1 November 2016

Nearly 200 Countries Adopt Kigali Amendment to Montreal Protocol

- *Global Phase Down of HFCs Could Prevent Up to 0.5°C Warming by 2100*
- *Complementary Improvements in the Energy Efficiency of Refrigeration, Air Conditioning and Thermal Insulating Foam Could Double the Climate Benefit of the HFC Phase Down*
- *Momentum of International Action on Climate Change Growing Steadily After the International Civil Aviation Organization (ICAO) and Montreal Protocol Agreements*
- *Importance of Sister Agreements to Support and Implement Paris Agreement Now Clear*
- *Focus on Importance of Near-Term Mitigation Growing*

"The world community has agreed to phase down the production and consumption of HFCs and avoid up to 0.5°C of warming by the end of the century – making a significant contribution towards achieving the goals we set in Paris."

—Barack Obama, President of the United States

"The Kigali Agreement to the Montreal Protocol reached is a historic occasion, which will have a lasting impact on our planet."

—Narendra Modi, Prime Minister of India

"We came. We labored for years. We conquered."

—Andrew Yatilman, Director of the Office of Environment and Emergency Management, Federated States of Micronesia

"We need to implement the breakthrough we achieved just last week in the Montreal Protocol to phase down super-polluting HFCs and avoid as much as half a degree of warming."

—Hilary Clinton, Presidential Nominee, United States

Summary

On Saturday October 15, 2016, all 197 UN parties agreed to phase down the production and consumption of hydrofluorocarbons (HFCs) under the Montreal Protocol.

Developed countries will take the lead in reducing HFC production and consumption, starting in 2019, with some developed countries starting one year later in 2020. This will be followed by two separate groups of developing countries. The earlier acting group of developing countries will first freeze HFC production and use in 2024. This group includes China, the largest producer of HFCs, along with more than 100 other developing countries. The second group of developing countries will freeze HFC production and use in 2028. This group is smaller, and includes only several Middle Eastern countries plus Pakistan and India. See Figure 1 below. The text of the Kigali Amendment is here.

Under the phasedown agreement, developed countries' early actions will help drive climate-safe HFC alternatives into the market at full economy-of-scale and competitive prices in time for use by developing countries. Developed countries will also provide financial support for the actions developing countries will take. The global phase down of HFC is expected to prevent warming of up to 0.5°C by 2100.

Countries agreed to begin examining opportunities to enhance the energy efficiency of the appliances and equipment that will use climate-safe alternatives to HFCs, which has the potential to double the climate mitigation of an HFC phase down, while also delivering additional sustainable development benefits such as better air quality, improved public health and greatly improved energy access and energy security.

Introduction

After an all-night negotiating session that concluded shortly before 7 a.m. Saturday morning October 15, the 197 countries that are Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer adopted the Kigali Amendment to that treaty, to undertake a global phase down of the production and consumption of HFCs.

The HFC Amendment to phase down HFCs under the Montreal Protocol was first proposed in 2009 by the Federated States of Micronesia and Mauritius, along with Morocco. The US, Canada, and Mexico soon submitted their own proposal, and many island States joined in supporting the island proposal. In 2015, the Africa group of 54 countries joined the islands, North Americans, and the EU in supporting the HFC amendment. But for many years, the HFC amendment was opposed by several large developing countries, including Argentina, Brazil, India, Pakistan, Saudi Arabia, and other Gulf States.

Through eight years of negotiations, the Parties began to recognize that the same treaty that had phased out the predecessors to HFCs, mostly CFCs and HCFCs, was particularly well-suited to cost-effectively phase down the production and use of HFCs as well. The global HFC phase down plan agreed in Kigali is expected to prevent greenhouse gas emissions equivalent to 80 billion tons of carbon dioxide emissions or more by 2050 and could prevent global warming of up to 0.5°C by 2100, and much more when the energy efficiency mitigation is included. The phase down agreement will make a tremendous contribution to achieving the long-term temperature goals included in the Paris Agreement on Climate Change in 2015.

Formal HFC Proposals Submitted to Amend the Montreal Protocol

2009	1. Federated States of Micronesia (FSM), Mauritius, joined by Morocco
2010	1. FSM, Mauritius, Philippines, Marshall Islands, Seychelles, Tuvalu 2. Canada, Mexico, United States (North American)
2011	1. FSM 2. North American
2012	1. FSM 2. North American
2013	1. FSM 2. North American
2014	1. FSM 2. North American
2015	1. FSM, plus Kiribati, Marshall Islands, Mauritius, Palau, Philippines, Samoa, Solomon Islands 2. Africa Group (discussion paper) 3. North American 4. European Union (discussion paper) 5. India
2016	1. FSM, plus Kiribati, Marshall Islands, Mauritius, Palau, Philippines, Samoa, Solomon Islands 2. North American 3. European Union 4. India

The HFC phase down agreement is by far the single largest measure taken so far to mitigate climate change emissions since the Paris Agreement. Coming just weeks after countries agreed on a program to limit greenhouse gas emissions from aviation under the International Civil Aviation Organization (ICAO), and after sufficient ratifications of the Paris Agreement to bring it into effect on 4 November 2016, the Montreal Protocol amendment builds even further momentum for immediate, international action on climate change. *See* Editorial in *The Guardian* expanding on the benefits of the Kigali Amendment, *The Guardian vied on climate change: good news—but not yet good enough* (23 October 2016):

> *The Montreal protocol is the most successful environmental treaty in history, and arguably one of the most successful of any international pact. It phased out the gases that were destroying the ozone layer, averting potential catastrophe and healing the hole that human activities had opened in our protective layer. Unfortunately, it had a side-effect overlooked when it was signed in the 1980s: some of the chemicals substituted for the ozone-destroyers had an effect on the climate thousands of times higher than carbon dioxide. This month, world governments agreed to address that by eliminating the substitute chemicals – called HFCs – potentially reducing rising*

temperatures by as much as 0.5C in a relatively short time. Scientists put the safe limit on future rises at 2C above pre-industrial levels by the middle of this century: beyond that, catastrophic and irreversible climate changes are judged likely. So the reduction agreed under the Montreal protocol could have an enormous, and swift, impact. ...

Scientists say we have a rapidly closing window to reorient the world's economies to a low-carbon future, just a few years before we are locked into dangerous levels of warming. In 1987, the Montreal protocol was agreed despite clamour from industry that phasing out these destructive gases would be technically impossible or economically catastrophic. ...

To achieve what is needed before the window closes, we must recapture the sense of urgency that motivated the Montreal protocol. Then, a clear and imminent danger – based on only two decades of scientific research, compared with more than 100 years of global warming – led nations, even during the cold war, to come together to protect our planet. Climate change may be slow-burning compared with the ozone layer's destruction, but it is no less threatening. Montreal should provide the template by which we tackle it.

Background on HFCs

HFCs are manmade greenhouse gases with global warming impacts up to several thousands of times as powerful as carbon dioxide by weight. They are used as refrigerants in cooling appliances such as air conditioners and refrigerators and are also used in specialized applications such as foams, insulation, solvents and fire suppressants. HFCs were developed as replacements for CFCs and HCFCs, which had been used for the same purposes as HFCs before being phased out under the Montreal Protocol due to their destructive impacts on the ozone layer. Although HFCs do not destroy the ozone layer, the rapid growth of the production and use of these super-potent greenhouse gases threatened to put internationally agreed climate goals out of reach unless emissions were promptly prevented.

In the years after the first proposals to amend the Montreal Protocol to phase down HFCs were submitted in 2009, government leaders made numerous statements supporting a global phase down of HFCs. These included the outcome document of the Rio+20 Summit, Leaders' Statements of the G20, of the G8, and of the Pacific Island Forum, and ministerial statements of the Arctic Council and other bodies. In 2015, Parties to the Montreal Protocol finally agreed to the Dubai Pathway on HFCs which set out issues to address and a plan to adopt an amendment to the Montreal Protocol to phase down HFCs in 2016.

Mechanics of the Phase Down: Baselines, Freeze Dates and Schedules

The phase down agreement reached with the Kigali Amendment follows the model of previous phase outs under the Montreal Protocol, with developed (Article 2) countries taking the lead in their actions to limit HFC production and use, followed by actions to be taken by

two separate groups of developing (Article 5) countries, whose efforts will be financially supported by developed countries through the Montreal Protocol's Multilateral Fund (or MLF). As described in the chart below, most developed countries, including the U.S., Canada and EU will begin reducing HFCs on or before 2019 and will continue phasing them down to 15% of baseline levels by 2036. The first group of developing countries, including China, the world's biggest producer of HFCs, will freeze production and use in or before 2024 at agreed baseline levels and will begin reductions of production and use with a step down of ten percent below freeze levels in 2029. Reductions will continue in steps until production and consumption reach 20% of freeze levels in 2045. The second group of developing countries, including India, Pakistan, Iran, and a number of Middle Eastern countries, will freeze production and use on or before 2028 at agreed baseline levels and will begin reductions by 2032, phasing down to only 15% of its freeze level by 2047.

2016 Kigali HFC Amendment

	A5 Parties Group 1	A5 Parties Group 2*	Most Non-A5 Parties	Some Non-A5 Parties**
Baseline	2020-2022	2024-2026	2011-2013	2011-2013
HFC Formula	Average	Average	Average HFC	Average HFC
HCFC Formula	65% of baseline	65% of baseline	15% of baseline	25%
Freeze	2024	2028		
1st Step	2029 – 10%	2032 – 10%	2019 – 10%	2020 – 5%
2nd Step	2035 – 30%	2037 – 20%	2024 – 40%	2025 – 35%
3rd Step	2040 – 50%	2042 – 30%	2029 – 70%	2029 – 70%
4th Step			2034 – 80%	2034 – 80%
Last Scheduled Step	2045 – 80%	2047 – 85%	2036 – 85%	2036 – 85%

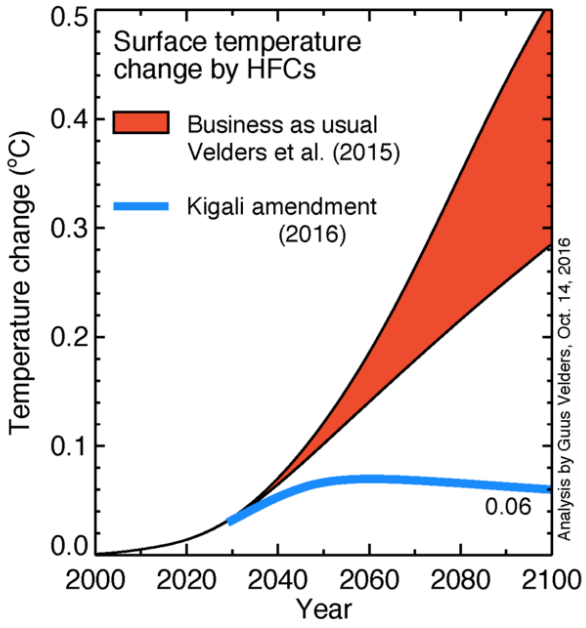
*Bahrain, India, Iran, Iraq, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia, and United Arab Emirates

**Belarus, Kazakhstan, Russian Federation, Tajikistan, and Uzbekistan

Technology review in 2022 and every 5 years; Technology review 4-5 years before 2028 to consider the compliance deferral of 2 years from the freeze of 2028 of Article 5 Group 2 to address growth in relevant sectors above certain threshold.

The Kigali Agreement will avoid up to 90% of the warming HFCs otherwise would have caused by 2100 and more when the control schedule is strengthened in response to commercialization of emerging technology and existing technology reaching economies-of-scale and competitive prices. The graph below captures this analysis by depicting the amount of warming that would have occurred by 2100 from HFC emissions with the amount of

warming that we can now expect from HFC emissions now limited by the phase down agreement.



Kigali Decision on Energy Efficiency

In addition to the specific commitments to freeze and phase down the production and consumption of HFCs under the Amendment, the Parties at MOP 28 also agreed on a decision to investigate opportunities to enhance the energy efficiency of appliances and equipment that use such refrigerants. The Kigali Decision on Energy Efficiency submitted by Rwanda and Morocco requests the Technical and Economic Assessment Panel to review energy efficiency opportunities in the room AC and heat pump sectors, invites parties to submit, on a voluntary basis, relevant information on energy efficiency innovations in these sectors to the Ozone Secretariat by May 2017, and requests TEAP to assess the information submitted by parties on energy efficiency opportunities in the RAC sectors during the transition to low- and zero-GWP alternatives and to report to MOP 29 next year. Such a decision is especially important given that recent climate science indicates that the climate mitigation benefits of an HFC phasedown could be doubled if matched up with complementary measures to improve energy efficiency of appliances and equipment.

Improvements in energy efficiency would also contribute substantially to additional sustainable development goals such as reducing air pollution, improving public health and improving energy security. Reductions in energy demand driven by energy efficiency improvements in appliances can reduce blackout and brownout events, as well as the need for, and costs of, building new energy infrastructure. Reduced energy demand can also reduce the need to extract and import fossil fuels and can save money for both domestic and commercial energy consumers, as well for governments that provide subsidies or rebates through their policies. Therefore, as they move forward with HFC phase down plans, the Parties to the Montreal Protocol will need to pay special attention to the relationship between the HFC

phase down and countries' various national energy efficiency programs and policies. MOP 28's Kigali Decision on Energy Efficiency will help Parties takes the first step in this direction.

Additional Elements of the Kigali Amendment on HFC and Related Decisions

In addition to the staggered phase down steps of developed and developing countries and the decision on opportunities to enhance the energy efficiency of equipment, the Kigali Amendment and the package of related decisions by the 28th Meeting of the Parties to the Montreal Protocol also emphasize important principles, make requests for key information and provide additional incentives for environmentally friendly practices. For example:

- Developing countries will have flexibility to prioritize which hydrofluorocarbon applications to phase down first and which later, select technologies/alternatives, and elaborate and implement their strategies to meet agreed hydrofluorocarbon obligations, based on their specific needs and national circumstances, following a country-driven approach.
- Parties may also be provided flexibility in the timing of their HCFC reduction plans and obligations to phase down HFCs in the effort to avoid double conversions.
- Parties have offered extensive guidance to the Executive Committee of the MLF on various issues, including the principles and priorities that should inform its work, the categories of costs to be considered, including new ones, the stages of manufacturing conversions to address and various kinds of enabling activities that might be supported.
- Technology Assessments by TEAP will take place every five years to assess the rate of technology development and adoption in affected sectors and to allow countries to consider any necessary adjustments in the control schedule and financing. Such periodic assessments may present opportunities to increase the level of climate change mitigation over the course of the phase down, as was done during the CFC, HCFC and other ODS phaseouts.
- Several forms of exemptions will be allowed:
    - A select group of countries with High Ambient Temperature will be allowed to claim an exemption from required phase down actions for up to four years in certain sectors in which proven, cost-effective, and safe alternatives to HFCs may not be presently available.
    - Applications for which the High Ambient Temperature exemption applies:
        - Multi-split air conditioners for commercial and residential
        - Split ducted air conditioners (residential and commercial)
        - Ducted commercial packaged (self-contained) air conditioners
    - As in past phase outs, exemptions will also be considered for certain essential and critical uses, such as medical/metered dose inhalers, if alternatives are not available.

Related Developments

A group of developed countries have contributed USD $27 million in "fast start funds" starting as early as 2017, in order to build capacity and prepare for actions under the phase down agreement, including capturing opportunities to secure energy efficiency improvements in appliances and equipment. An additional USD $53 million in fast-start funding for energy efficiency has been contributed by a number of U.S. philanthropies to augment this public contribution in 2017, which will be accessible by Group 1 developing countries only.

A group of developing countries, led by Micronesia and Colombia, have emphasized the opportunity for many Article 5 Parties to take action in advance of the agreed schedule of Group 1 Parties, for example by selecting 2021 as their freeze date. They have called for Article 2 Parties to join them in exploring ways forward for financing such early actions. Therefore, there remains open an opportunity to enhance the ambition of the HFC phase down agreement by cultivating and supporting the efforts of interested early actors and by amending the guidance to the Executive Committee of the MLF to offer such support.