26th Meeting of the Parties to the Montreal Protocol

17-21 November 2014
Paris, France

FULL STEAM AHEAD:
Charting the Path to a Future without HFCs

As the international community heads towards a milestone climate change agreement in 2015, the Parties to the Montreal Protocol stand poised to begin negotiations on the most immediate, cost effective and tangible global measure to address climate change ever contemplated – the phase-down of hydrofluorocarbons (HFCs).

If production and consumption of HFCs continue to rapidly increase, the hard-earned climate benefits of eliminating ozone-depleting substances (ODS) under the Montreal Protocol will be obliterated. Conversely, a global deal to eliminate HFCs, which are among the most powerful global warming agents known to man, would prevent the emission of well over 100 billion tonnes of carbon dioxide-equivalent (CO_2e) by mid-century. With adequate financing, many Article 5 countries could leapfrog HFCs altogether at a very modest cost.

Around the world, the vision for a future without HFCs is becoming a reality as governments and major corporations move ahead with plans to eliminate their use. Industrial sectors once heavily reliant on fluorinated gases are now embracing new technologies which, in addition to their reduced direct HFC emissions, offer significant indirect benefits through energy efficiency improvements. Landmark legislative changes in some of the biggest HFC producing and consuming countries, as well as an historic commitment to adopt climate-friendly refrigeration from the global consumer goods industry, are signs of a changing market. Against this backdrop, a global agreement on HFCs, which would create regulatory certainty and a level playing field for all countries and industries, is the logical next step.

At the recent UN Secretary General's Climate Summit in New York, countries, cities, non-state organisations and companies committed to scale up actions to mitigate short-lived climate pollutants including HFCs.[1] Last month, the joint statement between the United States and India recognised: *"the need to use the institutions and expertise of the Montreal Protocol to reduce consumption and production of HFCs, while continuing to report and account for the quantities reduced under the UNFCCC".*[2] These pledges follow several other high-level declarations, including the Presidential agreements between China and the United States in 2013,[3] the Arctic Council's call for a phase-down of HFCs under the Montreal Protocol in May of the same year[4] and the G20 leaders' statement at the St Petersburg summit.[5]

The science on climate change is unequivocal. Abrupt tipping points are approaching faster than predicted and urgent action is needed now to reduce short-lived greenhouse gases. The technology is ready and the market conditions are right. The final remaining element is political will and associated financial commitment. Several countries have put forward proposals for amendments to the Montreal Protocol which take into account the different situations in developed and developing countries. At the 26th meeting of the Parties to the Montreal Protocol, EIA calls on all Parties to agree a formal contact group to begin discussing the details of an agreement on the basis of these proposals and other innovative ideas.

The choice is simple: countries can either delay action on HFCs until the stakes are unconscionably higher or they can take a seat at the negotiating table while there is still time. As our climate system heads closer to the point of no return, we will not have the luxury of that choice for much longer.

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environmental investigation agency

ABOUT EIA

The Environmental Investigation Agency (EIA) is an independent charity founded in 1984 to fight environmental crime. We have developed innovative and effective investigative methods for defending the environment and seek lasting solutions to the problems we uncover. In three decades of work, EIA has amassed an impressive series of exposés and victories, from its key role in securing the 1989 international ivory trade ban and helping to bring in legislation to protect the world's precious forests to pushing whale meat off the menu in Japan. We have been involved in investigating and combatting illegal trade in ODS since the mid 1990s.

ACKNOWLEDGEMENTS

Report design by:
www.designsolutions.me.uk

November 2014

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CHANGE IS UNDERWAY – COUNTRIES TAKE DOMESTIC ACTION ON HFCs

This year has seen the introduction of landmark new regulations limiting the use of HFCs and encouraging the use of alternatives around the world. In April, the European Union (EU) adopted an ambitious Regulation to control fluorinated gases which will enter into force in 2015. Aimed at reducing consumption of HFCs in Europe by 79 per cent by 2030, it comprises several complementary measures, including new product and equipment bans, an economy-wide phase-down schedule and by-product destruction obligations.[6] The sectoral bans, which enter into effect over the next decade, cover new equipment in the refrigeration and air-conditioning sectors, technical aerosols and foams. Earlier this year, China announced that it would eliminate emissions of 280 million tonnes CO_2e of HFC emissions by the end of 2015 to meet the commitment to mitigate emissions of HFCs in its Twelfth Five-Year Plan[7] and is taking other domestic actions to transition to HFC-free technologies.

The United States is also taking regulatory action under the Clean Air Act through its Significant New Alternatives Program (SNAP) and two proposed rules. The first will prohibit the use of certain higher-GWP HFC alternatives in almost all foam-blowing uses, motor vehicle air-conditioning, aerosols, retail food and vending machines, cold storage rooms and warehouses, ice machines, refrigerated transport, ice skating rinks and industrial process refrigeration. The second SNAP rulemaking will allow a wide variety of equipment and products using natural refrigerants onto the US market.[8] Additionally, the California Air Resources Board recently adopted a Scoping Plan Update under the Global Warming Solutions Act of 2006, outlining new strategies and recommendations to reduce HFC emissions that build upon actions being taken by the US EPA and the EU.[9]

In September, Canada outlined plans to regulate HFCs in line with the US regulations,[10] while Japan has also proposed legislation to reduce HFC emissions and is providing five billion yen in subsidies for incentivising natural refrigerants.[11]

These measures all send a clear regulatory signal to businesses, requiring them to rethink how they currently use HFCs and helping to open up a huge global market for HFC-free alternatives.

CLIMATE-FRIENDLY REFRIGERATION TAKES OFF AROUND THE WORLD

HFC-free refrigerants are not only better for the climate but also deliver lower operating costs due to energy efficiency gains and reduced leakage and system

maintenance requirements.[12] With regulations on the use of HFCs in numerous jurisdictions, the cost of HFC-free technologies is dropping as market penetration increases. The inexpensive disposal of natural refrigerants at the end of appliances' lifecycles will also become a major financial incentive to switch to climate-friendly refrigeration and cooling systems.

There is growing uptake of HFC-free refrigeration across the global retail sector as companies seek "future-proof" alternatives.[13] In European supermarkets, the installed base of HFC-free installations has nearly doubled in the past two years, with more than 5,000 stores currently running on transcritical or cascade/secondary systems.[14] In Japan, the total number of stores equipped with CO_2 systems is expected to reach 650-700 by March 2015.[15] For the first time, retailers in the Southern Hemisphere are overtaking some of their European counterparts: this year, EIA has documented how most leading retailers in South Africa are leapfrogging HFCs to transition directly to natural refrigerants, reporting positive experiences despite a more challenging operating environment and higher ambient temperatures.[16] Several retailers in the US are also moving to HFC-free refrigeration systems.[17]

Historically, high annual or summer temperatures have presented a barrier to the roll-out of CO_2 cooling in supermarkets. However, new technologies – such as booster systems, parallel compressors[18] and evaporative condensers[19] – have led to a shift towards climate-friendly technologies even in high ambient temperature climates.[20] For example, French retailer Carrefour has had significant success with installations using parallel compressor technology across southern Europe, with one store in Valencia reporting energy savings up to 13 per cent compared to an HFC-404A system. Following the success of the pilots, Carrefour has announced plans to install a further 10 such systems throughout Italy in 2014.[21] In February 2014, Japanese convenience store chain Lawson opened a CO_2 transcritical store in Jakarta, Indonesia with expected energy efficiency improvements of up to 39 per cent.[22]

Although CO_2-based technology is emerging as the dominant natural refrigerant alternative in supermarket refrigeration, chains operating smaller format stores are also realising the benefits of using hydrocarbons such as propane.[23]

GOING GLOBAL: THE HFC PHASE-DOWN

At the July 2014 workshop convened by the Ozone Secretariat prior to the 34th OEWG, experts demonstrated that there are no technical or legal barriers to a global phase-down of HFCs.[24] The overwhelming majority of Parties to the Montreal Protocol share this view and have repeatedly expressed their wish to launch formal discussions on proposals to amend the treaty in a contact group. At MoP26, the introduction of a discussion paper by the EU on *"Enabling a global phase-down of hydrofluorocarbons"*[25] is expected to lend momentum to existing initiatives.

For the past five years, Parties have considered proposals from the Federated States of Micronesia (FSM)[26] and North American countries Canada, the US and Mexico (NA)[27] to amend the Montreal Protocol to control HFC production and consumption. The FSM and NA proposals were first submitted in 2009 and have remained substantially similar in content and ambition, following the structure of the ODS phase-outs setting out differentiated schedules for developed (Article 2, or A2) and developing (Article 5, or A5) countries. In addition

BELOW:
In South Africa, most leading retailers have started to move to natural refrigerants.



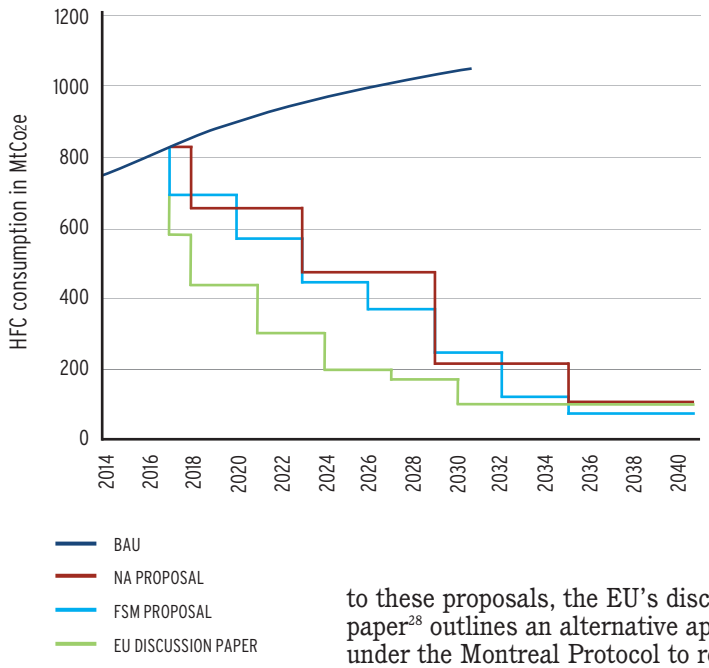
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TABLE 1:

HFC CONSUMPTION AND PRODUCTION IN A2 PARTIES				
		FSM Proposal	NA Proposal	EU Discussion Paper
BASELINE	HFC CO_2e Consumption	Average of HFC consumption and HCFC consumption in 2014-16	Average of HFC consumption and 85% HCFC consumption in 2008-10	Average of HFC consumption in 2009-12 and 15% HCFC baseline consumption in 1989
	HFC CO_2e Production	Average of HFC production and HCFC production in 2014-16	Average of HFC production and 85% HCFC production in 2008-10	Average of HFC production in 2009-12 and 15% HCFC baseline production in 1989
	Reduction Schedule	2017: 85% 2020: 70% 2023: 55% 2026: 45% 2029: 30% 2032: 15% 2035: 10%	2018: 90% 2023: 65% 2029: 30% 2035: 15%	2017: 85% 2018: 65% 2021: 45% 2024: 30% 2027: 25% 2030: 15%

Comparison of potential A2 HFC consumption phase-down scenarios compared to estimated business-as-usual

Source: EIA analysis of proposals to MoP26 based on BAU data contained in Preparatory study for a review of Regulation (EC) No 842/2006 on certain fluorinated greenhouse gases (Öko-Recherche, 2011) and Article 7 data



to these proposals, the EU's discussion paper[28] outlines an alternative approach under the Montreal Protocol to reduce HFC consumption and production in A2 and A5 Parties, exploring a scenario where A5 targets would initially be based on an HFC/HCFC CO_2e basket, with a view to operationalising the commitment to minimise the climate impact of the HCFC phase-out, which is enshrined in Decision XIX/6 .

Reduction Schedules in A2 Parties

Since the FSM and NA proposals were first submitted, new market and regulatory developments have provided a compelling argument for greater ambition in A2 Parties. First, as previously described, many A2 Parties are taking unilateral action to address HFCs. Secondly, increasing use of natural refrigerant technologies has proven their viability and cost-effectiveness, as well as their potential to yield significant energy savings compared to HFC-based technologies. Thirdly, it is widely acknowledged that immediate action on HFCs is both a scientific imperative and a low-hanging fruit. For these reasons, the greater ambition for A2 Parties contemplated in the EU discussion paper is a welcome addition to the debate.

Greater ambition in A2 Parties will also ease the transition to low-GWP technologies in A5 Parties in the future. Natural refrigerant technologies in key sectors such as refrigeration and air-conditioning are developing at lightning pace, resulting in the commercialisation of new, highly energy-efficient products and equipment. Accelerating their market penetration through legislation provides a spur to investment in their production, which in turn promotes economies of scale, lowers capital costs and facilitates their large-scale deployment.

Reduction Schedules in A5 Parties

The FSM and NA proposals set out reduction schedules for phasing down HFC consumption and production in A5 Parties. The FSM proposal seeks to reduce HFC consumption and production to 10 per cent, with the baseline and starting year to be agreed through negotiation. The NA proposal seeks to reduce HFC consumption and production to 15 per cent of a specified baseline by 2045, with the first cut in consumption taking place in 2025.

In contrast, the EU discussion paper advances a scenario whereby HFC consumption in A5 Parties would be reduced based on a series of commitments and complementary actions. It envisages a freeze of combined HCFC and HFC consumption (in CO_2e) in 2019 while maintaining the existing accelerated HCFC phase-out schedule. The baseline proposed for consumption is the average combined HFC and HCFC consumption in 2015-16, which would build upon Decision XIX/6 by capping a "basket" of combined HCFC-HFC CO_2e consumption. This allows some growth in HFC consumption in A5 Parties but ensures that CO_2e emissions do not increase overall. It encourages countries to leapfrog HFCs through activities funded by the Multilateral Fund (MLF) and would limit but not prevent "new" HFC growth – i.e., growth unrelated to HCFCs – in A5 Parties. The paper proposes an agreement on an A5 reduction schedule at a later date – 2017 or 2018 is suggested – after HFC data has been collected in A5 Parties. For HFC production, the EU discussion paper suggests a similar phase-down to that proposed for A2 countries, with a grace period or deferred dates for individual phase-down steps.

HFC-23 By-Product

Both the FSM and NA proposals include important provisions to limit HFC-23 by-product emissions. Whereas the FSM proposal limits HFC-23 by-product emissions during HCFC manufacture to 0.1 per cent of the mass of HCFCs manufactured across the economy, the NA proposal limits HFC-23 by-product emissions during HFC and HCFC manufacture to 0.1 per cent of the mass of HCFCs and HFCs manufactured at individual production lines. The NA proposal calculates that this provision would reduce HFC-23 emissions by approximately 12 Gt CO_2e by 2050.

TABLE 2:

HFC CONSUMPTION AND PRODUCTION IN A5 PARTIES

		FSM Proposal	NA Proposal
BASELINE	HFC CO_2e Consumption	Average of HCFC consumption in 20XX-20XX	Average of HFC consumption plus 40% HCFC consumption in 2011-2012
	HFC CO_2e Production	Average of HCFC production in 20XX-20XX	Average of HFC production plus 40% HCFC production in 2011-2012
	Reduction Schedule	20XX: 85% 20XX: 70% 20XX: 55% 20XX: 45% 20XX: 30% 20XX: 15% 20XX: 10%	2020: 100% 2025: 70% 2031: 40% 2045: 15%

TABLE 3:

HCFC-HFC CO_2e CONSUMPTION IN A5 PARTIES

		Commitment	Complementary Action
EU DISCUSSION PAPER	Baseline	Average of combined HCFC-HFC CO_2e consumption in 2015-16	Data collection on HFC consumption for purposes of establishing baseline
	HCFC-HFC CO_2e Freeze	Freeze combined HCFC-HFC CO_2e consumption in 2019	
	Reduction Schedule	Negotiate reduction schedule in 2017 or 2018 to reduce combined HCFC-HFC CO_2e consumption	

TABLE 4:

HFC PRODUCTION IN A5 PARTIES

		Commitment	Complementary Action
EU DISCUSSION PAPER	Baseline	Average of HFC CO_2e production in 2009-12 plus 70% of the 2009/2010 HCFC baseline in CO_2e	Data collection on HFC production for purposes of establishing baseline
	HFC Freeze	Freeze of HFC CO_2e production in 2019	
	Reduction Schedule	Negotiate reduction schedule in 2017 or 2018 to reduce HFC CO2e production to 15% by 2045	

THE REPLENISHMENT: A CRUCIAL OPPORTUNITY TO MAXIMISE CLIMATE BENEFITS

The triennial replenishment of the MLF has been crucial to the Montreal Protocol's success in achieving a universal phase-out of the CFCs and other Class 1 ozone depleting substances (ODS). Under Article 10A of the Montreal Protocol, developed countries are required to transfer "best available, environmentally safe substitutes and related technologies" to developing countries at "fair and most favourable trade conditions."[29] Further, Decision XIX/6 requires Parties to consider climate impacts when choosing alternatives to HCFCs. Decision XXI/9 supports this by urging the Executive Committee to the MLF to provide incentives to cover the additional costs of transitioning directly to low GWP-alternatives.

At MoP26, Parties will negotiate the 2015-17 replenishment. The Technical and Economic Assessment Panel (TEAP) has conducted assessments of the financial contribution required to support the ongoing phase-out of HCFCs in "Assessment of the Funding Requirement for the Replenishment of the Multilateral Fund for the Period 2015-2017",[30] examining two different funding scenarios. In Case 1, which is described as a "commitment-based phase-out", a Replenishment of US$609.5 million will be needed for the next triennium. Case 2, which describes a scenario for an "unfunded phase-out," equates to a reduced replenishment figure of US$489.7 million. This is based on the fact that the amount of funding



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RECOMMENDATIONS

- The Parties must adopt a robust replenishment which will ensure that climate benefits are maximised during the HCFC phase-out as required by Decision XIX/6. A5 countries have warned that without adequate financial backing their ability to implement existing commitments under the Montreal Protocol will be severely compromised.
- The Replenishment must be adequate to cover activities such as pilot and demonstration projects for low-GWP alternatives, ODS destruction, capacity building and customs training to prevent illegal trade. In recent years, these activities have been repeatedly postponed, rejected for funding or received only partial funding. Although they are considered as 'not required for compliance' by the MLF these activities along with the global network of ozone officers are fundamental to effective implementation of the HCFC phase-out.

received by some A5 countries covered activities over and above the required 10 per cent reduction step in Stage I of the HCFC phase-out and therefore assumes a reduced amount of funding for implementation of Stage II. Both of these estimates are significantly lower than the US$731.2 million requested by the implementing agencies for the HCFC phase-out and non-compliance actions, according to the consolidated 2015-17 Business Plan of the Multilateral Fund.[31]

In addition, the TEAP finds that in order to maximise the possible climate benefits from the HCFC phase-out, an additional US$23 million per year for at least the next two replenishments will be necessary. While this figure does not appear to include funds to allow countries to phase out faster than the existing schedule, or consider transitions to not-in-kind technologies, it does confirm that funding constraints in the eplenishment are likely forcing unnecessary conversions to high-GWP HFCs.

Many Article 5 countries have argued for greater funding to expedite the HCFC phase-out and to enable whole sectors to leapfrog the use of HFCs. As the Parties negotiate the replenishment, they must be mindful of the need to avoid locking countries in to costly short-term transitions to HFCs.

THE MONTREAL PROTOCOL MUST LEAD THE WAY ON HFCs

Governments around the world are taking actions to control their domestic use through national or regional legislation. These important steps, which are reinforced by developments in the private sector, are not enough. The climate cannot wait for these disparate actions to coalesce and be replicated universally; a mandatory global phase-out of HFCs under the Montreal Protocol must be adopted without delay. The longer Parties wait, the greater the HFC installed base will grow, compounding the problem and escalating the cost of eliminating these super greenhouse gases.

While there are many ideas about how a global agreement to address HFCs should be structured and financed, it is clear there are no legal or technical obstacles to such an agreement. The Montreal Protocol led the world in tackling the first truly global environmental crisis and phasing out the chemicals that were destroying the ozone layer. We look to the Parties to the Montreal Protocol to take the lead once again by adopting a balanced and equitable agreement on HFCs that reflects the needs and respective capabilities of all countries.

"An HFC-free future is both feasible and cost-effective."

EIA calls on Parties to take the following steps to accelerate action on HFCs:

- **Open formal negotiations on a global agreement to phase-down HFCs at MoP26.** Parties must agree to establish a contact group at the 26th Meeting of the Parties to begin detailed discussions on a global agreement to address HFCs under the Montreal Protocol considering inter alia, the FSM and NA amendment proposals, the EU discussion paper and any other mechanisms proposed;
- **Agree to finance HFC data collection.** Future discussions by all Parties about managing and phasing down HFCs would benefit from the immediate preparation of inventories of HFC consumption by sector in Article 5 Parties;
- **Advance domestic actions.** Recent unilateral measures in A2 and A5 Parties – both adopted and contemplated – underscore that an HFC-free future is both feasible and cost-effective. In parallel to the international process, countries must commit to taking domestic action now to start reducing their emissions from HFCs;
- **Avoid mid-GWP technologies.** Parties must avoid phasing in mid-GWP HFCs and HFO/HFC blends under both the accelerated HCFC phase-out and any HFC phase-out. This will avoid entrenching in the global marketplace technologies that are at best only transitional substances and will not provide a permanent solution for reducing HFC emissions.



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ENVIRONMENTAL INVESTIGATION AGENCY (EIA)

EIA - LONDON

62/63 Upper Street
London N1 ONY, UK
Tel: +44 (0) 20 7354 7960
Fax: +44 (0) 20 7354 7961
email: ukinfo@eia-international.org

www.eia-international.org

EIA - WASHINGTON, DC

PO Box 53343
Washington, DC 20009 USA
Tel: +1 202 483-6621
Fax: +1 202 986-8626
email: info@eia-global.org

www.eia-global.org