Rating program is strengthened to foster competition and help consumers identify the most efficient room ACs.
- Bulk Procurement Programs. Bulk procurement programs, such as EESL's AC program, are revolutionizing the landscape for high efficiency products, and a strategy to advance efficiency is encouraging lower-GWP refrigerants as part of the procurement process.
- Raising Consumer Awareness. Differentiating among room ACs with stronger efficiency standards, above ISEER 4.5, would help consumers identify the most energy efficient room ACs as well as including GWP-based refrigerant labels to the Star Rating program.
- Local Supply Chains and R&D. Leveraging programs such as "Make in India," the AC industry can work with the Indian government to increase domestic components used in room ACs, as well as, financial incentives for high-efficiency components and private buyers clubs.
- National Cooling Action Plans. India is developing a National Cooling Action Plan that brings cooling strategies together from more efficient AC designed, low-GWP refrigerants, and passive cooling technologies.

While policies like the Kigali Amendment, strengthened energy efficiency standards and nascent bulk procurement programs have spurred progress, it is ultimately the industry that has delivered the technical innovations that have resulted in ground-breaking room ACs reaching the Indian market. In identifying the strategies in this report, we have sought to work with various stakeholders to identify ways to accelerate the AC market transformation already underway in India and elsewhere.

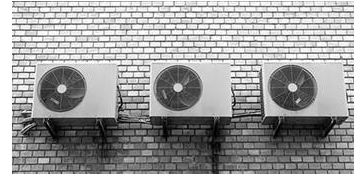
While many of these strategies are already in use, greater ambition and better integration can still make a big difference to meet the growing cooling demand from an onslaught of climate change and rising temperatures so that with both adaptive and mitigation strategies thermal comfort for all can be realized in a climate friendly and sustainable manner.

Natural Resources Defense Council, 25 April 2018, By: Anjali Jaiswal and Sameer Kwatra

Europe & Central Asia

9. NEW REPORT: Removing 'F-gases' could slow global warming by 0.5 degrees

Government must step up to the global challenge to tackle emissions from fridges, asthma inhalers, and air conditioners – doing so could knock 0.5 degrees off this century's temperature rise.



The Environmental Audit Committee has today published its report, UK Progress on Reducing F-gas Emissions. The report calls on the Government to enforce existing F-gas regulations and use its procurement power to promote products with a lower global warming impact.

It has also called on the NHS and medical companies to reduce the production and use of Metered Dose Inhalers, establish a recycling system for them, and legislate to avoid them going to landfill. The report examines the issues surrounding the regulatory impact of the UK's withdrawal from the EU's F-gas regime, and the knock-on effect issues such as F-Gas regulation could have on multilateral international agreements (where both the UK and EU are signatories), and on future trade deals.

F-gases are greenhouse gases with a high global warming potential (which are worse for climate change). While a small proportion of the planet's and the UK's emissions, if all countries meet their F-gas reduction targets, it would reduce global temperature rises over this century by half a degree.

Mary Creagh MP, Chair of the Environmental Audit Committee, said:

“Global warming is a clear and present danger and the UK should be doing all it can to bend the curve of global temperature rises. Some F-gases make a much bigger contribution to global warming, and are found in everyday items such as inhalers, fridges, and air conditioning units.”

“At present, the Government is failing to enforce the regulations surrounding F-Gas emissions, particularly on car air conditioning units, while the NHS remains reliant on F-gas fuelled inhalers despite less damaging alternatives being available and widely used in other European countries.

“The Government, the NHS, manufacturers and medical companies should be doing much more to address F-gas emissions. International cooperation on removing F-gas emissions could have hugely beneficial consequences for future generations.”

The reports states that:

- F-gases have contribute considerably more the global temperature rises, but are replaceable by less damaging alternatives.
- The Government must enforce existing F-Gas regulations to meet legally binding carbon budgets, and must allocate resources to monitoring illegal sale, use and handling of F-gases.
- The Committee heard that online vendors of F-gases (or products containing F-gases) are not always checking that those using them are qualified and trained to do so. There are concerns from the refrigerant industry that some mechanics might be tempted to substitute more expensive lower GWP alternatives (which contribute less to climate change) for cheaper higher GWP refrigerants (which contribute more). There are also concerns that as EU quotas begin to drive up the price of higher GWP refrigerants, mechanics may be tempted to retrofit mildly flammable lower GWP refrigerants in older non-flammable car air conditioning units, which could be dangerous.
- The NHS should reduce reliance on asthma medication which uses Metered Dose Inhalers (MDIs), which use high GWP HFC propellants (which contribute more to climate change than alternatives).
- Medical companies or the NHS should establish a pharmacy-based inhaler recycling system to ensure that residual HFCs from MDIs are recycled rather than released in landfill. The UK uses 35 million MDIs a year, and only about 0.5% are recycled.
- The Government should use its procurement power to promote dry powder alternatives.
- The UK's withdrawal from the EU raises significant challenges for the UK's F-gas regime – depending on the future relationship with the EU's F-gas quota system.

- The UK's withdrawal from the EU has led to uncertainty over the status of mixed multilateral international agreements, where both the UK and EU signed.
- The issue of UK companies which hold F-gas quotas needs to be resolved as it could present problems for a future trade deal with the EU.

Membership of the Committee

Media Information: [Sean Kinsey](#) / 07917 488791

[Specific Committee Information](#) / 020 7219 6150

Committee news and reports, Bills, Library research material and much more can be found [here](#)

All proceedings can be viewed live and [on-demand](#)

[UK Parliament, 25 April 2018](#)

10. ODS banks: Over 70 participants learned in GIZ webinar about environmental friendly disposal of old appliances in RAC sector



Germany, April 2018 - Reducing banks of Ozone Depleting Substances (ODS) is a complex issue, but can significantly contribute to protect our environment. If ODS are released into the atmosphere, those chemical substances – used as refrigerants and foam blowing agents in cooling appliances and foam - deplete the ozone layer and contribute to global warming. While the Montreal Protocol covers the production and consumption of ODS, the disposal of accumulated substances has not been regulated yet. Emissions from these so-called ODS banks correspond to 1.5 Gt CO₂eq per year which equals the annual emissions of 441 coal-fired power plants.

Against this background, the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH hosted a webinar on Thursday April 19th, providing insights on key processes to establish good practices in ODS bank management. Over 70 participants from public, private and civil society learned about the steps of correct collection, recycling and disposal of ODS and listened to first hand experiences from Ghana. Within the project “Management and Destruction of existing ODS Banks” implemented by GIZ Proklima and funded by the International Climate Initiative (IKI) on behalf of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), a number of guidelines, posters and a short awareness clip highlighting the importance of this cross-cutting issue have been developed.

They are all accessible on the respective website: (<https://www.giz.de/expertise/html/4809.html>) or on the YouTube channel (<https://www.youtube.com/watch?v=DZH34n9W7tM>).

Finally, a practical on line tool can be found here: <https://www.transparency-partnership.net/system/files/document/GIZ-ODS-global%20roadmap-final.pdf>

Contact : Nicole Annette Mueller [[email](#)], Proklima, OE G330 Climate Change, Environment, Infrastructure, Deutsche Gesellschaft für, Internationale Zusammenarbeit (GIZ) GmbH

Featured



OZONE SECRETARIAT

-
- 40th Meeting of the Open-ended Working Group of the Parties to the Montreal Protocol, 11-14 July 2018, Vienna, Austria
 - Vienna Convention and Montreal Protocol Meetings: A Primer - [Read/Download](#)
 - [29th Meeting of the Parties to the Montreal Protocol](#)
 - [28th Meeting of the Parties to the Montreal Protocol](#)
 - Final text of the Kigali Amendment to the Montreal Protocol available in all the six official UN languages ([A](#) [C](#) [E](#) [F](#) [R](#) [S](#))
 - OEWG 39: The 39th Session of the Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, preceded by the 58th meeting of the Implementation Committee under the Non-Compliance Procedure for the Montreal Protocol, held on 9 July and a workshop on safety standards relevant to the use of low-GWP alternatives to HFCs, held on 10 July 2017.
 - [Draft report of the thirty-ninth meeting of the Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer - Addendum](#)
 - [Draft report of the thirty-ninth meeting of the Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer](#)
 - Click [here](#) for further information.
 - Browse through the Ozone Secretariat “[In Focus](#)” to learn about latest updates.
 - Click [here](#) for Montreal Protocol Meetings Dates and Venues

The UN Environment Assessment Panels have been the pillars of the ozone protection regime since the very beginning of the implementation of the Montreal Protocol. Through provision of independent technical and scientific assessments and information, the Panels have helped the Parties reach informed decisions that have made the Montreal Protocol a world-recognized success.

UNEP initiated the process of setting up the assessment panels in 1988, pursuant to Article 6 of the Montreal Protocol, to assess the scientific issues of ozone depletion, environmental effects of ozone depletion, and the status of alternative substances and technologies and their economic implications.

Four panels, namely the panels for Scientific, Environmental Effects, Technology, and Economic Assessments were formally established and approved at the First Meeting of the Parties to the Montreal Protocol in 1989 where their first set of Terms of Reference were adopted. Shortly after the Second Meeting of the Parties in 1990, the Panels for Technical Assessment and the Panel for Economic Assessment were merged into one Panel called the Technology and Economic Assessment Panel (TEAP), which together with the Scientific Assessment Panel (SAP) and the Environmental Effects Assessment Panel (EEAP) make up the three assessment panels active today.

In accordance with Article 6 of the Montreal Protocol and subsequent decisions of the Parties, the three panels carry out a periodic assessment at least every 4 years. The first assessment reports were published in 1989 and since then major periodic assessments have been published by all three panels in 1991, 1994, 1998, 2002, 2006 and 2010. For each periodic assessment, the key findings of the panels are synthesized into a short report. The full SAP assessment report for 2014 was published in December 2014, while the EEAP assessment report for 2014 was published in January 2015.

PROGRESS & QUADRENNIAL ASSESSMENT REPORTS

- [EEAP](#)
- [SAP](#)
- [TEAP](#)

SYNTHESIS REPORTS

- [2014 assessments](#)
- [2010 assessments](#)
- [2006 assessments](#)

[Assessment Panels List of Meetings](#)



THE MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL

- 2018 Executive Committee Primer
- [Report and other Documents](#) for the 80th meeting of the Executive Committee
- [Agenda](#) for the 80th meeting of the Executive Committee
- [Report](#) of the 79th meeting of the Executive Committee

[Learn more](#)



OZONACTION

RAC Videos

Download on the App Store

GET IT ON Google Play

New videos available on the OzonAction RAC video application

A series of new videos has just been released on the Refrigeration and Air-conditioning Technician Video Series application, with a focus on working with flammable refrigerants ...

50,000 downloads and counting!

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

OzonAction launches initiative to highlight 'Women in the refrigeration and air-conditioning sector'

OzonAction, in cooperation with UN Women, is seeking to collect experiences and short 'stories' from women working in the refrigeration and air-conditioning (RAC) sector. From female service technicians to installers, from designers to trainers, from manufactures to RAC associations, UN Environment OzonAction are looking to highlight your experience...

"Women in the RAC Sector" [flyer](#) | [Submission Form](#)

Learn more [UN Environment, OzonAction, March 2018](#)




An online portal that provides **National Ozone Units and other participants** access to the documentation for meetings, workshops and side events organised by **OzonAction's Compliance Assistance Programme**

FEATURES

- **Pre-session** distribution of concept notes, logistics information, agendas & meeting documents
- **In-session** sharing of presentations delivered during the meeting & updated documents
- **Post-session** circulation of meeting reports & recommendations
- **Secure** operations with password protection before & during meetings

24/7 ACCESS from PC, tablet, & mobile phone

www.ozonactionmeetings.org

Visit the [OzonAction Meetings Portal](http://www.ozonactionmeetings.org) and learn more about our current, upcoming, and future events



OzonAction Scoop- A tri-annual newsletter by UN Environment, OzonAction under the Multilateral Fund for the Implementation of the Montreal Protocol.
 Issue#1 | Issue#2



The application allow you to easily convert ODP, CO₂-eq and metric quantities of refrigerants and other chemicals

- Helps in understanding and reporting under the Montreal Protocol (and future commitments under the Kigali Amendment)
- The calculator will automatically perform the conversion between metric tonnes, ODP tonnes and/or CO₂-equivalent tonnes (or kg) and display the corresponding converted values
- The app includes both single component substances and refrigerant blends
- The components of a mixture and their relative proportions (metric, ODP, CO₂-eq) are also displayed.

Available for free from the Apple IOS store and Google PlayStore. Search for "GWP ODP CALC" in the Playstore to install!

Download it Now!



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

- Chemical name
- Chemical formula
- Chemical type
- ASHRAE designation
- Trade names
- HS code
- CAS number
- UN number
- Montreal Protocol Annex and Control measures
- Ozone depleting potential (ODP)
- Global warming potential (GWP)
- Blend components
- Toxicity and flammability class
- Main uses

OzonAction Smartphone Application WhatGas?
Available for **free** in the Google Play and Apple IOS Store
Scan the QR code or search for “UNEP”, “OzonAction” or “WhatGas?”



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

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

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

[OzonAction YouTube](#) | See also: [United Nations Treaty Collection](#)

OzonAction Factsheets



Click [here](#) to access **OzonAction Series of Fact Sheets** relevant to the **Kigali Amendment**.

HS Nomenclature (HS Codes) for HCFCs and Certain Other Ozone Depleting Substances
Post-Kigali Update

INTRODUCTION

In recent years, trade patterns in ozone depleting substances (ODS) have changed with the complete phase-out of chlorofluorocarbons (CFCs) as of 1 January 2010 (except for a few exempt uses), the hydrochlorofluorocarbon (HCFC) phase-out in progress and the increased trade hydrofluorocarbons (HFC) and other alternatives as replacement alternatives.

To better facilitate monitoring of trade in ODS, the Parties to the Montreal Protocol requested the World Customs Organization (WCO) to revise the Harmonized Commodity Description and Coding System, used in the Harmonized System (HS) codes for HCFCs. This resulted in providing headings 28.53 of Chapter 28 with the objective of assigning specific eight digit HS to the most commonly used HCFCs, and at the same time labelling individual HCFC codes previously assigned to CFCs. This amendment entered into force on 1 January 2012. With the 2016 Kigali Amendment to the Montreal Protocol phase-down HCFCs it is expected that a future amendment of the HS will assign separate HS codes for the most commonly used HFCs and other commonly used HCFCs.

HS Classification for ODS (2012)

Under the HS 2012 HCFCs and certain other ODS are to be classified in the HS as follows:

Chapter 28. Organic chemicals

28.53 Halogenated derivatives of hydrocarbons.

2853.1 - Halogenated derivatives of acyclic hydrocarbons containing two or more different halogens

2853.11 - Chlorofluoromethane (=HCFC-22)

2853.12 - Dichlorodifluoromethane (=HCFC-123, covers two isomers)

2853.13 - Dichlorotrifluoromethane (=HCFC-113, covers two isomers)

2853.14 - Chlorodifluoromethane (=HCFC-141, covers 3 isomers, including the most popular HCFC-141b)

2853.15 - Dichloromonofluoromethane (=HCFC-225, covers 3 isomers, including the most popular HCFC-225a and HCFC-225b)

2853.16 - Bromochlorodifluoromethane, bromochlorofluoromethane and dibromochlorofluoromethane

2853.17 - Other (= all remaining HCFCs and a number of other halogenated derivatives of acyclic hydrocarbons containing two or more different halogens, including other than the following ozone depleting substances controlled by the Montreal Protocol: hydrochlorofluoromethane (HCFC) and bromochloromethane (BCMC))

Download & present a correlation table showing the previous HS classification of ODS until 31 December 2011 (HS 2007) and the revised classification, which were applicable from 1 January 2012 (HS 2012). Information is also provided on the current HS codes for ODS-containing mixtures (see back page).

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

The Kigali Amendment to the Montreal Protocol: HFC Phase-down

INTRODUCTION

The Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer reached agreement at their 28th Meeting of the Parties on 15 October 2016 in Kigali, Rwanda to phase-down hydrofluoro-carbons (HFCs).

HFCs are commonly used alternatives to ozone depleting substances (ODS). While not ozone depleting substances themselves, HFCs are greenhouse gases which can have high or very high global warming potentials (GWPs), ranging from about 12 to 14,800.

The phase-down of HFCs under the Montreal Protocol has been under negotiation by the Parties since 2009 and the successful agreement on the Kigali Amendment (Decision XXXVI) and accompanying Decision XXXVII) continues the historic legacy of the Montreal Protocol.

This fact sheet summarises and highlights the main elements of the Amendment of particular interest to countries operating under Article 5 of the Protocol (Article 5 Parties).

OVERVIEW OF AMENDMENT

The Kigali Amendment adds to the Montreal Protocol the phase-down of the production and consumption of hydrofluoro-carbons (HFCs) and the main features of the amendment are the following:

- The Kigali Amendment will enter into force on 1 January 2019, provided that it is ratified by at least 20 Parties to the Montreal Protocol (90 per cent ratification) by the COP Party.
- There are four groups of Article 5 Parties with different cessation dates and phase-down schedules (see chart and graph on page 2).
- Some non-Article 5 Parties have already submitted calculations and different initial phase-down rates from the main group (non-Article 5 Parties) (see chart and graph on page 3).
- A new Annex F has been added to the Protocol. This lists the HFCs separated into two groups:
 - Annex F, Group 1: all HFCs (except HFC-125 and HFC-134a)
 - Annex F, Group 2: HFC-23.
- Global warming potential values have been added to the Protocol for HFCs and selected HCFCs and CFCs (see page 6).
- Production, consumption, import, export and stocks as well as consumption balances of HFCs and the agreement on carbon dioxide (CO₂) equivalent.
- Businesses are to be calculated from both HFC and HCFC production/consumption.
- There is an exemption for high ambient temperature countries (see page 5).
- Impact and export licensing systems for HFCs must be in place by 1 January 2019.
- Trade and Parties that have not ratified the Amendment ('non-Parties') will be banned from 1 January 2023.
- The Executive Committee is required to develop, within two years, guidelines for financing the phase-down of HFCs.
- A timeline of the HFC phase-down is provided on page 4.

The Kigali Amendment to the Montreal Protocol: HFC Phase-down - The phase-down of HFCs under the Montreal Protocol on Substances that Deplete the Ozone Layer has been under negotiation by the Parties since 2009 and the successful agreement on the Kigali Amendment at the 28th Meeting of the Parties on 15 October 2016 in Kigali, Rwanda to phase-down hydrofluoro-carbons (HFCs) continues the historic legacy of the Montreal Protocol.

This factsheet summarises and highlights the main elements of the Amendment of particular interest to countries operating under Article 5 of the Protocol (Article 5 Parties).

Refrigerant Blends: Calculating Global Warming Potentials
Post-Kigali Update

INTRODUCTION

The number of single component refrigerants with different thermodynamic properties suitable for different types of equipment is limited. Growing demand for refrigerant and air conditioning with diversified applications has led to a continued search for suitable refrigerant blends. A number of such blends have been developed by mixing two or more single component refrigerants in different proportions. The resulting blends have entirely different properties from that of its components.

While it is common to use the term 'blends' in the context of the Montreal Protocol, it is important to note that the term 'mixtures' is also used to describe refrigerants which are composed of more than one component. The terminology 'mixture' is specifically used in the Working Group on Harmonized Commodity Description and Coding System, also known as the Harmonized System (HS) codes.

TYPES OF REFRIGERANT BLENDS

A refrigerant blend or mixture of refrigerants is made up of two or more single component refrigerants. These blends can be of two types: Azeotropic and Zeotropic.

Azeotropic blends

These blends behave like a single component refrigerant, in that they boil and condense at a constant temperature or at a constant pressure. In the azeotropic refrigerant mixture, there is no change in composition during the phase change. These blends are assigned numbers for ASHRAE codes in the 500 series, e.g. R502A.

Zeotropic blends

These blends boil and condense through a range of temperatures at a given pressure. This range of temperatures is called the 'temperature glide'. Zeotropic blends are assigned ASHRAE codes in the 400 series, e.g. R404A, R407C, etc.

Global warming potential (GWP)

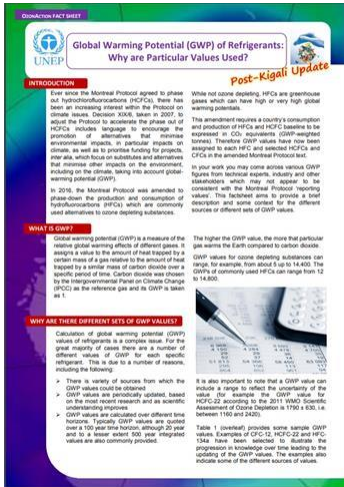
Global warming potential (GWP) is a measure which enables comparison of the global warming effects of different gases. It compares the amount of heat trapped by a certain mass of a gas to the amount of heat trapped by a similar mass of carbon dioxide over a specific period of time. Carbon dioxide was chosen by the Intergovernmental Panel on Climate Change (IPCC) as the reference gas and its GWP is taken as 1.

Following the 2016 Kigali Amendment, the Montreal Protocol has adopted flexible hydrocarbon (FHC) and HFCs, also including fluorinated hydrocarbon (FHC) and HFCs which have been incorporated into the list of the Protocol in Annexes A, C and F.

GWP values for some common refrigerants

Substance	GWP value
CFC-12	10,900
HCFC-22	1810
HFC-134a	810
HFC-143a	2310
HFC-143b	4470
HFC-152a	124
HFC-23	14,800
HFC-32	675
HFC-125	3000
HFC-134a	1430
HFC-124aF	<1
HFC-124aF	<1
R-290 (Propane)	3

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



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



Tools Commonly used by Refrigeration and Air-Conditioning Technicians



OzonAction Multimedia Video Application: Refrigeration and Air-conditioning Technician Video Series - 50,000 download to date

OzonAction has launched an exciting new application which hosts series of short instructional videos on techniques, safety and best practice for refrigeration and air-conditioning technicians.

This application, consisting of short instructional videos on techniques, safety and best practice, serves as a complementary training tool for refrigeration and air-conditioning (RAC) sector servicing technicians to help them revise and retain the skills they have acquired during hands-on training.

New videos on flammable refrigerants just added!

Please share with your RAC associations, technicians and other interested stakeholders...

OzonAction Multimedia Video Application: Refrigeration and Air-conditioning Technician Video Series

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



OzonApp eDocs+ launched in Android Play Store and Apple Store.

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

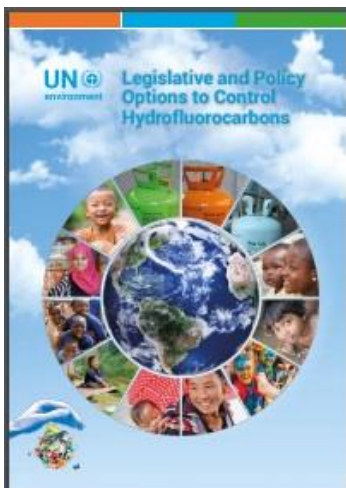
OzonApp eDocs+ available in the [Android Play Store](#) and [Apple Store/iTunes](#).
(Just search for "OzonAction", or scan this QR code)



Publications



Twinning of National Ozone Officers and Energy Policymakers - Under the Kigali Cooling Efficiency Program (K-CEP), UN Environment is implementing a two-year "twinning" project to build the capacity of National Ozone Officers and national energy policymakers for linking energy efficiency and Montreal Protocol objectives in support of the Kigali Amendment.



Legislative and Policy Options to Control Hydrofluorocarbons

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

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

Events

2018

- [12th Conference on Phase-change Materials & Slurries for Refrigeration & Air Conditioning](#), 21-23 May 2018, Orford, Quebec, Canada
- [13th IIR-Gustav Lorentzen Conference on Natural Refrigerants](#), 18-20 June 2018, Valencia, Spain
- [9th Ibero-American Congress of Refrigeration Science and Technology](#), 19-21 June 2018, Valencia, Spain
- [24th International Compressor Engineering Conference at Purdue](#)
- [17th International Refrigeration and Air Conditioning Conference at Purdue](#)
- [5th International High-Performance & Green Buildings Conference at Purdue](#)
9-12 July 2018, West Lafayette, Indiana, USA
- [International Conference on Emerging Technologies for Sustainable and Intelligent HVAC&R Systems](#), 27-28 July 2018, Kolkata, West Bengal, India
- [Solar Heating and Cooling Forum](#), 9 August 2018, Brisbane, Qld, Australia
- [25th International Congress of Refrigeration](#), 24-30 August 2018, Montreal, Canada
- [1st IIR International Conference on the Application of HFO Refrigerants](#). 2-5 September 2018, Austin Court Conference Centre, Birmingham, United Kingdom.
- [The Future of HVAC Conference 2018](#), 12–13 September, Melbourne, Australia.
- [3rd IIR Conference on Cold Application in Life Sciences 2018](#), 12-14 September 2018, St. Petersburg, Russia
- [3rd IIR Conference on Cold Application in Life Sciences 2018](#), 12-14 September 2018, St. Petersburg, Russia
- [8th International Conference on Magnetic Refrigeration at Room Temperature \(Thermag VIII\)](#), 16-20 September 2018, Darmstadt, Germany
- [Healthcare ColDays](#), 15 November 2018, Lyon, France,

See other [IIR upcoming events](#)

Reading



[Twenty Questions and Answers About the Ozone Layer](#), presents complex science in a straightforward manner. It complements the [2014 Scientific Assessment Report of Ozone Depletion](#) by WMO and the U.N. Environment Programme.

Lead Author:
Michaela I. Hegglin
Coauthors:

David W. Fahey, Mack McFarland, Stephen A. Montzka, Eric R. Nash



[Primer on Hydrofluorocarbons \(HFCs\)](#) - IGSD -11 January 2018

Summary:

Fast action under the Montreal Protocol can limit growth of hydrofluorocarbons (HFCs), prevent 100 to 200 billion tonnes of CO₂-eq by 2050, and avoid up to 0.5°C of warming by 2100.

Lead authors:

Durwood Zaelke, Nathan Borgford-Parnell, and Stephen O. Andersen.

Contributing authors:

Kristin Campbell, Xiaopu Sun, Dennis Clare, Claire Phillips, Stela Herschmann, Yuzhe Peng Ling, Alex Milgroom, and Nancy J. Sherman.



The [IIR International Dictionary of Refrigeration Available in 11 languages](#), the complete version of the International Institute of Refrigeration (IIR) International Dictionary of Refrigeration is now freely accessible online.

The IIR International Dictionary of Refrigeration offers researchers, industrialist or administrations the practical resources required to produce content related to refrigeration technologies in multiple languages.

This online tool allows you to find definitions, in English and French, of scientific and technical terms, as well as identify terms in the language of your

choice and find corresponding translations in the 10 other languages.

The dictionary provides term searches in Arabic, Chinese, Dutch, English, French, German, Italian, Japanese, Norwegian, Russian and Spanish.

The dictionary in numbers:

- more than 4,300 terms in English and French, including 800 synonyms,
- around 3,500 definitions in English and French,
- approximately 7,800 terms, synonyms and definitions
- content in 11 languages.

This international tool is the result of the work of nearly 200 experts, members of the IIR network, from around 30 countries throughout the world.

The dictionary's content covers all areas of refrigeration such as:

- basic principles (thermodynamics, transfer of heat and mass ...)
- production of refrigeration (refrigerated systems, refrigerants...)
- refrigerated installations
- methods of chilling, refrigeration and freezing
- storage, transport and distribution
- refrigeration applications for perishable products and the agro-food industry
- air conditioning
- heat pumps
- cryogenics
- environment

Access the International Dictionary of Refrigeration on the IIR [website](#)



Letter to the Editor

Refrigerants: There is still no vision for sustainable solutions

Risto Ciconkov

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by Risto Ciconkov

Letter to the Editor, International Journal of Refrigeration

[Abstract and highlights](#)



University of Birmingham. "[Draining peatlands gives global rise to greenhouse laughing-gas emissions.](#)" ScienceDaily, 28 March 2018.

Miscellaneous



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

The United Nations Environment, OzonAction, in collaboration with Marco Gonzalez and Stephen O. Andersen are updating and expanding the "Montreal Protocol Who's Who" as part of the 30th Anniversary of the Montreal Protocol celebration.

The new website was launched during the 29th Meeting of the Parties to the Montreal Protocol, Montreal, Canada, 20-24 November 2017.

We are pleased to invite you to submit your nomination*, and/or nominate 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 men and women who made an important contribution to the Montreal Protocol success and ozone layer protection.

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

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



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

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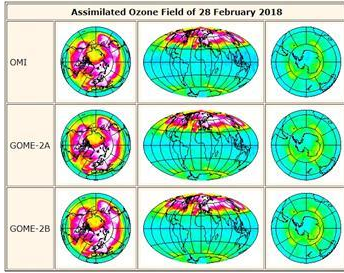
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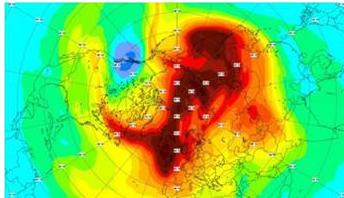
To access this new service, click "[activate my e-IJR subscription now](#)" and follow the instructions.



International Observers - New AREA membership category - Due to the significant worldwide interest in European legislative developments and the increase in competence of personnel who handle new refrigerants, AREA is pleased to introduce its brand new "International Observer" membership category. This provides a fantastic opportunity for non-European RACHP installer bodies the world, to benefit from the expertise and discussions within Europe through access to AREA. Contact: info@area-eur.be



TEMIS -- Near-real time global ozone field. The in near-real time delivered total ozone columns, derived from satellite observations, are input to a data assimilation program which provides global ozone fields for today and a forecast for the coming days.



Copernicus Atmosphere Monitoring Service. Since 7 February, CAMS has predicted the appearance of an ozone mini-hole over western Canada around 12-13 February. The 5-day forecast from the ECMWF Copernicus Atmosphere Monitoring Service (CAMS) showed the location of this ozone mini-hole and predicted its shape and size. This prediction was broadly consistent with other leading global atmospheric composition forecasting centres. Satellite observations acquired on 12 and 13 February data

assimilation actually confirmed these predictions. "It is a nice way for us to show that our models really work and can accurately predict these kinds of events," says Mark Parrington, senior scientist for CAMS...



Survey: "Hydrocarbons availability & impact of standards"

You are invited to participate in this survey as part of the work conducted within the EU-funded project "LIFE FRONT" (<http://lifefront.eu/>).

The project aims to remove barriers posed by standards for flammable refrigerants in refrigeration, air conditioning and heat pump (RACHP) applications.

The aim of the survey is to map the available technology and product groups using hydrocarbon (HC) refrigerants, their expected future availability, and the impact of standards on such market development. The findings will contribute to the market research investigating the impact of current (restrictive) standards on the European HVAC&R industry, and their end users.

The results of the survey will be available for free to the public as one of the outcomes of the project. The expected publication date is early September.

The respondents can help advance the objectives of the project that seeks to eliminate the existing barriers for hydrocarbons.

Who should answer?

Interested participants to the survey could be:

- system manufacturers
- end-users
- trade bodies
- the research community
- national authorities
- NPOs

The questionnaire takes around 15 minutes to complete, depending on the level of detail you provide.

All results will remain anonymous and only aggregated data will be used to outline the current and future situation for this market segment.

Deadline for contributions: 02 April 2018

For any questions, do not hesitate to contact us at info@lifefront.eu .

Take the survey



The 2018 Climate & Clean Air Awards are now open for nominations! For the 2nd consecutive year, we are calling on the SLCP community to recognise the projects and policies making an impact on climate change and air pollution.



AIRAH Awards 2018 nominations now open! The AIRAH Awards recognise the individuals, companies, research projects and products across the diverse specialist fields that make up the HVAC&R industry. Open to individuals, companies, corporate bodies, institutions and government authorities, the 2018 Awards will recognise work carried out during 2016/2017.

UNDP project to reduce textile emissions in Vietnam - The United Nations Development Program (UNDP) and the Vietnam Chemicals Agency, ministry of industry and trade recently held the inception workshop of a project called the 'Application of Green Chemistry in Viet Nam to support green growth and reduction in the use and release of Persistent Organic Pollutants (POPs) and hazardous chemicals'.

The project will reduce the use of POPs and release of Unintentional Persistent Organic Pollutants (U-POPs) through the introduction of green chemistry in various industrial sectors in Vietnam including textiles. It aims to create an enabling environment for the introduction and the application of green chemistry to relevant sectors as part of Vietnam's commitment to the Stockholm and the Minamata Conventions.

"This is the first green chemistry project that aims to minimise the use and emission of chemicals that are not in the Multilateral Environment Agreements list to be implemented in Vietnam and in Southeast Asia. The project has three objectives: create a legal framework, raise awareness, and piloted practices that will help reduce emissions and the use of POPs," said Dao Xuan Lai, UNDP assistant country director, head of the environment and climate change unit.

At the workshop, Christine Wellington Moore, UNDP programme advisor Montreal protocol unit/chemicals, Asia Pacific regional centre, introduced the overall project activities, result framework and components to be implemented in Vietnam. "Green chemistry is not new, but it is not easy to do, so we want to get stakeholders' opinions present in the workshop today."

With the support of GEF and UNDP, this 3 year-project will also promote awareness on green chemistry, its benefits, and its guiding principles. These principles are: prevent waste; maximise atom economy; design less hazardous chemical syntheses; design safer chemicals and products; use safer solvents and reaction conditions; increase energy efficiency; use renewable feedstocks; avoid chemical derivatives; use catalysts, not stoichiometric reagents; design chemicals and products to degrade after use; analyse in real time to prevent pollution; and minimise the potential for accidents.



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