

25th Meeting of the Parties to the Montreal Protocol
on Substances that Deplete the Ozone Layer

October 21st - 25th 2013, Bangkok, Thailand

WHEELS IN MOTION

Towards an international
phase-down of HFCs



ABOUT EIA

EIA is an independent campaigning organisation committed to bringing about change that protects the natural world from environmental crime and abuse. As part of our work, we have undertaken groundbreaking investigations into the illegal trade in ozone depleting substances (ODS) and have been closely involved in the international ozone and climate negotiations for well over a decade.

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EIA - LONDON
62/63 Upper Street
London N1 0NY, 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

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“Limiting climate change will require substantial and sustained reductions of greenhouse gas emissions”

Intergovernmental Panel on Climate Change (IPCC), September 2013

THE 25TH MEETING OF THE PARTIES - THE YEAR FOR ACTION ON HFCs

In a year that has seen concentrations of atmospheric carbon dioxide pass the 400ppm mark and the world's scientific community issue its starkest warning yet that human activities will result in far-reaching disruption of the climate system, the need to swiftly rein in anthropogenic greenhouse gas emissions has never been more acute. Against this backdrop, nations around the world are gearing up to tackle HFCs (hydrofluorocarbons), by far the fastest growing source of global man-made emissions. Recent events indicate that 2013 could mark a major turning point in the journey towards a global agreement on eliminating these

super greenhouse gases, which owe their existence to the ongoing and successful phase-out of ozone depleting substances (ODS) under the Montreal Protocol.

Support for global action on HFCs has significantly advanced over the past few months, from the Arctic Council calling for a phase-down of HFCs under the Montreal protocol in March, to the US-China announcement in June following a meeting between Presidents Barack Obama and Xi Jinping, to the G20 leaders' statement at the St. Petersburg summit in September and, most recently, the joint declaration by Presidents Manmohan Singh and Obama in Washington DC establishing a task force to resolve issues surrounding an HFC phase-down.



World leaders agreed to use the resources of the Montreal Protocol to get rid of HFCs during the G20 Summit in Saint Petersburg, Russia, Sept. 5, 2013.

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High-level engagement of this order breathes new life into a process which just one year ago seemed in danger of stalemate due to the politics of the global climate negotiations. In signalling their willingness to address HFCs, global leaders have made an important statement of intent. However, the real question is whether the international community has the ability and political will to translate these fine words into decisive action within a timeframe that will contribute to avoiding acute and irreversible dangerous climate change tipping points.

Armed with this strong political mandate, Parties will now need to work doubly hard to ensure that the Montreal Protocol's impressive climate legacy is upheld over the decades to come. In the quarter-century since its inception, the Montreal Protocol has prevented over 200 billion tonnes (Gt) of carbon dioxide-equivalent (CO₂e) from ending up in the atmosphere. An HFC phase-down can avoid at least 100 GtCO₂e and probably more by 2050. With an ever-widening gap of 8-13 GtCO₂e between the emissions reductions required to limit global temperature rise to 2°C by 2020 and current climate pledges, the international community can ill afford to ignore such massive potential for climate mitigation. This is particularly true given the limited atmospheric life of virtually all HFCs (15 years on average), which means that the impact of this mitigation will be felt in the near term.

There will no doubt be challenges along the way to securing a global agreement on HFCs. In particular, Article 2 countries will need to reassure

Article 5 countries that sufficient financial resources will be available through the Multilateral Fund to fund the phase-down, while meeting the financial requirements of the HCFC phase-out and ensuring that opportunities to maximise climate benefits of the HCFC phase-out are not squandered.

At June's Open-Ended Working Group, the Parties agreed to the establishment of a formal "discussion group" on HFC management. While this was a significant achievement, the work undertaken at MOP 25 to move the Amendments forward will need to be more substantive and focused. An open-ended formal contact group needs to be established and consideration given to an extraordinary meeting early in 2014 to ensure there is adequate time to consider all relevant financial, technical and legal aspects of the proposals.

With commitment from the world's largest consumer and the world's largest producer of HFCs, it should surely just be a matter of time before the international community unites to tackle HFCs – but time is not on our side. An HFC phase-down is easily the most tangible prospect for immediate action and failure to work together to achieve this does not bode well for the future of mankind. We look to the delegates of the 25th Meeting of the Parties to the Montreal Protocol to finalise an international agreement to eliminate HFCs, and build a lasting and appropriate legacy for the Montreal Protocol, the world's most effective environmental treaty.

“The increasing availability of low-GWP alternatives makes it feasible to now convert entire sectors to low-GWP compounds and technologies.”

LET NEGOTIATIONS ON THE HFC AMENDMENT PROPOSALS BEGIN

Left unchecked, emissions of HFCs (hydrofluorocarbons), super greenhouse gases hundreds to thousands of times more potent than carbon dioxide, are predicted to reach between 5.5 and 8.8 billion tonnes (Gt) of carbon dioxide equivalent (CO₂e) by 2050. Reports of increases in the use and atmospheric concentrations of HFCs all indicate that the 2009 business-as-usual predictions by Velders, *et al.*¹ are being met or exceeded. In developing countries alone, HFC emissions are expected to increase by 800%.²

HFCs were commercialised as a result of the Montreal Protocol's phase-out of ozone depleting substances; therefore, the Montreal Protocol has the obligation to phase them out. The restoration of the ozone layer must not come at the expense of the global climate. Countries must take concrete actions now to eliminate HFCs, and using the mechanisms and bodies of the Montreal Protocol is the most efficient and cost-effective way to do so.

Proposals to amend the Montreal Protocol to regulate production and use of HFCs have been filed every year since 2009 by Micronesia, and by Canada, Mexico and the United States, and yet

formal discussions only began this year.³ The clock is ticking, and Parties must convene a formal contact group at this 25th meeting to negotiate the details of an HFC amendment agreement.

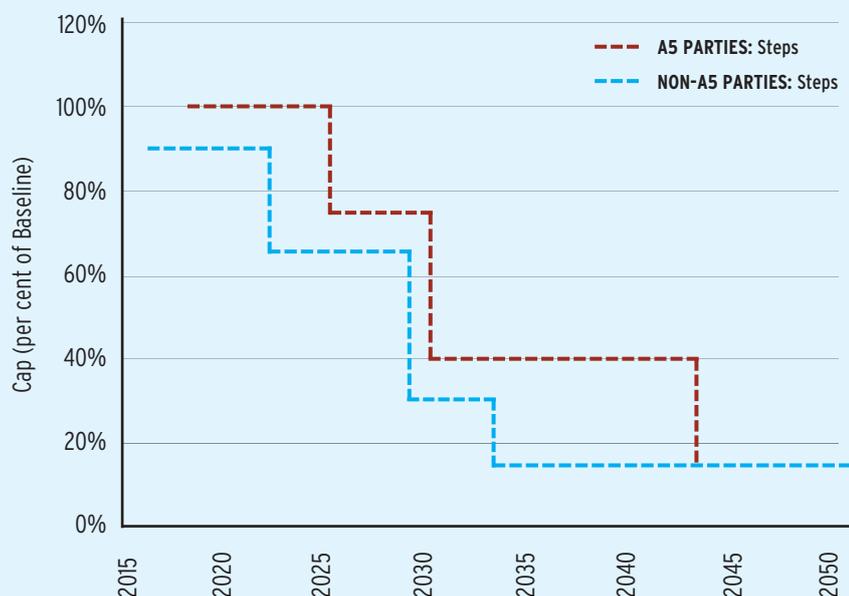
While the current proposals to amend the Montreal Protocol have succeeded in initiating negotiations, they are too conservative in their approach, taking too long and in the case of the North American amendment proposal having an overly generous 'tail' of allowable HFC consumption (15%). The increasing availability of low-GWP alternatives makes it feasible to now convert entire sectors (e.g., foams, aerosols, mobile air conditioning, domestic, commercial and industrial refrigeration and a significant proportion of air-conditioning) to low-GWP compounds and technologies.⁴ There are no longer any technical reasons for Parties to delay action to control HFCs, as evidenced by numerous studies, low-GWP transitions agreed through HPMPs, and significant voluntary commitments by end-users (e.g. the Consumer Goods Forum) to phase out HFCs. The current schedules also ignore the successful history of the Montreal Protocol in accelerating innovation in the sectors that currently use HFCs, as well as the fact that there are dramatically more alternatives available today than at the beginning of either the CFC or HCFC phase-out.⁵

Both amendment proposals include provisions to address HFC-23 emissions,

"HFCs were commercialised as a result of the Montreal Protocol's phase-out of ozone depleting substances; therefore, the Montreal Protocol has the obligation to phase them out."

FIGURE 1: HFC Reduction Steps for Article 5 and Non-Article 5 Countries (% of Baseline)

Source: Document supplied to the thirty-third meeting of the Open-ended Working Group of the Parties to the Montreal Protocol by the United States, Mexico and Canada



but the proposed schedules need to be tightened. HFC-23 has a global warming potential of 14,800 and an atmospheric life time of 250 years. The technology exists to prevent all emissions of HFC-23 at minimal cost. The companies responsible for these emissions clearly have the funds to address this issue, but choose not to. Many have profited from the billions spent on UNFCCC certified offsets for past HFC-23 destruction and should use these profits to prevent continued HFC-23 emissions. The HFC amendment should contain language requiring automatic destruction of all HFC-23 byproduct in Article 5 and Article 2 countries. This should take place immediately following adoption of the HFC Amendment at facilities that presently have the destruction technology onsite, and within six months for facilities that require the installation of destruction technology.

Progress has been made on resolving political impediments to an Amendment. For example, the G20 began defining the relationship between the Montreal Protocol and the UNFCCC, stating that the countries “*support complementary initiatives, through multilateral approaches that include using the expertise and the institutions of the Montreal Protocol to phase down the production and consumption of hydrofluorocarbons (HFCs), based on the examination of economically viable and technically feasible alternatives. We will continue to include HFCs within the scope of UNFCCC and its Kyoto Protocol for accounting and reporting of emissions.*”⁶ Other similar statements have been made by the parties to the Arctic Council⁷ and in an agreement between the United States and India.⁸

More than 110 countries signed the Bali and Bangkok Declarations and many more have voiced support for a phase-down since then.⁹ Focused, substantive and sustained negotiations must occur at the MOP to address the multiple issues raised in order to secure a phase-down of HFCs, if not this year then in 2014. The U.S. and China have specifically called for a formal contact group at this year’s MOP to begin these discussions on the Amendment proposals, which is the necessary next step in the process.¹⁰

RECOMMENDATION:

- Parties should demand a rapid phase-out of HFCs that takes full advantage of the numerous alternatives already available and those known to be on the way to being commercialised or proven.

CALL TO ACTION

COUNTRIES MUST IMMEDIATELY ACT TO STOP EMISSIONS OF HFC-23

At the OEWG meeting in June 2013, EIA released the results of a two-year investigation into emissions of HFC-23. The investigation found that:

- 11 plants not covered under the Clean Development Mechanism (CDM) of the UNFCCC in China have been venting millions of CO₂e tonnes of HFC-23 each year, making them some of the largest point source emitters of greenhouse gases in the world.
- Because HFC-23 destruction credits have been excluded from all mandatory carbon markets the HCFC-22 plants formerly receiving HFC-23 destruction credits are poised to join the non-CDM plants in venting HFC-23 if they have not already done so, despite the presence of destruction technology at these facilities that could prevent these emissions.

Since the issuance of the report, China, India, Mexico, Argentina, South Korea and Russia have all failed to take any public action to mandate the destruction of HFC-23. EIA urges all Governments with HCFC-22 production to do the following without delay:

- Publicly commit to mandatory control of HFC-23 emissions;
- Immediately enact legislation to require that all HCFC-22 plants destroy all HFC-23 emissions through best-practice technologies;
- Explore incentives to help fund those HCFC-22 facilities that have not received huge profits from the CDM to date to ensure they are able to install the necessary destruction equipment;
- Require all HCFC-22 plants to install best available technologies to achieve near 100% HFC-23 abatement; and
- Reject HFC-23 destruction credits in mandatory and voluntary carbon markets.





ABOVE:
Flags wave in the breeze in front of the European Commission's headquarters in Brussels.

REVIEW OF EU LEGISLATION ON F-GASES COULD SET THE SCENE FOR A GLOBAL PHASE-DOWN AGREEMENT

In 2006, the European Union adopted legislation to curtail growing emissions of HFCs, known as the EU Regulation on Certain Fluorinated Gases (commonly referred to as the F-gas Regulation). At the same time, a Directive was passed focusing on mobile air-conditioning, which banned the use of HFCs with a GWP of more than 150 in passenger cars, starting in 2011 for new models of cars and 2017 for all new vehicles.

A review of the Regulation conducted for the European Commission highlighted significant shortcomings in the chosen approach, which focused on containment, and demonstrated that without additional measures, emissions from stationary sources would continue to grow. The study found that in the best case scenario of full implementation of the Regulation and the MAC Directive, EU F-gas emissions would only stabilise at around the current level of 110 MT CO₂-eq., an increase of 20% from 2006 when the legislation was adopted.¹¹ Taking out the impact of the MAC Directive, the study showed that that the F-Gas Regulation would actually allow an 82% increase in HFC emissions from stationary equipment (refrigeration, air-conditioning, foams, aerosols etc.) by 2050, with all the emission cuts being delivered through the bans in the MAC Directive.

Faced with these facts, the European Commission published a proposal for a revised EU F-gas Regulation in November 2012. This contained a range of measures to reduce emissions of HFCs, including a cap and phase-down of 79 per cent by 2030, a requirement to destroy HFC-23 by-product starting in 2015, and bans on the use of HFCs in new hermetically sealed domestic and commercial refrigeration and air-conditioning systems.

In June 2013, the European Parliament adopted a number of amendments to strengthen the Commission's proposal. In particular the Parliament proposes to ban the placing on the market of new HFC-containing equipment in the sectors of refrigeration, air-conditioning, fire-protection, foams, aerosols and solvents, starting in 2020. The Parliament also proposes to levy a fee of up to €10 per CO₂e tonne for companies to access their HFC quotas under the phase-down. The phase-down steps were also strengthened by tightening the first and last steps.

New equipment bans will enable a swift transition away from HFCs to truly low-GWP alternatives. Unsurprisingly, the reaction to the measures from the HFC chemical industry has been overwhelmingly hostile, with unsupported claims of extortionate costs and a lack of suitable alternatives for all sectors. In fact, the bans proposed by the European Parliament are supported by an unparalleled body of technical evidence and an abundance of real-world experiences. Moreover they are essential to support the phase-down, and lock in emission reductions where transitions can be easily made (e.g. in new equipment).

Negotiations between the Council (Member States), the European Parliament and the Commission have now begun, with a view to reaching an agreement in December and adoption of a new Regulation in early 2014. Once adopted, the effects of the Regulation are likely to be felt well beyond the borders of the European Union as it will create EU demand for alternative technologies, spurring innovation and economies of scale in other markets. This will in turn reduce the cost of a global phase-out of HFCs as well as providing impetus for an international agreement on reducing consumption and production of HFCs.

DECISION XXIV/7 TASK FORCE REPORT ON ADDITIONAL INFORMATION ON ALTERNATIVES TO ODS

Decision XXIV/7 of the Twenty-fourth Meeting of the Parties requested the Technology and Economic Assessment Panel (TEAP) to prepare a draft report on alternative refrigerants and technologies for consideration at OEWG 33, leading to a final report at MOP 25. The TEAP was requested to describe “all available alternatives to ozone-depleting substances that are commercially available, technically proven, environmentally-sound, taking into account their efficacy, health, safety and environmental characteristics, cost-effectiveness, and their use including in high ambient temperatures and high urban density cities” as an update to information provided in previous reports.¹²

Although the report contains valuable information, the final version fails to give a balanced picture of the alternatives available to countries as they transition from HCFCs. In addition to this, key concepts such as the nomenclature of global warming potential (when is it appropriate to label an alternative “low-GWP”?) have been subjected to overly subjective analysis. This leads to highly specious statements such as the claim that “alternatives with GWPs at 1,000 or 300 can also be considered as ‘low’” and that “In the refrigeration and air conditioning sector, the average GWP for an alternative to be considered as ‘low’ across the sub-sectors is approximately 750.” This conclusion is all the more questionable given that the figures referred to in the report correspond to the GWP of the listed refrigerants over a 100-year timeframe. In fact, it would be more appropriate to calculate the impact of HFCs over a 20-year period, given their average lifetime.¹³

Like the authors of the report, EIA fully acknowledges the importance of adopting a “systems approach” when substituting an ODS for another chemical or technology. We fully recognise the importance of a holistic approach to the choice of alternatives, one which focuses as much on good system and component design as on choice of refrigerant; in that regard, it is clear that climate impact associated with energy consumption should be a key factor in assessing the environmental profile of any substance, all the more so as cooling accounts for approximately 15%

of global energy consumption, with 7% annual growth expected up to 2050.¹⁴

However, direct and indirect (energy-related) emission reductions from the use of alternatives are often woefully underestimated, casting higher-GWP options in an unrealistically favourable light. EIA’s annual survey of the commercial refrigeration sector (“Chilling Facts”) shows that absolute emissions (in CO₂e terms) from leaking refrigerant gases are still higher than the total emissions associated with energy use. In short, removing HFCs from a system often has a bigger positive environmental impact than using carbon neutral energy. What is more, supermarkets invariably report greater than anticipated efficiency gains from the installation of HFC-free systems.

Commercial Refrigeration

The Task Force report singularly fails to capture the transformational nature of the developments which have taken place in commercial refrigeration over the past half decade. In particular, there is scant reference to the remarkable energy efficiency gains reported by retailers who have adopted non-fluorinated alternatives to ODS and HFCs. A comprehensive overview of these is available in EIA’s “Chilling Facts V: Retailers on the Cusp of a Global Cooling Revolution” report.¹⁵ For example:

- Japanese retail giant AEON, which has committed to introduce CO₂ in all its new stores, reports energy savings of between 10-30 per cent and an overall CO₂ reduction of 50 per cent in the stores it has converted to CO₂ since 2009. The retailer notes that its transcritical direct expansion CO₂ systems provide high reliability and high efficiency even in hot and humid climates;¹⁶

BELOW:
Commercial refrigeration has experienced a transformation in recent years.



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“All newly built and refurbished Coop Schweiz stores use CO₂ systems for cooling, reducing their energy needs by about 30%.”

- French retailer Carrefour’s transcritical CO₂ store in Istanbul, Turkey, is reporting energy efficiency improvements of about 15 per cent;
- Tesco has begun using water-cooled hydrocarbon systems in one of its Thai stores, resulting in five per cent energy savings;
- All newly built and refurbished Coop Schweiz stores use CO₂ systems for cooling and a quarter of their stores are already running on this technology, reducing their energy needs by about 30% (see Figure 2). They report no loss in efficiency on warmer days and plan to have all their retail stores equipped with 100% CO₂ by 2023;
- In Hungary, Auchan has also achieved energy savings of 35 per cent with its hybrid CO₂-ammonia systems compared with previous HFC installations.¹⁷ Year after year, EIA’s research has shown that commercial refrigeration using natural refrigerants is gaining ground, not just in Europe but around the world. The retail sector truly is on the cusp of a global cooling revolution but the Task Force report fails to reflect this.

Industrial refrigeration

The Task Force report highlights the widespread use of ammonia in large industrial applications (90% penetration) and supplies figures pointing to the potential for increased market penetration for smaller systems, with limited market share of 5% in India and China and 25% in Europe and Russia.¹⁸ While the report is clear that other alternatives exist including hydrocarbons, air and particularly CO₂, a systematic analysis of alternatives available for different applications, of which there are many, is lacking.

The benefits of using ammonia as a refrigerant are clear. Because of its superior thermodynamic properties, it requires less energy than other refrigerants when used in large industrial systems.¹⁹ Generally speaking, ammonia refrigeration systems cost 10-20% less to install than systems using alternative industrial refrigerants.²⁰

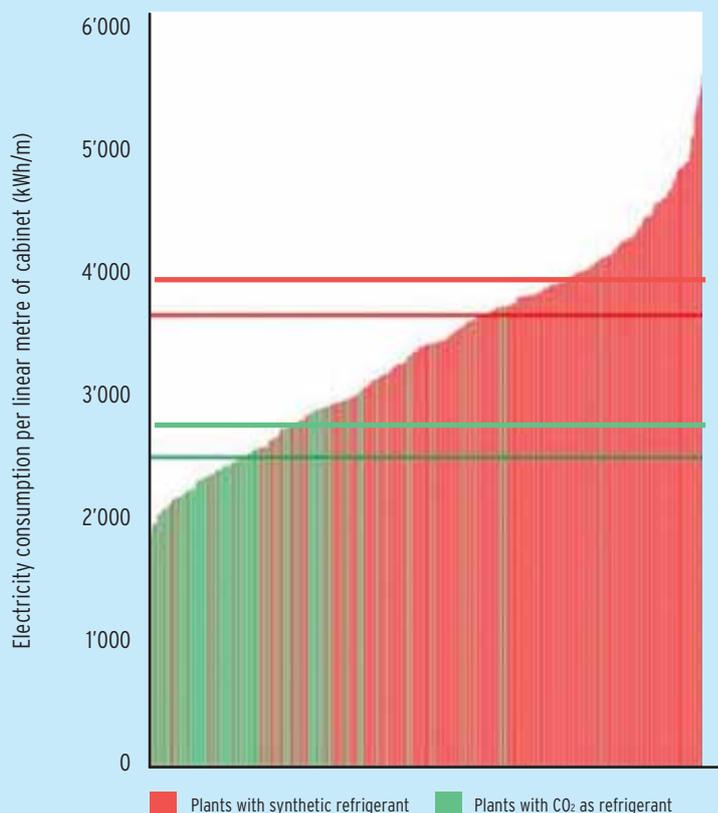
While it is true that penetration rates for small ammonia-based industrial systems remain low, some manufacturers are taking up the challenge. For example, Frigopol Kälteanlagen GmbH, based in Austria, has designed a bespoke small ammonia system for a biogas plant.²¹ A recent report by the Danish government also describes progress in developing cascade systems for industrial refrigeration applications, consisting of two stages: ammonia in the high temperature stage and CO₂ in the low temperature stage. This approach is in many cases more efficient and minimises the amount of ammonia in the system.²²

Transport refrigeration

The section on transport refrigeration similarly lacks detail, although there have been some clarifications since the initial draft. For instance, contrary to the draft report, there is an acknowledgment that some studies have demonstrated that overall energy consumption related to cryogenic systems is dramatically lower than systems currently in use. There is also new information about a Japanese manufacturer’s innovative ice slurry system. It would appear from the report that CO₂ systems are shaping up to be the most favourable option for transport refrigeration – the authors note that “In 2012, three manufacturers of transport refrigeration equipment exhibited concepts of trailer or vans refrigeration units with R-744 at a trade show” but go on to remark that “a detailed comparison with today’s equipment is yet to be seen”. Since

FIGURE 2: Energy efficiency comparison of HFC refrigerants versus CO₂ systems in Coop Schweiz stores, exhibiting an average energy saving for CO₂ systems of about 30%.

Source: Coop Schweiz





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publication of the report, major UK retailer Sainsbury's has announced that it is to trial the "world's first naturally refrigerated truck", which runs on Carrier Transicold's NaturaLINE CO₂ technology. The retailer estimates it could help it save over 70,000 tonnes of CO₂ compared to the current refrigerated trailer fleet, equivalent to taking over 34,000 cars off the road.²³

Air conditioning

Alternatives for the air conditioning sector receive more satisfactory analysis in the Task Force report. However, EIA is alarmed at the emphasis placed on the new refrigerant "blends" as potential substitutes for the chemicals which are currently in use. The GWP of these substances ranges from 290 at the "low" end to 1,410 at the higher end.²⁴ Focus should be on refrigerants that are truly low-GWP, given the sector represents such a large and rapidly growing share of global refrigerant consumption.

In Europe, several recent studies have identified technically feasible and safe alternatives already in use in the European Union.²⁵ The alternatives vary for each subsector, but mostly rely on natural refrigerants such as propane, isobutane, ammonia and carbon dioxide.²⁶

The Task Force report highlights the better energy performance of HC-290, with "numerous studies reporting changes, often improvements, in COP ranging from -2% to +16% with a midrange average improvement of +7% (without capacity reduction)". In fact, companies in several large emerging economies are investing heavily in

HC-290 technology as the alternative in the air conditioning sector. For example, China has committed to converting some 18 production lines from HCFC-22 to HC-290 by 2015.²⁷ Based on this initiative, supported by UNIDO and GIZ, the Deputy Manager at China's Ministry of Environmental Protection (MEP/FECO) in Beijing recently stated that "[HC-]290 will eventually be used in 70% of RAC production (annual capacity of 5 million HC AC units)."²⁸ In India, Godrej has developed and sold more than 25,000 hydrocarbon split air-conditioning units. Tests demonstrate comparable performance and capacity to R-22 units at high ambient temperatures.²⁹

CO₂ is also suitable for a range of applications across various AC subsectors but it does not receive much attention in the TEAP report. One striking example that could have been included is the project undertaken by a research team including representatives of the US Army and engineers from the Modine Manufacturing Company in the mid-2000s.³⁰ With a mandate to optimise the Army's Environment Control Units (ECUs), they developed an alternative CO₂ HVAC system for the Up Armored M1114 High Mobility Multi-purpose Wheeled Vehicle (HMMWV). Modine was also commissioned to retrofit the Army's current line of Environment Control Units (ECU) from HCFC-22 to CO₂.³¹ The technology, which went on to win a US Army Environmental Excellence Award, affords appreciable energy savings and is designed to operate in temperatures of up to 40°C.³²

ABOVE:

In September 2013, UK retailer Sainsbury's announced it is trialling the world's first naturally refrigerated trailer.



© frankbeat

Technical standards are highlighted as being a potential barrier to the use of certain refrigerants which are by far the best option from an environmental and energy efficiency perspective. For example, ammonia is cited time and again as affording excellent energy performance across multiple sub-sectors and at an extremely low cost (typically less than \$1/kg). Although there are barriers to its use, its properties are very well understood and there are multiple ways of addressing these obstacles. However, as the report notes, there are concerns surrounding possible changes to existing standards and regulations, e.g. in the case of positive displacement chillers,³³ despite the fact that the regulations “have been successfully in place for many years”.³⁴

Foams

Although the TEAP report neatly summarises several climate-friendly alternatives to HCFCs, and HFCs for use in blowing foam, especially low-GWP hydrocarbon (HC) alternatives and CO₂, it continues to overemphasize the emergence of unsaturated HFCs (HFOs) as necessary to replace many remaining HCFCs and saturated HFCs. The TEAP report considers that HFOs with improved thermal properties could not only replace blowing agents with high-GWPs such as HCFCs and saturated HFCs, but also replace some elements of the hydrocarbon and CO₂-blown sectors. This conclusion is contrary to the rapid and widespread market penetration of low-cost, low-GWP alternatives which have been adopted by Article 5 countries both during the CFC phase-out and in all of the Stage I HPMPs, and does not take into account the unknown but likely extremely high price of HFOs.

The TEAP report is supposed to provide the Parties with a technology neutral description of the available alternatives, their uses and the extent of their commercial use. Even the producers of HFO foam blowing agents concede that these products will only be used in specialty foam blowing operations where issues such as flammability or space limitations justify the cost. For the vast majority of foam blowing operations, cost-effectiveness and the availability of domestic supplies of natural foam blowing agents will favour continued transitions to these low-GWP alternatives. Hydrocarbons are being adopted by all Article 5 countries and are widely used in the EU and other developed countries and meet the most stringent energy efficiency standards.

Global HFC consumption in the building/construction foams sector was estimated to be approximately 38 million tonnes of CO₂e in 2010,³⁵ 98% of which is in developed countries. These countries should look at regulatory intervention to prevent continued use of HFCs in these sectors, given that Article 5 countries are successfully converting to low-GWP alternatives in the very same sectors.

FINANCING CLIMATE BENEFITS OF THE MONTREAL PROTOCOL

Terms of Reference for the Replenishment

At MOP 25, the terms of reference (TOR) for a TEAP study to evaluate the requirements for the 2015-2017 Replenishment will be finalised. Decision XIX/6(5) provides that the Parties:

“agree that the funding available through the Multilateral Fund for the Implementation of the Montreal Protocol in the upcoming replenishments shall be stable and sufficient to meet all agreed incremental costs to enable Article 5 Parties to comply with the accelerated phase-out schedule both for production and consumption sectors ...”

The negotiations for the last Replenishment were unnecessarily contentious. It is important for all Parties to remember that mechanisms were incorporated into the Montreal Protocol to provide the financial resources necessary for developing nations to meet their obligations. The dominant financial mechanism is the Multilateral Fund (MLF), which is designed to cover incremental costs incurred by developing countries as a result of the ODS phase-out. The MLF

has played a pivotal role in the successful phase-out of ODS, by facilitating the transfer of technology and supporting capacity building.

Both Article 2 and Article 5 countries have an interest in the MLF continuing to perform the role it was set up to undertake. It has been central to the universal ratification of the Montreal Protocol and the timely and cost-effective phase-out of all CFCs and halons by December 31, 2010 and implementation of the current accelerated phase-out of HCFCs. Article 5 Parties have a right to expect sufficient funds to pay the incremental costs of implementing the HCFC phase-out and Article 2 countries have the right to expect only to pay for transitions deemed to be cost-effective on an ODP basis, plus the agreed 25% climate benefit for transitions that go directly from HCFCs to low-GWP alternatives. Parties should request that the TEAP prepare a balanced range of scenarios for the amount needed for the next triennium. As the majority of countries will be implementing their Stage I HPMPs and an agreement for funding China's production sector phase-out has been reached, there should be substantially less uncertainty in the TEAP report concerning the next Replenishment than there was in the last.

The timing of this Replenishment is significant, given that it is being negotiated contemporaneously with the HFC amendment proposals. Article 2 countries have to recognise that sufficient funding for the accelerated phase-out is required if Article 5 Parties are to trust that there will be adequate funding for an HFC agreement. Parties should also recognise the close synergies between the HCFC phase-out and the HFC phase-down, and the fact that funding to maximise direct transitions from HCFCs to low-GWP alternatives in A5 countries will substantially reduce costs of an HFC phase-down. In this regard, we urge Parties to support Draft Decision XXV/[C] which requests the Executive Committee of the MLF to consider the cost implications of avoiding, to the extent possible, transition to high-GWP alternatives in stage II HCFC phase-out management plans.

MLF Funding Issues

EIA urges the Parties to adopt a Decision along the lines of Decision XXI/9(7) which urges the ExCom to promptly negotiate Stage II guidelines and continue to prioritise substitutes and alternatives that minimise impacts on the climate, taking into account GWP, energy use and other relevant

factors. At a minimum this should include the continuation, potentially with refinements such as more flexibility for small and medium-sized enterprises (SMEs), of the 25% climate benefit for direct transitions to low-GWP alternatives. As part of this process, the ExCom should evaluate how the 25% climate incentive has worked and whether any modifications would make it more effective. In accordance with decision XIX/6, the ExCom opened up a limited tranche to fund pilot projects to prove low-GWP alternatives to HCFCs in sectors and regions where alternatives have not been proven or commercialised. As more countries contemplate conversions in the RAC sector, the Parties should authorise the ExCom to fund further demonstration and pilot projects focused on the effectiveness of low-GWP alternatives to HCFCs in the air-conditioning and refrigeration sectors in high ambient Article 5 countries. The rapid pace of change in the alternatives industry means it is hard to keep track of developments; the characteristics of new alternative technologies, including details on energy efficiency need to be established to give countries the confidence to transition to these alternatives and to be willing to fund these new technologies. Given the requirement to reduce HFC emissions globally, these demonstration and pilot projects will benefit both Article 2 and 5 countries.

Climate Fund to Maximise Transitions to Low-GWP Alternatives during the HCFC Phase-out

As A5 Parties tackle the HCFC phase-out in the refrigeration and air conditioning sectors, the incremental costs of transitioning to low-GWP alternatives will potentially rise. According to the current funding guidelines, A5 countries can apply for the incremental costs of transitions on an ODP basis, and if the transition is directly from HCFCs to low-GWP alternatives they receive an additional 25% climate benefit. If this funding is insufficient, countries face the choice of providing co-financing (e.g. from industry, government or other stakeholders) or transitioning to high-GWP alternatives. In the recent evaluation of the Stage I HPMPs, the Secretariat found that co-financing from third parties was rarely available. A Climate Fund under the MLF would allow donations to effectuate these transitions without countries having to incur the administrative burden, cost and time delays related to implementing a bilateral financing arrangement. Rather, the MLF would control the spending of the Climate Fund and the projects would be facilitated by the



“A one-year pilot and subsequent TEAP evaluation would give Parties confidence to initiate a Climate Fund with swift feedback on its effectiveness.”

implementing agencies as a single project. This process will encourage donors to help maximise the climate benefits of the HCFC phase-out as they will get the benefit of the MLF’s vast experience with funding phase-out projects, without incurring undue administrative costs.

While it is understandable that all Parties are cautious of creating a new financial mechanism under the Montreal Protocol, a one-year pilot and subsequent TEAP evaluation would give Parties confidence to initiate a Climate Fund with swift feedback on its effectiveness. EIA urges the Parties to set aside their differences and adopt a simply-worded Decision authorising a Climate Fund and instructing the ExCom to operationalise it in accordance with some basic principles, including:

- Money from the Climate Fund would primarily be used to maximise transitions from HCFCs to low-GWP alternatives based on a climate cost-effectiveness analysis including both direct (GWP) and indirect (energy efficiency) emission reductions, where funding above the threshold according to the funding guidelines (which already includes the 25% climate incentive) is required;
- The Climate Fund could be used to fund ODS destruction projects (for ODS that are already banned) and for demonstration and pilot projects for low-GWP alternatives to HCFCs in RAC sectors where low-GWP alternatives have not yet been proven or commercialised;
- Donors could specify the type of project (low-GWP transitions or ODS destruction or demonstration/pilot projects to prove low-GWP alternatives) with all remaining decisions made by ExCom;
- The existence of the Climate Fund would not impact in any way on the Replenishment;
- The Climate Fund would be set up as a one-year pilot project, and its effectiveness subsequently evaluated by the TEAP.
- With the approval of the ExCom the Climate Fund could also finance destruction of banned ODS and demonstration or pilot projects for alternatives to HCFCs in sectors where low-GWP alternatives have not been proven and/or commercialised.

ILLEGAL AND COUNTERFEIT TRADE IN ODS AND HCFC

Parties must prepare for a resurgence in illegal ODS trade

Following a 2013 freeze in HCFC consumption in Article 5 countries and further deep cuts in developed country consumption, incidences of HCFC refrigerant and equipment seizures are on the rise. Table 1 documents just a fraction of the recent cases. The large Spanish seizures are note-worthy as they are reminiscent of the illegal CFC trade in Europe which began in Spain in the late nineties; the high number of arrests suggests that illegal trade was prevalent. The Serbian seizure is also interesting as it demonstrates the vulnerability of Europe’s eastern land borders to smuggling from non-EU countries with less stringent HCFC restrictions. Illegal importation of HCFCs into the US remains a problem with Florida being a target for many smugglers. The most recent case, documented in Table 1, relates to the illegal sale of over 65 tonnes of HCFC-22. In 2012 five other HCFC-22 smuggling cases led to prosecutions in the US.

Based on recent seizures, it seems clear that refrigerant smugglers still prefer the use of disposable cylinders, most likely due to the fact they cannot be traced. Therefore removing them from the market would make illegal trade in HCFCs much more difficult. Banning their use is an unpopular policy option in Article 5 countries, perhaps due to some of the challenges involved for businesses in acquiring fleets of refillable cylinders. However there are business advantages associated with using refillable containers, primarily that it creates customer loyalty while initial costs can be recouped through deposits or rental fees. Governments could also consider issuing loans to cover the initial capital costs involved.

Although the Montreal Protocol does not regulate trade in ODS-containing equipment, allowing imports of HCFC-based equipment into a country can be problematic as it increases the bank of equipment and thus demand from the servicing sector. This in turn reduces a country’s capacity to reduce demand for HCFCs to meet phase-out requirements and thereby increases the risk of illegal trade in HCFCs. In recognition of this problem an increasing number of countries are controlling trade in HCFC-based equipment. However as the recent



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TABLE 1: RECENT ODS SEIZURES

Country	Date	Substances traded	Exporting country	Details
Novorossiysk, Russia	August 2013	A/C systems containing HCFC-22	China	130 A/C R-22 split systems, valued at around £28,000, were packaged and mislabelled as being R410A units. ³⁶
Tuticorin Port, India	August 2013	HCFC-22	Dubai	1,305 cylinders of unlicensed HCFC-22, estimated to be more than Rs.35 lakh in the international market, were found concealed behind cartons of fresh oranges. ³⁷
Hamburg, Germany	February 2013	CFC containing refrigerators		A police raid discovered 43 CFC-containing fridges, some of which had been mislabelled as containing R-600a, a hydrocarbon. ³⁸
Serbian-Bulgarian border, Serbia	July 2013	HCFC-22	Bulgaria	Serbian customs stopped a truck at border coming from Bulgaria destined for Italy. Inspections revealed 10 cylinders with white "R134" over original R-22 labels amongst a larger batch of R-134a cylinders. Testing of the cylinders confirmed that they contained HCFC-22. ³⁹
Gran Canaria, Tenerife, and Zaragoza, Spain	Throughout 2012	HCFC-22	China	97 people were arrested and charged with involvement in the illegal trade of more than 150 tonnes of R22 refrigerant. Investigators stated that a number of companies were supplying R22 to the Russian and Lithuanian fishing fleet. Some refrigerant was also suspected of being acquired for land-based refrigeration systems. The illegal activities are estimated to have netted in excess of Euro 4m per year. ⁴⁰
United States	March 2013	HCFC-22	Various	FSD Group, LLC, which also operates under the name Saez Distributors, pled guilty for knowingly receiving, buying, selling and facilitating the transportation, concealment, and sale of approximately 65,592 kg of HCFC-22 which had been illegally smuggled into the United States contrary to the Clean Air Act. ⁴¹

**ABOVE:**

About 5% of the 1.3 million reefer units in use worldwide contain counterfeit gas, amounting to about 65,000 shipping containers.

seizure of HCFC air-conditioning systems in Russia revealed, smugglers may also mis-declare HCFC-based equipment as HFC-based and therefore Parties should consider ways of monitoring and controlling trade in HFC-based equipment.

Whilst HCFC seizures are on the rise, a significant amount of illegal trade is prevented through the increasingly effective informal Prior Informed Consent (iPIC) procedure, now being used by many Parties. In order for licensing systems to work efficiently, prior to issuing a company with a licence for export, custom officers or NOUs from the exporting country should verify that the exporter is within its quota and that the importer is licensed. Since 2012 a new online system provides participating countries with real-time access to licensing system data making the procedure much more practical. 2012 had the highest number of queries to date; of the reported 138 cases, over 30% were rejected preventing trade in almost 1,000 metric tonnes of ODS.⁴²

Counterfeits and contamination

Following a series of fatal explosions on ship reefers in Brazil and Vietnam, and a non-fatal incident in China during 2011, the issue of counterfeit and contaminated refrigerants is attracting renewed interest. Investigations suggested the explosions were caused by the use of counterfeit refrigerants contaminated with R-40. R-40, also called methyl chloride or chloromethane, is an industrial feedstock; however it is both toxic and highly flammable. It has very similar cooling properties to HFC-134a, but costs just US\$0.50 per kilo to produce. As a result some unscrupulous traders looking for quick profits have been mislabelling refrigerants contaminated with R-40 as R-134a.

It is estimated that about 5% of the 1.3 million reefer units in use worldwide contain counterfeit gas, amounting to about 65,000 shipping containers.⁴³ It is likely a global problem, but there

do appear to be localised hot spots. Mark Bennett of the Container Owners Association has said "South America remains one area where it is likely counterfeit refrigerants are being used as are Africa and South East Asia."⁴⁴

Whilst the shipping industry has been the focus of media attention, given the high charges used and catastrophic results, it is likely that R-40 contamination is leading to accidents in other sectors such as mobile air-conditioning. For example, in 2010 an air-conditioning unit in a bus in Athens exploded due to suspected R-40 contamination.⁴⁵ Another common strategy used by fraudsters is to sell refrigerant mixes recovered from old machinery as R-134a. Testing of a recent seizure in Poland revealed cylinders containing a cocktail of CFCs, HCFCs and HFCs.⁴⁶

The problem of counterfeit refrigerant use appears to be more widespread in countries with high demand for air-conditioning. For many years the Middle East has been a target; in February 2013 authorities in Saudi Arabia seized nearly 3,500 cylinders of counterfeit R-134a arriving from China.⁴⁷

As HCFCs are phased out and market prices for legitimate refrigerants increase, it is expected that the problem of counterfeit refrigerants will increase. Global trade in HFCs is currently unlicensed, allowing vast amounts of counterfeit HFC-134a to be traded throughout the world.

Few Article 5 countries currently incorporate, or plan to incorporate, HFCs into licensing systems. This is primarily because HFCs are not controlled substances under the Montreal Protocol. By including HFCs in licensing systems and iPIC procedures it may be possible to reduce the prevalence of counterfeit R-134a and improve traceability of chemicals, assisting customs and other enforcement agencies to prevent counterfeit trade.

RECOMMENDATION:

- Extend licensing system to cover HFCs and HFC-containing mixtures
- Ban use of disposable cylinders
- Trade in HCFC and HFC containing equipment should be licenced
- All Parties to the Montreal Protocol should participate in the iPIC system.

" Whilst the shipping industry has been the focus of media attention, it is likely that R-40 contamination is leading to accidents in other sectors."

CONCLUSIONS

We currently stand at a crossroads in the hitherto distinguished history of the ozone regime. In one direction lies the pragmatic recognition that a new commitment to protect the climate through action to address HFCs is part and parcel of the Montreal Protocol's obligations. In the other direction lies international stalemate that would spell disaster for the planet. We owe it to ourselves, but mainly to the next generations, to take immediate and collective action to eliminate HFCs. Put simply, there is no valid reason why we cannot act now to arrest the growth of a family of highly destructive greenhouse gases - for which there are ample suitable alternatives - before it is too late.

What the Montreal Protocol has achieved is truly staggering. Without it, ozone depletion would have risen to around 50 per cent in the northern hemisphere and 70 per cent in the southern mid-latitudes by 2050. This would have resulted in twice as much UVB reaching the Earth in the northern mid-latitudes and four times as much in the south. The implications of this are severe: 19 million more cases of non melanoma cancer, 1.5 million cases of melanoma cancer, and 130 million more cases of eye cataracts.⁴⁸ Instead, 26 years down the line, atmospheric and stratospheric levels of key ozone depleting substances are going down, and it is believed that with full implementation of all of the provisions of the Protocol, the ozone layer should return to pre-1986 levels by the end of the century. Since ozone depleting substances are also powerful greenhouse gases, the Protocol has also prevented over 200 billion tonnes of carbon dioxide-equivalent from ending up in the atmosphere; around four years' worth of current global emissions.

The Montreal Protocol has a proven track record of facing even bigger challenges than those presented by a global phase-down of HFCs.

Global leaders have acknowledged that any real prospect for arresting climate change will require the use of all available international resources and mechanisms. In order to achieve a swift resolution, Parties should agree a number of steps at this 25th Meeting of the Parties:

1. Form a contact group to swiftly negotiate the terms of the HFC Amendment and related issues;
2. Send fair and balanced terms of reference (TOR) to the TEAP for the next Replenishment;
3. Create a Climate Fund to maximise transitions directly from HCFCs to low-GWP alternatives, fund demonstration and pilot projects for alternative technologies where they are lacking (e.g. in high ambient climates) and destruction of ODS banks;
4. Instruct the TEAP to continue updating information on alternatives to HCFCs to capture the rapid development and commercialisation of alternatives taking place;
5. Send a clear signal to the world that the Montreal Protocol will swiftly act to address the HFC problem it has unwittingly created with a phase down of the production and consumption of HFCs.

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ENVIRONMENTAL INVESTIGATION AGENCY (EIA)

EIA - LONDON

62/63 Upper Street

London N1 0NY, 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